

Volume 2  
Issue 1  
Academic Year  
2016-17



# ABHIVARG



# DEPARTMENT VISION & MISSION

## VISION

The department of Electronics and Telecommunication engineering envisions developing internationally competent professions with a sense of responsibility and social sensitivity

## MISSION

To impart professional education endowed with human values using active learning techniques, to transform the students to be competent and committed engineers meeting the current and future demands and capable of providing engineering solutions with social sensitivity

# DEAN'S MESSAGE



*Dr. Lochan Jolly  
Professor & Dean  
(Student & staff  
welfare)*

Hello friends,

Today I would just like to share a story of one of you who did a marvelous job and today I am proud of him. His name is Vicky Gupta of SE Civil.

I am sharing this story because I had seen many of you pampering the puppies near the canteen feeding them biscuits and milk. So I thought this story is going to touch many of the animal lovers in our campus.

On 4th October 2016 I received a call from the NGO Dhayan Foundation, who works for animal welfare. They informed me that the animal welfare ambulance is on its way to Thakur College. They received a call from one of our students informing them about a dog in campus. They were informed that dog's foreleg is broken and he needed help, as it was raining heavily.

I was so surprised and also happy to know that at least we had created awareness amongst our students about how they can help animals, through the seminar we conducted on 23rd September 2016 on animal welfare. In the seminar they were shown the cruelties that are happening with animals and how they can help them by just giving a call to that NGO, who is well connected with all animal lovers. These animal lovers understand the need of having an ecological balance where human beings and animals should live together respecting each other's importance in nature leaving behind

their greed.

Around 5.30pm the ambulance arrived in the campus they searched for dog as they were sent the photograph of the dog by our student. They tried to catch the dog but the dog was in so much pain and hunger that it was becoming violent and tried to bite them. They went back and next day with dog trap still they could not catch him. On 7th October they came with some sedative injections and could manage to take the dog.

Now when I tell you this story, that dog in the hospital and his treatment is going on and he is fine. He will soon come back to campus when he recovers.

This is a small story of a step taken by one of you to save a life. It is one of you who understood the pain of an animal and tried to provide help when it was really needed.

I hope all of you will also do at least one such good deed each semester so that when you grow up you also have lot of stories of your good deeds to share with your friends and family.

Just one last word, God has given enough for each one of us on the earth to satisfy our needs but not our greed. This greed has made us selfish and self centered that we hurt everyone around without understanding that every action has an equal and opposite reaction. Today if we harm animals and destroy their habitat it will come in area where human settlements are there and harm us.

Think it over and stay blessed.



Dog hiding in bushes when it was hurt



Dog in the ambulance



Ambulance taking the dog

# HOD'S MESSAGE



*Dr. Vinitkumar  
Dongre  
Associate Professor  
HOD EXTC*

It gives me immense pleasure to inform that this is the third issue of Abhivarg, the Electronics & Telecommunication Department magazine of TCET. I would like to congratulate everyone involved in the making and the release of this issue. It is due to the large amount of efforts put in by the students and teachers of the Editorial Committee, as well as the active inputs received in the form of articles, that has helped Abhivarg grow so much in popularity since its inaugural issue last year.

As said by Sophocles, "Always desire to learn something useful". It is this desire that helps one succeed in life. This magazine tries to inculcate the habit of reading in students and to provide them with information on the various latest technologies in the field of Electronics and Telecommunication, as this is very much essential to survive in today's highly competitive world.

In this issue we have included articles from industry experts, who have thrown light on making a good career in telecommunication industry and also on becoming an entrepreneur. Our alumni have also taken fine steps in extending the efforts of our students in making this magazine a worth exist.

Abhivarg is surely going to be a must read for all the technical minds out there. I sincerely hope that every forthcoming issue of this magazine continues to inspire more and more students and power them to achieve their dreams.

# FACULTY INCHARGE



*Mrs. Megha Gupta  
Assistant Professor*

Hello Friends,

DYNAMIC EXTC has outperformed in final year results this time.

It's a continuous effort of students and faculty as a team.

Here in ABHIVARG as well, our team is continuously working for the up gradation of content and procedure, for benefit of students. In this issue we have tried our best to bring the industry experts, professors and your own alumni to guide you for your future. They have also tried to give you the best of their knowledge in their fields.

Some of your friends have also contributed in the way they can, so you should encourage them and next time you should be the one to be a part of this magazine. ABHIVARG is giving you a platform to showcase your technical knowledge. So be a part of it, and gain the benefits provided.

# CREDITS



## **FACULTY IN-CHARGE:**

**DR. VINITKUMAR DONGRE**  
HOD (EXTC)

**MRS. MEGHA GUPTA - A.P. (EXTC)**

**MRS. ANVITA BIRJE - A.P. (EXTC)**

## **COVER PAGE AND INSIDE PAGE DESIGNING (HEADS):**

**PRATIK JAIN -TE A**  
**CHINMAY TOMPE-SE B**

## **EDITORIAL COMMITTEE:**

**ASHISH RAWAT- BE B**

**ARSHDEEPAUR SOOD-BE B**

**DHRUV BAL - TE A (HEAD)**

**NIKITA KHATIYA- TE A**

**RATAN GUPTA-TE A**

**VIVEK RAI- TE A**

**PRIYANKA DUBEY-TE A**

**VAISHNAVEE RATHOD- TE B**

**SATYAM SINGH -TE B**



# INDEX

ADVICE FROM INDUSTRY.....	1
ALUMNI'S BATON.....	11
TEACHERS' WISDOM...	18
STUDENTS' CONTRIBUTION.....	32
EVENTS.....	52
DEPARTMENT TOPPERS.....	69
CODE OF ETHICS.....	71



# ADVICE FROM INDUSTRY

# Interview : Vikrant Sankhe



Vikrant Sankhe (C Eng, Fellow IET)

Designation- Thought Leader | Evangelist - Analytics, IoT, M2M | Technology & Business Executive | Mentor, IBM India Pvt. Ltd.

He is multifaceted leader with over 18 years of Industry experience around Automation, M2M / IoT and Analytics, having worked on diverse roles across the value chain including Engineering, Consulting, Project Management, Sales, New Business Development and Business Management.

Good understanding of Electric Utilities, Oil & Gas and Telecom Industry.

'IoT Thought Leader' recognized by IoT India Congress

Fellow of The Institution of Engineering & Technology, UK

Engineering Council of UK certified 'Chartered Engineer'

Under Graduation & Graduation in Electronics Engineering and Post Graduation in Business Management.

We at Thakur College of Engineering & Technology, were fortunate enough to have with us Mr. Vikrant Sankhe. So we made his presence valuable for our students, by seeking his guidance for a better future. Here are some instances of the same:

**Q.** Could you tell us a little about your journey after Graduation?

**A.** I gained my first Industrial Experience at Tata Power. I then worked for ABB, Siemens and am now with IBM. I have over 18 years of Industry experience and have worked on diverse roles across the value chain including Engineering, Consulting, Project Management, Sales, New Business Development and Business Management.

My advice is that one should move across different functions of the Industry, so that he/she can learn about the value chain of the Industry. For example, if I learn only about the Sales side of the business and not about the Technology then I will not be able to sell the product as efficiently as the person who knows about both.

**Q.** What was your "best time" while working in the Industry in your area of interest?

**A.** There is no particular time that I can categorize as the "best time". I have always believed in life-long learning and I am following that belief. I initially started learning automation which had more influence of my Core Branch

**A.** There is no particular time that I can categorize as the “best time”. I have always believed in life-long learning and I am following that belief. I initially started learning automation which had more influence of my Core Branch. As I moved into IT, I have realized that it is an entirely new world. Every company and every year has taught me something new. I can therefore say that my entire journey can be called as my “best time”.

**Q.** What different job aspects can an EXTC student look at in their core branch?

**A.** People today are just fascinated with IT Industry, but unless and until you know the core Industry, you can not specify use of IT for that Industry. Unless and until I understand the Industry Perspective or understand the core stuff, I won't be able to justify application of IT in that Industry. EXTC students also need to focus more on core industry or core domain. If they are from Electronics and telecommunication, they should start focusing on various industries where Electronics, Automation and Telecommunication are used. IT is natural extension to all these. The main aim is to gain knowledge of your Core Industry and then use that knowledge in the IT Industry to solve their problems in an innovative and an efficient way.

**Q.** Could you suggest some courses, for the students, to bridge the gap between EXTC and IT Industry?

**A.** What they can do apart from their normal curriculum is get into short courses on analytics, where they will be learning on solving the problems from available information. From this they will learn how gain insights from the information to solve problems innovatively.

Generally, EXTC students won't get into IT in detail during their engineering. But what I suggest is that if they can learn Analytics it will be very beneficial for them. Analytics play a major role in IT Industry as they help us to analyze huge amounts of data in simple but efficient ways. There are short courses which they can look into from a Big Data & Analytics perspective. This will make them familiarize with current trends in IT Industry.

**Q.** Could you suggest some projects for students related to IOT?

**A.** I will suggest students to look around for the problems related to our society and how technology like IoT can solve them efficiently. Examples could be Water Automation for Buildings, Smart Premises, Smart Safety, Smart Farming etc. So let them identify problem area and then come up with Smart solution for solving the same, rather than deciding upon a project and then find out what problem it is going to solve.

**Q.** Anything more for students? As this is completely student centric.

**A.** Apart from curriculum, they need to go through different technical & business magazines available. Google is always available as widely used resource. Find out what is happening around the world and how they can use their learning to solve the problems in the society. They need to keep pace with what is happening around the world and not getting stuck with their curriculum. Students can also become part of Professional Organizations like IET, IEEE, ISA; CS etc. wherein they get chance to interact with experts across the globe. While initiating events for these organizations in the college, we can teach them the management aspect as well.

# Interview : Mr. Amit Deshpande



Amit is the Co-Founder at Minio. Prior to starting Minio, Amit was a part of a 7 year old core team at Experience Commerce (EC) - India's leading Digital Agency.

At EC Amit was the lead architect behind many award winning consumer campaigns, products and services for reputed global brands. Before EC, Amit worked as Lead Technologist on projects in UK and India at Rave Technologies and Zycus Inc.

**Q.** According to you what is a start-up?

**A.** A startup is a lean, fast paced environment where a business idea is turned into a product, assumptions are validated with users, the products are tested and tuned until it fulfills requirements of a segment of users and then it is turned into a viable business.

**Q.** How do you advice our students to go about start-ups

**A.** I would advise students to take up internships at startups to understand the work culture of startups and to learn from the experience.

**Q.** Do our students have any opportunity to work with you?

**A.** Right now it's a very small team we have; we would have opportunities in the future when we expand our company.

**Q.** How did you think of a start-up?

**A.** I always have tried new technologies and ideas for a start-up. My colleague and I stumbled upon an idea enabled by upcoming technologies and we thought about turn-

ing that idea into a product - so we formed a company (our startup).

**Q.** What would say about experience till now?

**A.** My startup experience has been great. There are ups and downs in a start-up. There are things to learn and figure by yourself as mostly you are working on new product and technologies, help for which is not easily available. There is a lot of joy in creating something new but along with it comes endless hours of work and patience taken to finish your product.

**Q.** How does one get sponsored for a start up?

**A.** We put in our own savings in our start-up when we began. When you have a prototype for your idea you can get funded by Investors. When you have a few users and need funds for Manufacturing/Development or Marketing there are Venture Capitalists (VCs) who would invest in your company. All Investments come at the cost of liquidating your equity (share) in your company.



# Interview : Dr. Saurabh Mehta



Dr. Saurabh Mehta  
Start Founder of  
Sun Wireless Technologies

Dr. Saurabh is a member of many international and national professional organizations including fellowship of IETE, Senior Life Members of CSI, Senior Member of IACSIT Singapore, life members of ISTE to name a few. His research interests are in the area of Wireless Networks, RFID Technology, Ubiquitous Computing, Game Theory, and Educational Technology.

Dr. Saurabh manages “Sun Wireless Technologies”, a consultancy firm in the area of embedded System, wireless technology, education, and technical market research. Beside technology he loves to spend his time in watching movies, reading books and educating people about HAM Radio.

We are fortunate enough to receive knowledge rays from Dr. Saurabh Mehta.

**Q.** Could you tell us a little about your journey, starting from your Bachelor’s degree to your present status?

**A.** My journey began long back. Even during my school days I was very clear that I wanted to be an Engineer. I switched to a Technical school after 7th std where I learnt Electrical Engineering Machine Drawing. I was much

focused and I wanted to do Diploma, hence I joined Vivekananda Polytechnic. I completed my Bachelor’s degree from Saboo Siddik College of Engineering. I then joined a company where I worked as an After Sales Engineer and I was looking for UPS and Battery Monitoring System. I then got a chance to complete my M.S. in Electronics Engineering from Ajou University, Korea. The University was initially funded by DOW. I received a scholarship from DOW as well as the Korean Government. I completed my M.S. by research. I then worked at different labs in different countries like Switzerland, Italy and Netherlands in the field of Wireless sensors area. I then completed my PhD in Wireless Communication from Inha University, Korea. I started my PhD work in 2007 and completed it in 2011. I wanted to enter the teaching field in the later part of my life after working in an industry and starting my own consultancy company. However I could not find any funding for my ideas when I returned to India and hence started looking for teaching assignments. I started Sun Wireless Technologies-a consultancy firm in the area of wireless technologies, embedded systems, education and technical market research

while I was completing my PhD since 2008. I then joined Vidyalankar Institute of Technology in 2011 and I was also a visiting faculty for Terna College of Engineering and Pandharpur College of Engineering. From 2010 the company has started working on projects are related with Inventory Control and Battery Monitoring System. I have dedicated my last 2 years to make education more accessible and interesting for the students, and my research is hence moving in that direction as it has vast opportunities. Recently we have gone through the NBA (National Board of Accreditation) process which has given me an insight into the education field. Without making policy changes and some curriculum changes, it is difficult to attract students towards Engineering.

**Q.** Do you have any assistant with you for your consultancy company?

**A.** We have a few students that have joined us which have completed their graduation. The students gain immense knowledge by participating in our project. They get Hands-On experience which helps them bridge the gap between their curriculum and the Industry standards. I encourage students to work with start-ups as they gain a lot of knowledge although their pay is lesser compared to the other companies in their Third or Fourth year. As this reflects in their Resume, they have better opportunities during their placements or even for higher studies. My current team is of 4 students, which I am looking to expand, as I am starting projects in IOT.

**Q.** What is a Technical School?

**A.** Technical School is like a normal school but we have to take 2 or 3 more technical subjects. Nowadays there aren't a lot of tech-

nical schools. 15% of Diploma seats were reserved for Technical School.

**Q.** How did you get scholarships to the Korean Universities?

**A.** I gave a Test organized by the University from where I completed my M.S. After an Interview round I got full scholarship for my tuition fees to complete my M.S. from the University. After 2 months I wrote a proposal to the Korean Government for another scholarship which I was successful in securing. I was also involved in some projects from the industry which acquired me some stipend.

**Q.** How can IOT help in teaching?

**A.** Through IOT one can teach several subjects to the students. For example, how one can interface hardware and software, using microcontrollers, microprocessors and cloud computing. Instead of giving them traditional experiments, one can give the students a problem statement. So, during an entire semester, by doing 10 small experiments the students can find a solution to the problem statement. This helps the students to learn various things by themselves.

**Q.** What kind of projects can we expect from our undergraduate students in IOT?

**A.** Any projects related to Data Acquisition System (DAS or DAQ) or automation or Monitoring. For example, I am starting a Virtual Lab in my college, as students get less time in labs due to travelling restrictions, where they can physically gain access to various kits and perform experiments. This project is taken up by my students.



# Interview : Anuj Ashokan



Mr. Anuj Ashokan  
Lead IoT Solutions Tata Teleservices  
Ltd  
Chair IoT – WG TSDSI,  
IoT Panel Member IET, India.  
Chair M2M Automobile WG, TEC-  
DoT India

**Q.** How would describe your career's journey?

**A.** After graduation I worked for 2 years in an IT company, earlier I Did my MBA from SITM. After MBA I joined VIRGIN MOBILES as MANAGEMENT TRAINING and I worked there for two years and then virgin mobiles got merged with TATA TELESERVICES and Since I have been working with TTSL I have been focusing on IoT technology.

**Q.** What is your role as a member of IET IOT panel?

**A.** As part of IET IoT Panel I work as part of Legal and regulatory team, as I am affiliated to TSDSI the body which works on creating Standards.

I am part of technology team, and I help business team in building the IoT ecosystem, also work along with various partners of IoT value chain. Also I represent TTL in various

industry forums. I have been leading many GoI initiatives on IoT. I am Current Chair of IoT WG of TSDSI (Telecommunication Standards development Society of India) I also Chair Automobile Work group (Telecommunication Engineering Centre, DOT)

**Q.** What do you feel about IOT and its future?

**A.** IoT is the most spoken about topic in industry and is the next evolution of technology. I am sure who all will invest time in working for this technology will have long term dividend.

**Q.** What are your views on start-up?

**A.** First of all what you can do is ask them to focus on that area where they can maximize their return on the efforts they will put in , usually when a startup starts they will first initially focus on something which is commonly spoken about like automobile, I have seen many startup coming and working on



automobile industry, but the thing is that it is already a saturated market so what we can do is-we can give startups guidance about where they have to focus, so that they can start-off right

Startups should always dream big. Certainly it's possibly now and we have many examples of what digital disruption can do. Largest retailer doesn't own a warehouse. Largest Travel Company doesn't own fleets. Largest hospitality provider doesn't have a property. We can see digital disruption all over. And startups should always try to become threat to the biggest player in the market. That's how they can establish themselves.

Probably from government also we need a cell, or organization which focuses on guiding on startups. I think that place is missing. Probably we need to take that step. Still from Modi government we are getting certain things right now as of now.....

So they are focusing, they know the problem, because without startups you cannot have so many so many jobs created for accommodating the huge working population.

**Q.** What would you say about funds that startups require?

**A.** There was never a better time for startups that are innovative and disruptive. Many venture capitalists are exploring initiatives from startups to fund them. In my presentation I have shown some of the funds which are committed by huge VCs. DoT DEITY also doing a lot of work for nurturing startups.

**Q.** What are the prospects for students in IOT?

**A.** In countries like US 80% of ideas come

from academic projects (Goggles was an academic level project which got converted into a tech giant), so projects taken up at academia should be done considering that we have to make this idea convert into a working project which will make some change in the society.

So I think, if somebody is asking me this question...some startup..I would request them to study Indian ecosystem, we have very diverse ecosystem. And this is the similarity between IoT and India.... both are extremely diverse. So we should focus on creating something which is unique for our ecosystem. India is a big market and if we can create something for this ecosystem can certainly be able to be expanded to other geography.

Being telecom experts the young technocrats should put efforts in studying technology evolution like LoRa, SIGFOX and work towards creating something similar for Indian ecosystem.

**Q.** What exactly is LORA and SIGFOX?

**A.** Like 4G, here if your mobile is connected to 4G it gives high bandwidth and low latency, but the fan which is connected does not need that much bandwidth.. That's not going to be used... Its small bandwidth is needed to control it. So LoRa is a technology similar to LTE created for small packets, long battery life, and long distances, so it is similar to LTE but specifically for optimized for IoT use cases. So, similarly if somebody creates it for Indian environment, government is waiting, everybody is waiting for somebody who can do this. There is a big market, India is a huge market.. somebody needs to come and tap it.. So you have entrepreneurs in this?

# Industrie 4.0- The Era of Connected Manufacturing



Mr. Jatin Panchal  
Business Development Manager at L&T Technology  
An Expert in Internet of Things and  
Engineering Analytics.

The manufacturing industry has been a forerunner in adopting new processes and technologies – right from Kaizen, JIT, and lean principles to robotic automation which have now become the essence of each and every manufacturing organization. One of the key elements in long-term sustainability of manufacturing companies is continuous improvement, which has given rise to the new era of manufacturing, i.e., Industrie 4.0.

Traditionally, the manufacturing and process industry has been too dependent on the knowledge base of a few process domain experts or maintenance managers, who carry a deep and crucial understanding of assets and their performance. Even after technological advancements, there is a huge dependency on knowledge base of domain experts. Apart from business intelligence, forecasting, optimization and other areas, BIG data analytics in manufacturing is focusing more towards eliminating such dependencies and creating robust self-learning systems that help to make flawless decisions. These demands for knowledge encapsulation of rich experienced workforce that can be modeled to further automate the decision-making process.

Industrie 4.0 or Connected manufacturing calls for integration of cyber physical systems (currently working in silos) to form an enterprise where data acts as a cohesion force between processes to bring about process optimization, thereby maximizing throughput. Today, data generated from these systems are analyzed independently to realize insights from a particular process or operation. BIG Data and Analytics will play a key role in integration of Information Technol-

ogy (IT) and Operational Technology (OT) systems thus bringing about the true value of Industrie 4.0.

L&T Technology Services' Engineering Analytics practice is focused on creating solutions that will help solve engineering problems with a justified data driven approach. With a strong domain expertise in multiple industry verticals, L&T Technology Services is steadily working towards developing solutions that will integrate IT & OT systems in the manufacturing environment, hence contributing to the Industrie 4.0 roadmap of customers. The solution offers multi-fold benefits.

1. The solutions are based on unsupervised machine learning that creates and stores data signatures and trains itself over the asset operating lifetime.
2. The insights generated from the solution are eventually used to achieve dynamic and automated work flow processes.

L&T Technology Services' Industry agnostic solutions like Predictive Asset Maintenance and Manufacturing Analytics are aimed towards achieving accuracy in asset failure predictions. The solution gives insights from shop floor to top floor, addressing the needs of all stakeholders, thus providing a holistic view of plant operations.



Today, the manufacturing operations including predictive maintenance activities are carried out in silos in enterprise servers, and predominantly focus on asset data (IT), with almost all ERP providers having their inbuilt BI that focuses on descriptive analytics. With a solution now focusing on data from sensors and machines (OT), the predictive maintenance is redefined and brings about more accuracy in the prediction. Combining the conventional predictive maintenance with CBM, the solution focuses on re-

al-time analytics and dynamic workflow giving rise to IT-OT integration.

I recall this statement from one of the TED Talk on Data Science, it says “Data is not the new Oil, but it is the new Soil”, I would further add to this saying “Data is the new soil, if harvested decently can reap outcomes that will answer industry’s toughest questions”.



# ALUMNI'S BATON





# COMMUNICATION ANALYTICS



Siddesh Muzumdar  
Stevens Institute of Technology  
Masters in information Systems

“What hath god wrought” Morse’s famous message was what launched our modern telecommunications. At a time when dots and dashes were thrust in one end of the line, and a logical thought came out the other; not even Morse could have possibly envisioned where those simple dots and dashes would take us. Telecommunications is a pretty hot topic considering the net neutrality debate that flooded Indian news outlets over the past few months. Knowing the fact that telecommunication providers have made a business out of information it does not leave one baffled that they plan on investing in qualitative data analysis programs. The value of data analytics to the telecom companies lies in the ability to show how their services are being used.

Increase in data analytics is an emerging trend in the telecom industry market. If the telecommunication companies can analyze and visualize the data that runs through their network, finding superior ways in the process to deliver better phone, internet and TV

provisions then who won't be game for such a change? According to recent report by “Global Big Data Analytics Market in Telecom Industry 2014-2018” the telecom sectors use of data analytics tools is expected to grow at a compound annual growth rate of 28.28 percent over the course of next four years. In the telecommunication companies the use of data analytics is beneficial in

## Optimizing the network

No telecommunication company would want its network underutilized or over utilized. When a network is down, nearing its maximum user capacity or underused; the costs add up. Using predictive analytics companies will analyze subscriber behaviour and can create personalized individual network usage policies. This will get the company a herd of happy customers and also increase their profitability. Telecommunication companies can combine their knowledge of network performance internally within their organization and can use the same in damage control scenarios such as locating the issue or locating



the affected users when the network is down.

#### Location based service initiative

Based on location, telecommunication companies can target customers in a specific area with tailored specific offers. Fed into predictive models mobile location data can help operators predict a subscribers behaviour with stunning accuracy. Say a person goes to a cafeteria daily for breakfast at 8 am, location based services can help telecommunication companies get the persons location, get him better deals and also predict his next day location at the same time since daily habits are hard to break.

#### Social media analysis

The evolution of social media has transformed the way companies view their customers. Data scientists are harvesting data from reviews, rants and social feeds and subjecting this information to detailed sentiment analysis.

Their goal in doing so is to help telecommunication companies:

Improve or defend their brand image, track usage patterns, monitor the reaction to new products, offers and campaigns, tackle potential problems and ease customer concerns and also identify new revenue streams

#### Challenges

Of a global population of 7.4 billion people, more than 4 billion people still don't have access to the internet, with 90 percent of them in developing countries. And only 1.1 billion have access to high-speed internet.

Watching mobile use permeate rampantly through the entire world and through every field from sports to banking and also set to expand further, telecommunication providers still face a lot of challenges. Getting a grip on such drastic change can stress the budget of a telecommunication company putting a lot of its resources and wealth in analytics.

Add to that filtering the huge chunks of data and integrating it for use which can require the patience of a monk.

There is evident danger in relying too heavily on the numbers. Social media, may be fascinating, but its users are primarily urban and young representing only a fraction of the overall population Hence the data cannot justify the solution to the real problem.

#### Customer churn

The biggest challenge that a telecom company faces is when network users hop from network to network in search of better bargains. Reasons for the same may include high pricing of services, poor service, poor connection, outdated technology that the company is using. Using real-time predictive analysis combining calls made/received minutes used per call, average bill amount knowing when a customer changes his SIM, companies can analyze subscriber behaviour and create personalized individual network usage policies to retain customer as soon as the change is noted.

Although the cognitive age is upon us with a market revenue upwards 60 million \$ by 2025, critics are skeptic about the data security of this vast accumulated information. Use of analytics in telecommunication or any field has its boon but is also accompanied the contentious issue of customer privacy which leaves people with an ambiguous outlook towards the analytics field. Whatever big data initiatives telecom companies take in the future, they should be aware that their actions will have a significant impact on their reputation. Although telecommunication is amongst the fields accumulating vast quantities of data about its user, their usage pattern and location pattern, the question is can they use it in a resourceful and user safe way?



# SMART WHEELCHAIR



Aditya Sonar  
Ex-Student (2012-16)  
EXTC-TCET

As it was seen in earlier days, people who were physically and mentally challenged found it difficult to survive a normal life among the people who are not physically challenged. For a paralyzed person, it was even more difficult to live a normal life and pursue the quality of mobility as others do. For this they needed a wheelchair to travel which could propel manually which was time consuming as well as energy consuming. For their mobility, we needed a helper backing up the wheelchair thereby utilizing and wasting both his time and energy. Driving a wheelchair in domestic environments is a difficult task even for a normal person and becomes even more difficult for people with arms or hands impairments.

So to overcome those problems we have come up with a new wheelchair which requires very less physical ability thereby reducing the strength usage and time wastage. Basically the importance of this wheelchair is it could be handled by the physically challenged victim himself. This is achieved by

modernizing our wheelchair and making it smart. We have designed this wheelchair which is controlled by touch panel by the victim himself thereby reducing the number of persons used to control a single wheelchair. Since this wheelchair is having an electric circuit implemented inside it for its mobility, almost zero strength of the victim is required to control it. Since this is electric wheelchair, running up and down the slope becomes very much easier as compared to those of earlier wheelchairs. It does not only moves up and down the ramp, but also climbs up and down the stair cases, which is completely a new world for the handicapped people.

The use of powered wheelchairs with high maneuverability and navigational intelligence is one of the great steps towards the integration of severely physically disabled and mentally handicapped people. Also if the person is mentally retarded, there is an automatic moving obstacle detector which will control the wheelchair and direct it



according to the obstacle detected and move the wheelchair in opposite direction thereby reducing the chances of severe accidents.

Our wheelchair will make the handicapped people independent of others, and make them move freely without anybody's guidance. It will provide them all together a new platform to live in outside world. Today not every building and government offices are compatible for handicap people ,building and offices which have made ramps and other facilities for handicap people are very less .Therefore we made Smart wheelchair. This kind of wheelchair is rarely seen in India.

Smart wheelchair is based on electrical and mechanical engineering fundamentals .Embedded systems is the branch of electronics that is the heart of our smart wheelchair. This wheelchair is that its user friendly and very useful to handicap people. The main feature of this wheelchair is that it can climb stairs up and down ,as majority of the building and public places don't have ramps for handicap so the stair climbing mechanism in the wheelchair is making it special .stair climbing mechanism is based on mechanical engineering fundamentals .

Smart wheelchair is also featured with obstacle detection, if someone using the wheelchair and the person has not noticed obstacle on his way then the results will be very harmful, so to avoid such accidents smart wheelchair has obstacle detection mechanism. IR transmitter and receiver are used to detect the obstacle and the signal from IR sensor is given to the microcontroller, microcontroller process the signal and that signal is send to motor driver IC which rotates the motor which results in changing direction of the wheelchair,

if obstacle is detected on left side then the wheelchair will move right and if obstacle is detected on right then the wheelchair will move left.

Climbing the stairs on a wheelchair is dangerous as the person seating on it can face balancing issues, there will be problem in both the directions while going upstairs as well as while coming downstairs. So to overcome this problem we used a motor which will tilt the chair while going up and down stairs .When the wheelchair is coming downstairs then the chair will tilt backward and when wheelchair is going upstairs chair will tilt forward direction.

In today's world everything gadget is featured with touch control panel, so Smart wheelchair also has touch control system, the movement of the wheelchair is controlled by touch panel , Touch panel has IR sensor in a particular pattern they are continually transmitting and receiving signals , when we keep our finger between this sensor the signal is interrupted and due to this interruption of signal the microcontroller send the appropriate signal to the motor driver IC to complete the command ,same method is used to move the wheelchair in forward and backward direction and move left and right. Smart wheelchair also has a LCD screen, LCD screen is to display the direction of wheelchair, if it's moving forward it will display forward and same for other direction movement

In future smart wheelchair can be made smarter, it can be added with solar cell for the power supply which makes the wheelchair much easier. This wheelchair is also cost effective, main aim of this project is to keep the price low as possible so that everybody can afford and get benefits .It's our responsibility to help handicap people and make their life happy .

# Li-Fi



Vivek Singh  
Ex-student (2012-16)  
EXTC-TCET

Li-Fi is a wireless communication which is a form of Visible Light Communications (VLC). It is a subset of Optical Wireless Communications (OWC) and termed as Light Fidelity.

Li-Fi uses common household LED (light emitting diodes) light bulbs to enable data transfer, boasting speeds of up to 224 gigabits per second. It has been proposed as a solution to the RF bandwidth limitation because it uses visible light communications or infrared and near-ultraviolet instead of radio frequency spectrum.

The term Li-Fi was coined by University of Edinburgh Professor Harald Haas during a TED Talk in 2011. Haas envisioned light bulbs that could act as wireless routers. Subsequently, in 2012 after four years of research, Haas set up company pureLiFi with the aim 'to be the world leader in Visible Light Communications technology'.

Li-Fi runs on visible light. It accommodates a photo-detector to receive light signals and a signal processing element to convert the data into 'stream-able' content. An LED lightbulb is a semi-conductor light source meaning that the constant current of electricity supplied to an LED lightbulb can be dipped and dimmed, up and down at extremely high speeds, without being visible to the human eye.

For eg, data is fed into an LED light bulb (with signal processing technology), it then sends data (embedded in its beam) at rapid speeds to the photo-detector (photodiode). The tiny changes in the rapid dimming of LED bulbs are then converted by the 'receiver' into electrical signal. The signal is then converted back into a binary data stream that we would recognize as web, video and audio applications that run on internet enabled devices.

Li-Fi has the advantage of being useful in electromagnetic sensitive areas such as in aircraft cabins, hospitals and nuclear power plants without causing electromagnetic interference.



Fig.1. Logo of Li-Fi Technology[3]



## Li-Fi vs Wi-Fi

Now, you might think that Li-Fi with its high speed such as 224 Gbps can go far beyond Wi-Fi but it does not seem too easy.

- Li-Fi signals cannot pass through walls, so in order to enjoy full connectivity; capable LED bulbs will need to be placed throughout the home.
- The lights will need to be on during the day to provide connectivity.
- Due to its shorter range, Li-Fi is more secure than Wi-Fi and it's reported that embedded light beams reflected off a surface could still achieve 70 megabits per second.
- Li-Fi could make a huge impact on the internet of things too, with data transferred at much higher levels with even more devices able to connect to one another

## References:

- [1] <http://www.techworld.com/big-data/what-is-li-fi-everything-you-need-know-3632764/>
- [2] <https://en.wikipedia.org/wiki/Li-Fi>
- [3] <http://photontransfer.com/blog/technology-watch/li-fi-light-based-wireless-communication>
- [4] [https://www.google.co.in/search?q=lifi&espv=2&biw=1366&bih=667&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjMst3sytLOAhVEv48KHaf1AWQQ\\_AUICCGD#img-dii=MOLG5MbbQ2VyuM%3A%3BMOLG5MbbQ2VyuM%3A%3BSY-Q2XtOy5AJJaM%3A&imgcr=MOLG5MbbQ2VyuM%3A](https://www.google.co.in/search?q=lifi&espv=2&biw=1366&bih=667&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjMst3sytLOAhVEv48KHaf1AWQQ_AUICCGD#img-dii=MOLG5MbbQ2VyuM%3A%3BMOLG5MbbQ2VyuM%3A%3BSY-Q2XtOy5AJJaM%3A&imgcr=MOLG5MbbQ2VyuM%3A)



Fig.2. Li-Fi Tech Representation



It is difficult to say what  
is impossible, for the  
dream of yesterday is the  
hope of today and the  
reality of tomorrow.

*Dr. Robert Hutchings Goddard  
Father of modern rocket propulsion*

# TEACHERS' WISDOM



# Quad-copter Controlled Using Android Smartphone

Anvita Birje

## ABSTRACT

This project applies the embedding knowledge to design a Quadcopter which works on a bluetooth trans-receiver, flight controller and interfaces an android application for controlling flight and motion. The project aim is to create the interface between android phone and Bluetooth module and to cover the surveillance range up to 100m. The project is based on the embedded system and uses the flight controller for controlling all the flight motions with wireless technology. A mobile camera has mounted externally so as to obtain the live video footage which help in air surveillance system to great extent.

## 1. INTRODUCTION

### 1.1 Importance of the project

Quadcopters are a growing point of interest for students involved in the Society of Physics. The Quadcopter is a lightweight flying device that can be used for examining areas that would otherwise be hard to reach for human. Many Quadcopters are equipped with tools such as a GPS and automatically leveling cameras. This project consists a WifiWebcam application in android mobile is mounted on Quadcopter in order to take aerial photos. It is important for us to stress the importance of science and technology. Quadcopters give the kind of hands on application and real world experience that society need.

The project is based on embedded system which uses wireless technology. This project works on separate transmitter and receiver and also a flight controller Board for controlling all the flight motions. Quadcopter has many applications in various fields of science and technology.

Although the Quadcopters are commercially available to consumers, the group builds many of the components for the Quadcopters that they fly. In competitive settings, there is little time to replace parts on the Quadcopter. Having extra parts available that the students have made helps save them time in contests.

It has many applications:

Quadcopters can be used to assist in search and rescue mission.

Used in sports for capture the different views.  
Used in rural area, where human beings are not able to reach.

Use for security purpose in Military applications.

Use for surveillance purpose.

Quadcopters capable of autonomous flight could help remove the need for people to put themselves in any number of dangerous situations. For example: Fires, drug traffics, epidemics etc.

### 1.2 Motivation

The research on unmanned aerial vehicles have been extensively explored in the last few years, especially the Quadcopters. This kind of vehicle will mostly useful for military



purpose. But the cost of buying this vehicle is more. In order to reduce the cost instead of using separate transmitter and receiver this project will use android smartphone to control the Quadcopter. This project modifying the components required to make the Quadcopter so that they are easy to use and cost is less.

## 2. PROPOSED WORK

### 2.1 Problem Definition:

The goal of this project is to build and implement a Quadcopter (Drone) using the sensors and computational power of a smartphone. No external sensors are to be used and all computations must be made by smartphone. External mechatronics for generation of pulse width modulated signals and three phase current will be required.

### 2.2 Problem while doing project

There are so many problems occur while doing the project. Some problems are listed below:

1. Testing of arduino code: Arduino code is used to generate PWM signal for flight controller. There is need to generate five PWM signal from bluetooth signal. If there is an error in that code the whole five outputs are not produced and hence it took time to make an arduino code to generate PWM for the flight controller.
2. For making an android application, knowledge of java programming language is needed and since we are from extc background we have to learn java programming language and also we have to learn the android application development. And in android application coding, it took lot of time to remove an error present in the code.

3. Also one of problem we encountered is interfacing of flight controller with android cellphone. For this purpose we have use the Bluetooth module which act as interface between android phone and KK2.1.5 flight controller..

4. There is a problem while flying the drone. The drone gets out of controlled after some time and propeller gets broken during the testing, so to prevent the damage we have used thermocol because of its light weight but there is need to rebuild the thermocol stand after every crash so we have used sponge balls which acts like a stand and the whole pressure comes on that balls when drone gets falls suddenly.

5. Also because of explosive nature of LiPo battery, extra care must be taken while using and charging the LiPo battery. So there is need to check the battery voltage after every flight and also extreme care is required so that the battery is not discharged upto certain limit. The batteries lowest discharge voltage is 9 volt but for safe we use this limit for 9.3 volt. Also the maximum charged voltage is 12.6 volt so a person is needed to monitor the voltage of battery while charging.

## 3. RESULTS AND CALCULATIONS

This report represents a way to make the Quadcopter user friendly by the use of android application to control the Quadcopter and capture of live video footage simultaneously. Also, by the use of parallel combination of batteries, current supply capacity of battery is increased, hence increase in battery life. At the end of semester, we are able to make a low weight, user friendly Quadcopter and enhancement of battery life.

Calculations:

Required Thrust:

$$T = [(eta * P)^{2 * 2 * pi * R^2 * rho}]^{0.3333}$$

T=thrust(in newtons)

Eta=prop hover efficiency=0.7-0.8 is typical for low pitch propeller

P=shaft power=voltage\*current\*motor efficiency

R=prop radius(in meters)

Rho=air density=1.22 kg/m<sup>3</sup>

$$T = [(0.75 * 10 * 11 * .75)^{2 * 2 * 3.14 * 0.127 * 1.22}]^{0.333} = 7.8 \text{ N}$$

T=ma

$$m = T/a = 14.51/9.81 = 0.8 \text{ Kg}$$

maximum thrust of quadcopter=0.8\*4=3.2 Kg

maximum weight of quadcopter =(maximum thrust of quadcopter)/2=1.6Kg

Maximum current battery can produce=20\*2.2=44.4 A

#### 4. CONCLUSION AND FUTURE SCOPE

This project helps to understand the mechanical, electrical and control system configuration that goes into building and flying a Quadcopter. This project understands the PID control mechanism using which the Quadcopter tries to stabilize itself for a smoother flight. An equal effort will need to be spent on tuning the Quadcopter without which all the effort goes into vain in case of crash landing because every stage impacts the previous stage and the future stages.

Once the Quadcopter achieves stable and smooth hovering capabilities, a gimbal camera mount can be put on the Quadcopter which would be used to take Aerial pho-

tography. Additional sensors like Ultrasonic range finder can be incorporated to avoid collisions. Barometer can be interfaced to insure that the Quadcopter doesn't lose its altitude when it is made to hover at a certain height. Also a robotic arm can be added to the quadcopter so that it can automate a particular system.

#### 5. REFERENCES

- [1] <http://www.ijstr.org/final-print/aug2014/Quadcopter-Flight-Dynamics.pdf>
- [2] <http://www.dronetrest.com/t/use-your-android-phone-as-a-quadcopter-autopilot/70>
- [3] <https://github.com/romainbaud/android-copter>
- [4] <http://projects-web.engr.colostate.edu/ece-sr-design/AY11/quadcopter/documents/ECE401final%20paper.pdf>
- [5] <https://software.intel.com/en-us/articles/how-to-develop-an-intelligent-autonomous-drone-using-an-android-smartphone>
- [6] <http://lup.lub.lu.se/luur/download?func=downloadFile&recordId=4933972&fileId=4933973>
- [7] <http://www.wseas.us/e-library/conferences/2014/Lisbon/ELEL/ELEL-02.pdf>
- [8] [https://ai.stanford.edu/ICRA09\\_Aeroeffects.pdf](https://ai.stanford.edu/ICRA09_Aeroeffects.pdf)
- [9] [Sal.aalto/pdf-files/\\_public.pdf](Sal.aalto/pdf-files/_public.pdf)
- [10] <http://www.tehrepublic.com/resource-library/whitepapers/quadcopter-uavs-for-border-security-with-gui-sytem>
- [11] <http://www.developer.android.com>
- [12] <http://www.stackoverflow.com>
- [13] <http://www.robotics.stackexchange.com>
- [15] <http://quadcopterproject.wordpress.com>



# Self Security Systems for Evidence Collection

Megha Gupta

Abstract—

This paper discusses a device made for security of civilians, especially women. In order to complete the proposed device one will be using the core concepts of mobile communication and in that GSM and GPRS specifically. Both these above mentioned tools will be useful to send the collected data to the recipient. Hence, here it will be required to interface GPRS, a small camera and an Emergency trigger on a single hardware/software block. For that readily available embedded boards like Raspberry Pie/Arduino UN/Arduino 101 (powered by Intel) will be used.

## I. INTRODUCTION

Security systems are deployed in order to protect the civilians, properties, and in some cases it is primarily used for evidence collection. In this project the prototype of a personal Security System which comprises of applications of Mobile Communication as well as Image Processing is used. Statistics say that a lot of accused criminals were granted bail without any substantial evidence. Our intention here is to showcase the prototype for the how the substantial evidence with proper presence of mind will be able to make a concrete case for the victim. In order to complete the project the core concepts of mobile communication and in that GSM and GPRS specifically will be used. Both these above mentioned tools

will be useful to send the collected data to the recipient. Hence here it will be required to interface GPRS, a small camera and an Emergency trigger on a single hardware/software block. For readily available embedded boards like Raspberry Pie/Arduino UN/Arduino 101 (powered by Intel) will be used. The proper working will be explained in the consequent sections.

A prototype to showcase a personal security system which is similar to the working of a CCTV camera are demonstrated by the model of the intended system. Just like a Black Box in airplanes, Dash Cam in Cars, the proposed system can be used for obtaining transparency in cases where the victim does not have any backing evidence of the occurred event.

The motivation and inspiration for the system has come from the need to build a safer place in this society especially for women, minors and senior citizens. The subsequent sections are intended to demonstrate the core concepts and devices used in the system.

## II. PROBLEM DEFINITION

To start with, a hardware platform is needed which makes the interfacing of the components easier. For this, two microcontroller options namely Arduino and



raspberry pi exist.

The second problem was to identify how to interface the microcontroller i.e. raspberry pi with the camera and GPRS shield.

As the awareness of the programming language (python) is not much, there is a need for understand the basics of it and then later develop a code that is specifically used for the working of the project which includes the interfacing of the camera with the microcontroller and GPRS shield.

### III. WORKING

#### 3.1. Core Working

This system is an integration of mobile communication and image acquisition. Basically, the series of images are captured using a camera. Now, this camera is interfaced with raspberry pi (Microcontroller) which also provides it the required power. Raspberry pi has an inbuilt timer circuit which keeps a tab on the duration for which the series of images

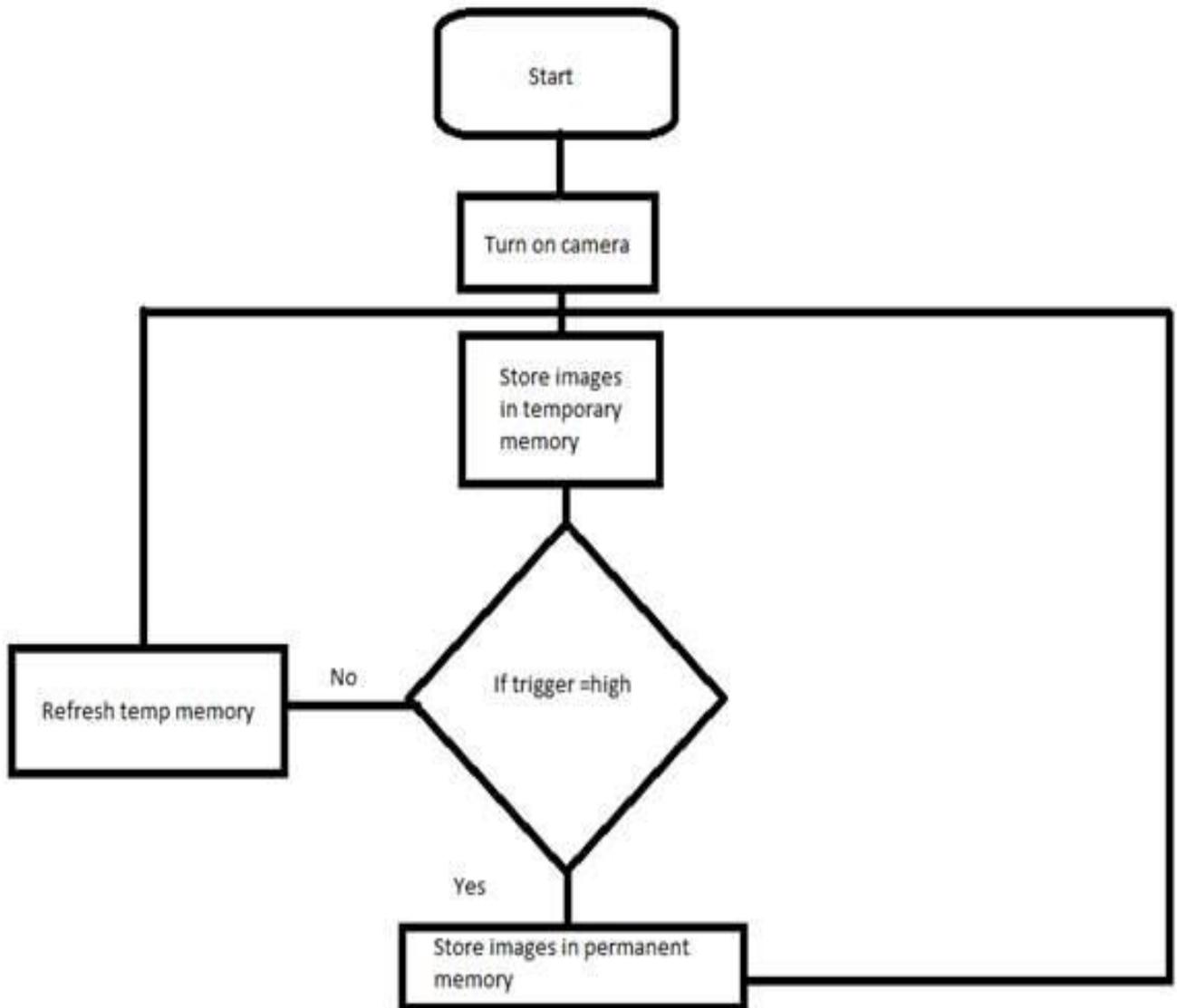


Fig 1.Flow Chart explaining the entire working



are recorded in the temporary memory. Let this time period be 'T'. Coding is done in such a way that the timer will keep on resetting itself. After this time period T the memory will refresh itself (if trigger pulse is not acknowledged). During this time period T, if a trigger pulse is noted from the victim, then it will not refresh itself. Instead it will keep adding the frame for the next T units and store the same in permanent memory. Hence information stored in permanent memory is of duration 2T. This can be used as evidence against the criminal. The second aspect of this project deals with tracking of location from where the trigger is sent.

### 3.1.1. Working Details

The entire working revolves around the processing unit of the project, Raspberry pi. The peripherals that are attached to this central unit are camera, a push button and GPRS shield along with basic utility providers like power supply (USB chord) and external memory. Initially power supply is given to the raspberry pi and its peripheral devices. An inbuilt timer is initiated with  $t=0$  at the same time when the camera is turned on. Timer is programmed in such a way that it resets itself after an interval of time 'T'. Camera is supposed to perform its normal operation of capturing series of images and saving those into memory. To make this project more efficient in terms of 'optimum usage of space', we have divided our memory into two; temporary and permanent memory. Temporary memory is further divided into two; temp1 and temp2. Images captured from camera are by default sent to temporary memory (temp1 first and then temp2 for next interval). After time interval 'T', the non-recent temporary memory will only get refreshed (if raspberry

pi doesn't receive any trigger pulse). This is the way the project works. Modifications can be done if any problem arises.

In case of any problematic situation, the working differs from the norm. To inform the self-security system that he/she is in danger, one can simply press a button which will send a trigger pulse to the raspberry pi. This will turn on the GPRS shield. This unit of the system is responsible for sending the co-ordinates of the current location to the recipients predefined in the system. Also, after acknowledging the trigger signal, it will stop refreshing the temporary memory. Rather Information in the current temporary memory (T interval) along with the previous temporary memory (T interval) is stored in the permanent memory. To get a complete idea of the situation we are concatenating the following interval's information also in the permanent memory.

### REFERENCES

- [1] International Journal of Application or Innovation in Engineering & Management (IJAIEEM) Web :An overview [Abstract]. KLE's College of Engineering and Technology, Belgaum, Dept. of Electronics & Communication. Retrieved from: <http://www.ijaiem.org/volume3issue4/IJAIEEM-2014-04-30-088.pdf>
- [2] A field guide to sources on, about and on the Internet: Safety jewellery.(2015, April 26) Retrieved from: <http://www.deccanchronicle.com/150426/technology-latest/article/indian-students-develop-jewellery-device-women-safety>
- [3] Raspberry Pi, Raspberry Pi foundation, UK 1129409, Article 'What is Raspberry Pi?', Retrieved from: <https://www.raspberrypi.org/help/what-is-a-raspberry-pi/>

# Performance Estimation of High Speed Adder

Amruta Naik

ADDITION is a fundamental operation in any digital system and can significantly influence the overall achievable performances. For this reason, novel high-speed adders are highly desirable. The speed performances of addition circuits can be improved by optimizing both the top-level structure and the circuit implementation. However, it is worth noting that the gate level modification can also significantly affect area, delay & thermal power dissipation. In digital adders, the speed of addition is limited by the time required to propagate a carry through the adder. The sum for each bit position in an elementary adder is generated sequentially only after the previous bit position has been summed and a carry propagated into the next position.

The Carry Select Adder (CSLA) is used in many computational systems to alleviate the problem of carry propagation delay by independently generating multiple carries and then select a carry to generate the sum. However, the CSLA is not area efficient because it uses multiple pairs of Ripple Carry Adders (RCA) to generate partial sum and carry by considering carry input  $C_{in}=0$  and  $C_{in}=1$ , then the final sum and carry are selected by the multiplexers (mux).[5]The conventional CSLA has been chosen for comparison with the BEC design as it has a more balanced delay, and requires lower power and area.

The basic idea of this work is to use Binary to Excess-1 Converter (BEC) instead of

RCA with  $C_{in}=1$  in the regular CSLA to achieve lower area and power consumption. The main advantage of this BEC logic comes from the lesser number of logic gates than the n-bit Full Adder (FA) structure. The paper comprises of delay and area evaluation methodology of 8-bit conventional CSLA and BEC CSLA along with ASIC implementation and its results.

## RELATED WORK

The related work for our approach includes the VLSI Implementation Of An Efficient Carry Select Adder Architecture[1]. This approach was developed by Senthil Kumar.A&Kousalyadevi.A [1]. Carry select adder (CSLA) is known to be the fastest adder among the conventional adder structures. Due to the rapidly growing mobile industry not only the faster arithmetic unit but also less area and low power arithmetic units are needed. In this research work, simple and efficient gate-level modification is suggested to significantly reduce the area and power of the CSLA. This research work was restricted to minimization of effective area of adder & power only & not the propagation delay.

Yan Sun, Xin Zhang, Xi Jin[2] has proposed the High-Performance Carry Select Adder Using Fast All-one Finding Logic[2]. Carry-select adder (CSA) can be implemented by using single ripple carry adder and an add-one circuit instead of using dual ripple-carry adders to reduce the area and

power but with speed penalty. This research work includes new add-one circuits using the fast all-one finding circuit and low-delay multiplexers to reduce the area and accelerate the speed of CSA, and no restrictions are imposed on the design of the adder blocks. The research design is a large trade-off between area, power & delay.

B. Ramkumar and Harish M Kittur has proposed the system “Low-Power and Area-Efficient Carry Select Adder[3]. This work uses a simple and efficient gate-level modification to significantly reduce the area and power of the CSLA. The design proposed in this paper has been developed using Verilog-HDL and synthesized in Cadence RTL

compiler using typical libraries of TSMC 0.18 um technology. The research design has reduced area and power as compared with the regular SQR CSLA with a slight increase in the delay.

#### EXISTING METHODOLOGY

The basic operation of Carry Select Adder (CSLA) is Parallel Computation. The structure of the 8-bit Regular CSLA uses two pairs of 8-bit Ripple Carry Adder (RCA) blocks with  $C_{in}=0$  and  $C_{in}=1$ . The 8 bits  $A[7:0]$  &  $B[7:0]$  are fed to each RCA. Depending upon the value of  $C_{in}$ , Mux selects the sum and carry from the corresponding RCA as shown in Fig. 1.[4]

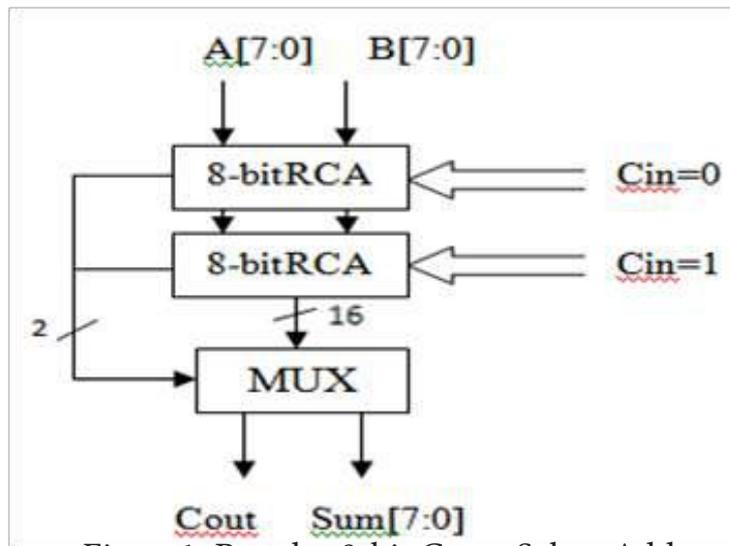


Figure1: Regular 8-bit Carry Select Adder

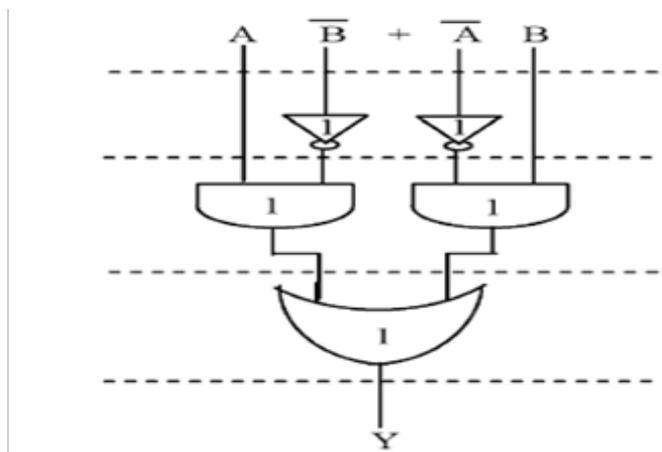


Figure. 2 Delay & Area Evaluation of an XOR gate

Delay and Area evaluation methodology of the basic adder blocks

The AND, OR, and Inverter (AOI) implementation of an XOR gate is shown in Fig. 2. The gates between the dotted lines are performing the operations in parallel and the numeric representation of each gate indicates the delay contributed by that gate. The delay and area evaluation methodology considers all gates to be made up of AND, OR, and Inverter, each having delay equal to 1 unit and area equal to 1 unit. We then add up the number of gates in the longest path of a logic block that contributes to the maximum delay. The area evaluation is done by counting the total number of AOI gates required for each logic block. Based on this approach, the CSLA adder blocks of 2:1 mux, Half Adder (HA), and FA are evaluated and listed below in table 1.[3]

Adder Blocks	Delay	Area
XOR	3	5
2:1 MUX	3	4
Half Adder	3	6
Full Adder	6	13

Thus, the number of gate count in the 8-bit regular CSLA is calculated as shown below:

$$\text{Gate Count} = \text{FA} + \text{HA} + \text{MUX}$$

Thus, the estimated maximum delay and area of the regular CSLA is 16 units & 151 units respectively

$$X0 = \sim B0$$

$$X1 = B0 \wedge B1$$

$$X2 = B2 \wedge (B0 \& B1)$$

$$X3 = B3 \wedge (B0 \& B1 \& B2)$$

Binary Logic	Excess-1 Logic
B3 B0 B1 B2	
X0 X1 X2 X3	
0 0 0 0	0 0 0 1
0 0 0 1	0 0 1 0
1 1 1 0	1 1 1 1
1 1 1 1	0 0 0 0

The structure of a 4-bit BEC is shown in Fig. 3. and Fig 4 illustrates how the basic function of the CSLA is obtained by using the 4-bit BEC together with the MUX.

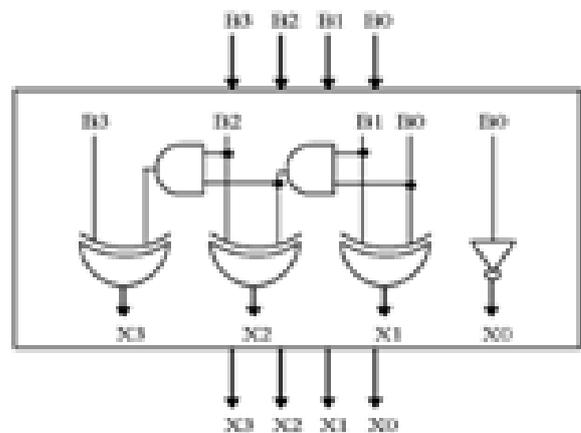


Figure 3. 4-bit BEC

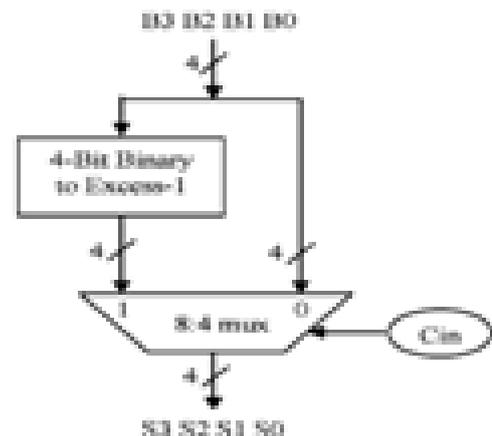


Figure 4. 4-bit BEC with 8:4 mux

## Delay and Area evaluation methodology of BEC 8-bit CSLA

The structure of the proposed 8-bit CSLA using BEC for RCA with  $C_{in}=1$  to optimize the area and power is shown in Figure 5. The structure is splitted into four groups. The delay and area estimation of each group are shown in Figure 6. The steps leading to the evaluation are as follows:

a) The group2 in Figure 6(a) has one 2-bit RCA which has 1 FA and 1 HA for  $C_{in}=0$ . Instead of another 2-bit RCA with  $C_{in}=1$  a 3-bit BEC is used which adds one to the output from 2-bit RCA. Based on the consideration of delay values of Table 1, the arrival time of selection input  $c1$  [time( $t$ )=7] of 6:3 mux is earlier than the  $s3$  [t=9] and  $c3$  [t=10] and later than  $s2$  [t=4]. Thus, the  $sum3$  and final (output from mux) are depending on  $s3$  and mux and partial  $c3$  (input to mux) and mux, respectively. The  $sum2$  depends on  $c1$  and mux.

b) For the remaining group's the arrival time of mux selection input is always greater than the arrival time of data inputs from the BEC's. Thus, the delay of the remaining groups depends on the arrival time of mux selection input and the mux delay.

c) The area count of group2 is determined as follows:

Gate Count = 43 (FA + HA + MUX + BEC)  
 Thus, the estimated maximum delay and area of the other groups of the BEC CSLA are evaluated & are found to be 19 units & 117 units respectively.

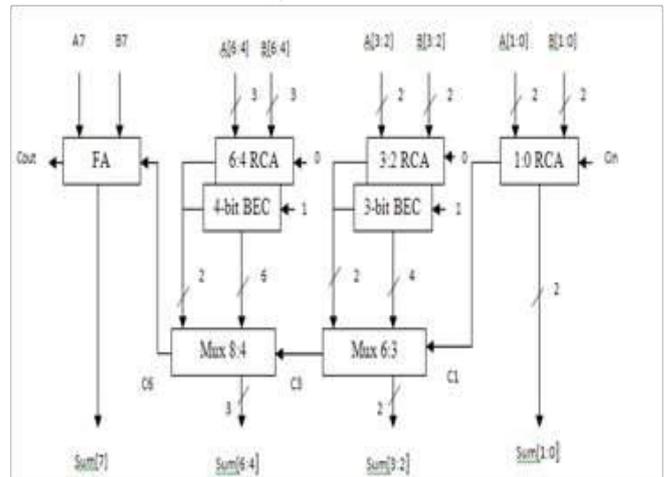
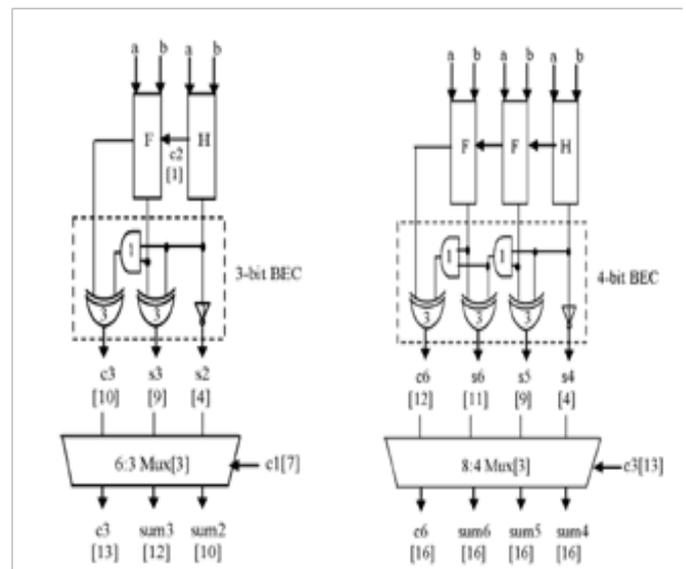


Figure 5. Modified 8-bit CSLA



(a) (b)

Figure 6. Delay and area evaluation of BEC

CSLA: (a) group 2 (b) group 3

To further evaluate the performance, we have resorted to ASIC implementation and simulation.



## ASIC IMPLEMENTATIONS

The complete designs have been developed & synthesized in VHDL using Altera Quartus II 9.1 Web Edition.[6] The design is verified both at a block level and top level Design.

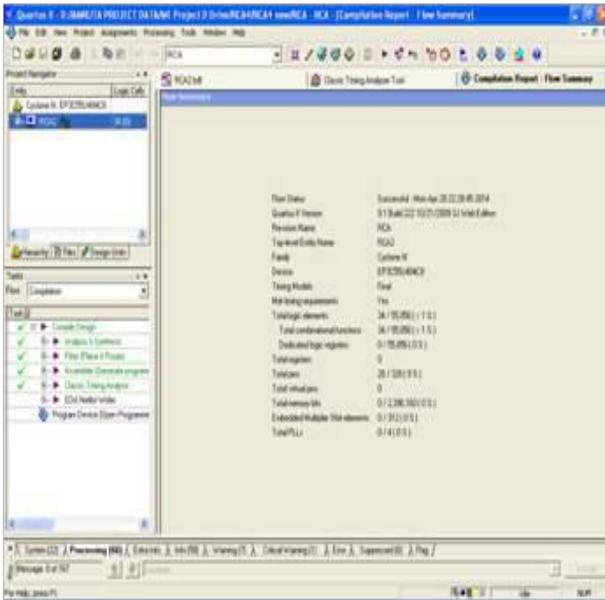


Figure 7. Evaluation of Area of Regular CSLA

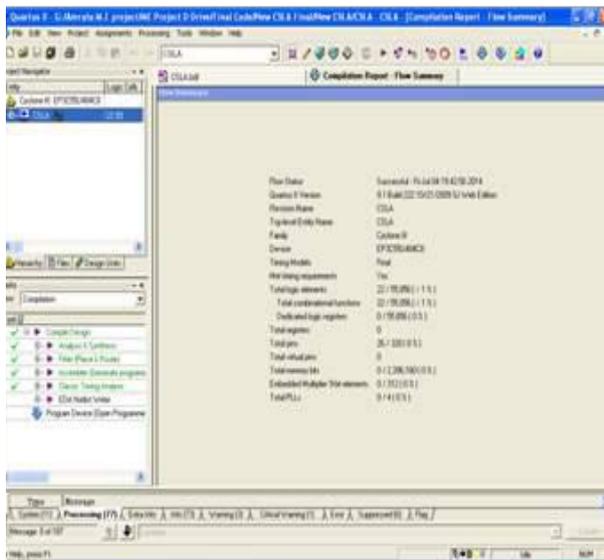


Figure 8. Evaluation of Area of BEC-CSLA

The fig. 7 shows the area occupied by Regular CSLA in terms of logic elements which is 34 and the fig. 8 shows the area occupied

by BEC CSLA in terms of logic elements which is 22.

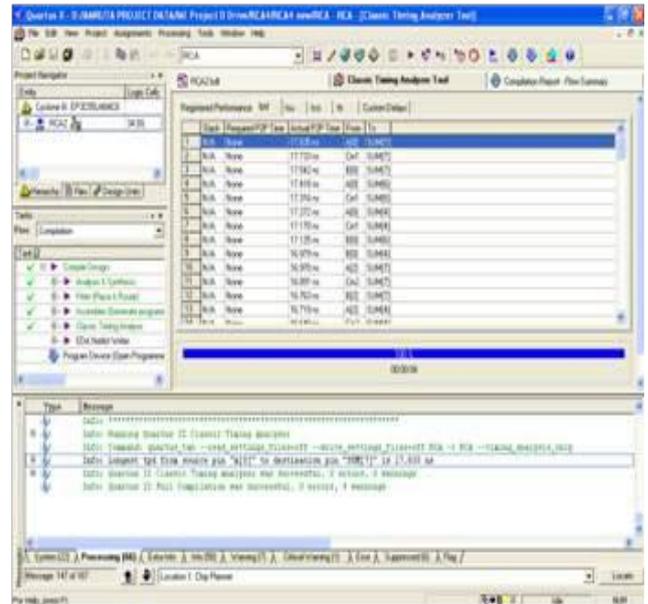


Figure 9. Evaluation of Delay of Regular CSLA

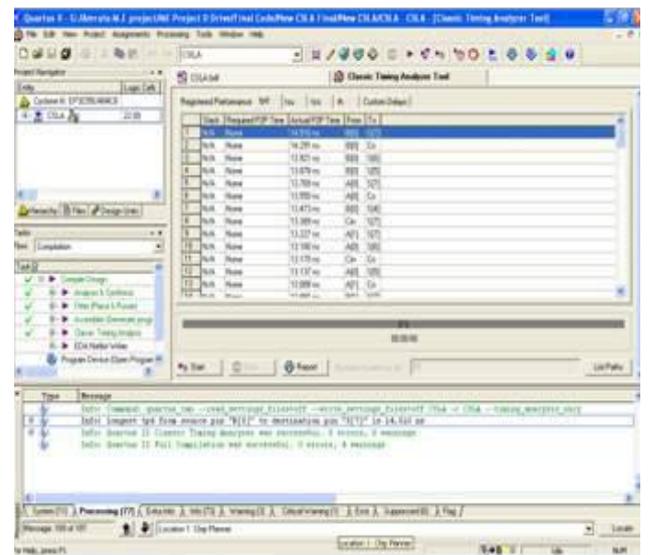


Figure 10. Evaluation of Delay of BEC-CSLA

From the fig. 9 the longest tpd from source pin A[0] to destination pin Sum[7] for Regular CSLA is 17.835ns and in the fig. 10, the longest tpd from source pin B[0] to destination pin Sum[7] for BEC CSLA is 14.510ns.



and power. It is clear that the area of 8-bit proposed CSLA is reduced by 35.29%. Similarly, the delay of 8-bit proposed CSLA is reduced by 18.64% & power dissipation by 0.17%.

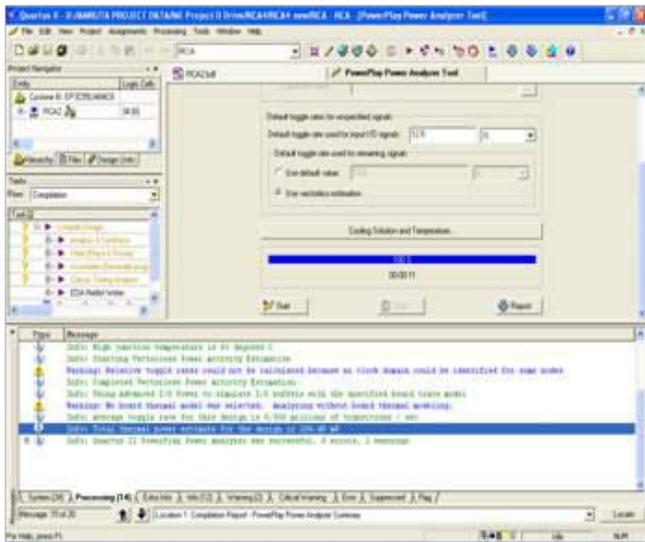


Figure 11. Evaluation of Power Dissipation Regular CSLA

Word Size	Adder	Area (Logic Elements)	Delay (ns)	Power Dissipation
8 bit	Conventional CSLA	34	17.835	109.40mW
8 bit	Modified CSLA	29	15.243	109.40mW

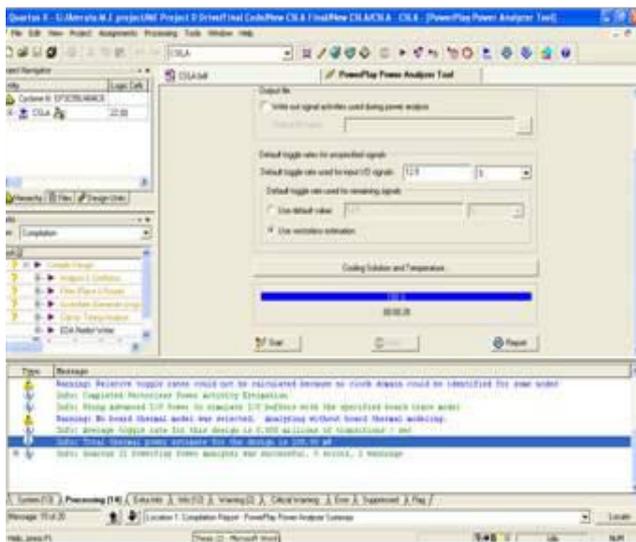


Figure 12. Evaluation of Power Dissipation of Regular CSLA

The fig. 11 shows the estimated total thermal power dissipation is 109.49mW for the Regular CSLA and for BEC CSLA estimated total thermal power dissipation is 109.30mW as shown in fig. 12.

## RESULTS

Table 3.exhibits the simulation results of both the CSLA structures in terms of delay, area

The graphical representation of the above simulation results is been plotted. The fig. 13 below shows the graph of area in terms of Logic Elements for Regular CSLA & BEC-CSLA. The graph of delay required to generate the outputs for Regular CSLA & BEC-CSLA is shown in below fig. 14. The fig. 15 below shows the graph of total power dissipated of Regular CSLA & BEC-CSLA.

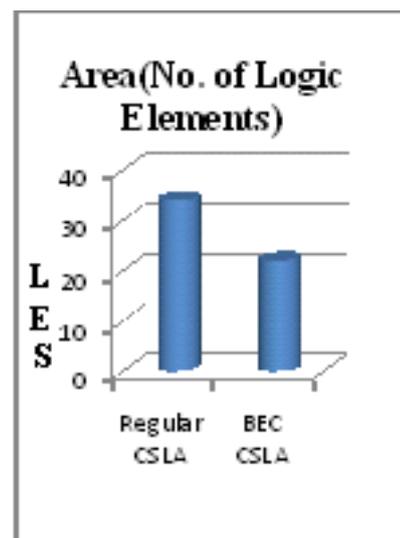


Figure 13. Graphical Representation of Area

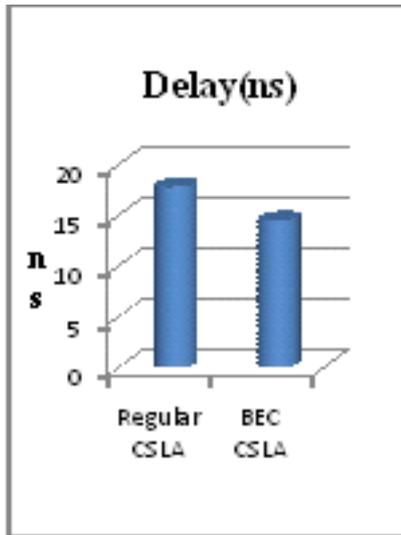


Figure 14. Graphical Representation of Delay

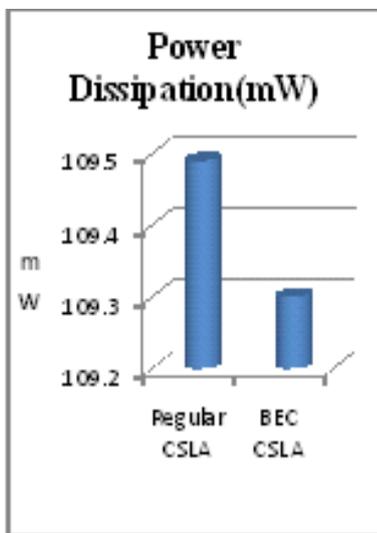


Figure 15. Graphical Representation of Power Dissipation

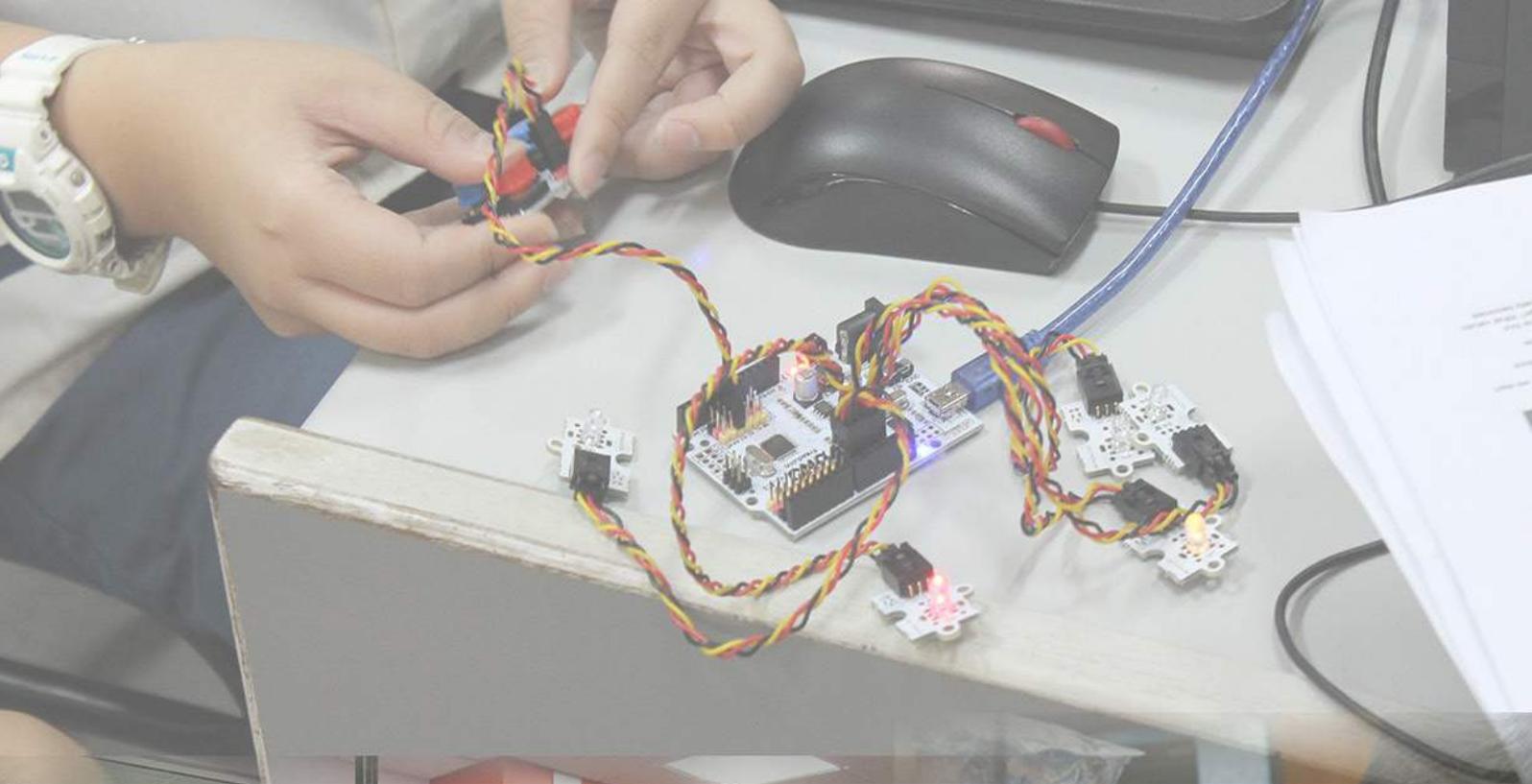
## CONCLUSION:

In this paper, we presented a methodology to minimize the area, delay, power of 8-bit carry-select adder for high performance and low-power applications. We implemented gate level modification to improve the performance parameters of

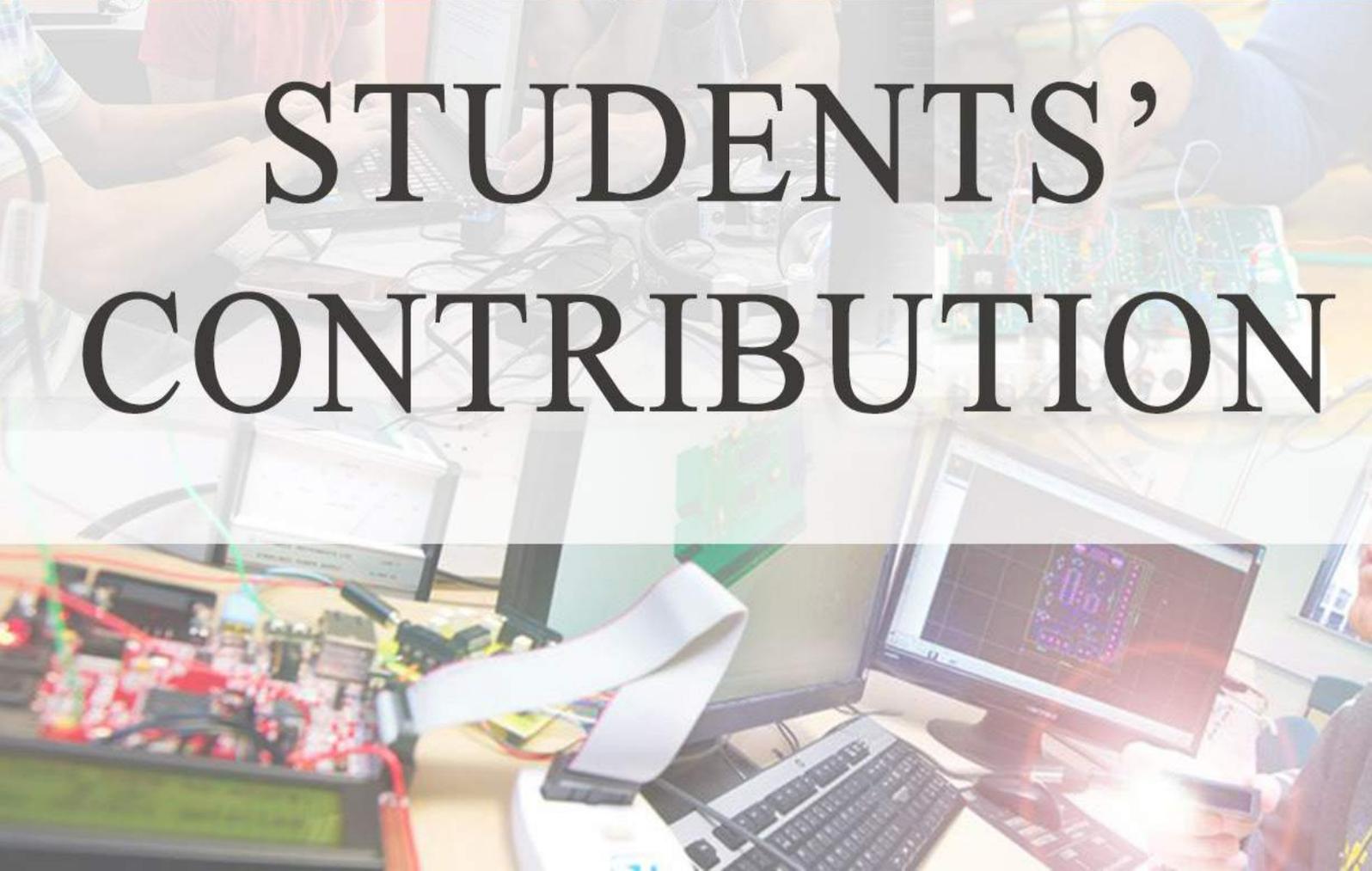
CSLA using Altera Quartus II software 9.1 using VHDL language. The compared results show that the modified CSLA area of 8-bit proposed CSLA is reduced by 35.29%. Similarly, the delay of 8-bit proposed CSLA is reduced by 18.64% & power dissipation by 0.17%. The modified CSLA architecture is therefore, low area, low power, simple and efficient for VLSI hardware implementation.

## REFERENCES

- [1] Senthilkumar, Kousalya devi "VLSI Implementation Of An Efficient Carry Select Adder Architecture", International Journal Of Advance Research In Science And Engineering IJARSE, Vol. No.2, Issue No.4, April, 2013.
- [2] Yan Sun, Xin Zhang, Xi Jin "High-Performance Carry Select Adder Using Fast All-one Finding Logic", Second Asia International Conference on Modeling & Simulation.
- [3] B. Ramkumar and Harish M Kittur "Low-Power and Area-Efficient Carry Select Adder", IEEE Transactions On Very Large Scale Integration (VLSI) Systems, Vol. 20, No. 2, February 2012.
- [4] Damarla Paradhasaradhi, Prof. K. Anusudha "An Area Efficient Enhanced Sqrt Carry Select Adder" D Paradhasaradhi et al Int. Journal of Engineering Research and Applications, Vol. 3, Issue 6, Nov-Dec 2013, pp.876-880.
- [5] John P. Uyemura, "Introduction to VLSI CIRCUITS AND SYSTEMS", April 2009
- [6] <https://www.altera.com/download/software/quartus-ii-we/9.1>.



# STUDENTS' CONTRIBUTION



# What Are You Looking At?

Ashish Rawat

B.E EXTC B

Everybody would have heard of stories where a child, when goes to bed sees the shadow of a witch's hand with her crooked fingers and long nails on the ceiling or the wall in their room, only to later conspire that it was just a branch of an old tree in front of a street lamp!

This post is somewhat about a similar dilemma which scares science only because truth has yet to be revealed!

It was 9th grade when I saw an animated video on 'YouTube' named 'Dr Quantum- Double slit Experiment' and honestly I understood very little of what was going on. Although the central idea of the double slit experiment was unclear to me I managed to grasp the message that was given at the end of the video.



Fig 1-Dr. Quantum

## 1. DR QUANTUM- DOUBLE SLIT EXPERIMENT

Here's what the video showed- An animated excited old scientist who begins with introducing the double slit experiment as the 'grand daddy of all the quantum weirdness', which honestly is quite justified and will be agreed upon by anyone once he watches the video. He

then describes an elementary idea of shooting marbles on a screen which pass through a single slit forming an identical pattern. On adding another slit, two patterns were observed, each corresponding to a single slit. Doing the same with the marble replaced by a ripple we observe a single pattern on the screen for a single slit. Now, interestingly, the ripple when passed through two slits instead of one gives an interference pattern on the screen. One can visualize as a high intensity spot on screen if there were two tops meeting and a zero intensity pattern where the crest and the trough cancel each other. On this note the video takes things to another level, when he shoots a beam of electron on the double slit. Expecting that the electrons behave like the marbles, we are taken aback, because that was not to happen. We observe an interference pattern! Just in order to make sure that the electrons did not collide while passing through the slits, electrons were shot one at a time. Even this did not make any difference. We still end up getting an interference pattern.

If you think you are baffled, let me take you to another level of what one could call impossibility. On setting up a measuring device that observes the behavior of the electron while it passes through the slit, just to add more complications in our understanding, electron behaves like a particle. YES! Just because of an observer the electron behaved in a different way.

The question that arises here is- How can something as tiny as an electron defy what we call human logic? In fact the approach to

understand an electron as a particle is shattered initially not only that, but also believing that what we observe is surely the truth is to a lot of extent false. So everything that we observe and understand around us as a non-introspecting observer might not be the complete reality. When I say a non-introspecting observer, I am referring to the observer who observes the outcome of the electron behaving as a wave, whereas an introspecting observer was the measuring device that was installed latter.

So, either introspection into an event changes the outcome to a false reality or maybe it reveals the truth. I cannot comment on the reality of the nature of electron but I can surely suggest something else. Outcome of an experiment is determined by the conditions it is performed in, which also includes a condition which we have been taking for granted for many years. The condition of either being under observation or not being under observation. I definitely did not mean that if you turn around, the objects behind you will start to float or dance in the air. I am sure that is quite eerie, but that is what I questioned myself about!

For anything to behave in a particular format it must have the information about how to behave in a particular situation (conditions of experiment including under observation or free from observation). This is a very premature statement, which I could explain if given an opportunity to do so.

Let's consider human body or any other living organism of significant size. It require food for its survival because, roughly speaking, food is the supplement of the major solid entity that it is composed of. Now, consider a fruit that we (human body) consume, the particles of different nutrients which once belonged to the fruit now becomes a part of our system.

This is because our body creates certain environment for the nutrients to react in a certain

way. There is information that the particles have in them which commands them, that if a human body fluids react with nutrients of a fruit, they behave in certain predetermined fashion. On an easier tone, if an orange is consumed by a human, it becomes the human to a great extent. If an orange is consumed by a monkey or a cow, it becomes a monkey or a cow. The laws governing such events are what I am referring to as information. Of course these are chemical reactions but the reason behind the reaction is what I am concerned about.

Now, before the inception of life on this planet, nature had its own laws in which atoms behaved in a certain way to form molecules and molecules to form compounds further those compounds became complex and started showing significant behavior at an extremely complex level-animals, plants etc. Reaction and events occurred due to either physical interaction of matter-collision, touch, push, pull, drop etc or exchange of energies- heat transfer, fission fusion etc. This was the case for simpler level of matter such as a table and chair (experiencing Newtonian forces), chemicals and basic compounds (experiencing thermodynamics) etc. But for a higher level of existing entities such as humans, more complex ways of reactions and behavior is observed. Behavior of one human with respect to the other or behavior of one human with respect to an object can both be different. That means different humans show different behavior for the same subject. This is due to the information of what a particular human being carries about a particular subject. If behavior of Humans can vary by touching a certain object or even by looking at it, why cant we expect a change in the behavior of an object on a touch or observation. An act of observations can bring about changes in the behavior of a human, so it can also bring about a change in objects, tiny particles, molecules, atoms, and for that matter an ELECTRON.

One other way to understand the dilemma set forth by the double slit experiment could be by defining consciousness. If nature were to give objectified results only if a conscious observer is observing, then maybe we can justify to our minds the occurrence of this mind baf- fling phenomenon. Let's just assume that na- ture by its self exists as waves and possibilities. As humans we observe objectified version of what we are able to observe. That means out of the many possibilities of a thing(stone, table, chair etc) to appear a certain way, we see the most prominent or the most highly probable objectified form of the same. When I say this I mean that the object you are looking at has multiple possibilities of having a shape and the shape that has highest stability of existence and highest possibility of presence is what we observe.

At the outer level of consciousness, that is as humans we observe that shooting single elec- tron also produces the interference pattern on the screen that means we are witnessing all the possible places where the electron could have struck. As I mentioned earlier that nature by its self exists as waves and possibilities, it does not objectify unless it is under observation of a consciousness. Since initially electron was not under observation, we found out all the possibilities of where it can strike. But just be- cause we have an observer, nature objectifies its results to show the region of highest possi- bility of existence.

Speaking of the levels of observation, we with our human senses are an upper level observer or the macro level observer. So all the things we see around us are objectified. things that are of perceivable size. Balls, buildings, coins, needle, planets, mountains, insects etc, that we can see with our naked eyes are objectified to us, whereas, air molecules which we can- not see with naked eyes have their existence at multiple possible places for us. Even mol- ecules unless we observe it with microscope

exists only as a possibility, but what those mil- lions of molecules make together is of signifi- cant size and hence becomes objectified.

If this were the case then we can also say that behavior of matter, as we know it, can also change if we design an observer to observe the exact movement of an electron in all the atoms present. This will result into perfect character- ization of atom and all the anomalous char- acteristics of the atom will settle down to the most stable form, only because it will be un- der conscious observation. Science could be objectified is observations were made at the right levels of introspection. Well this is just an idea or a possibility of how things can turn out in the coming future.

If there was a giant observer (a being), way bigger than our solar system, way bigger than everything in our galaxy it could have seen the presence of all us at multiple places. For that observer, things of the magnitude of our size will have random movement in space until it sets an introspecting conscious observer to observe us. Once he does that, the results of his experiment (broadly speaking so) will be objectified. My point over here is that the size of existence doesn't matter, it's the ratio of the size of the object under observation and the extent to which we observe it, would deter- mine the nature of what is been observed. If we observe the behavior of our subject generally like our eyes observe the results of an electron, we would find it to behave like a wave of and show us all the possible outcomes but a deeper look would make the results more specific.

I really wish to know the results when we use two layers of slits one with an introspecting measuring device and one without it placed one after the other. Also, studying the double slit experiment taking into account different frame of references could open doors to many other mysterious rooms of nature.

## 2. YOUNG'S DOUBLE SLIT EXPERIMENT

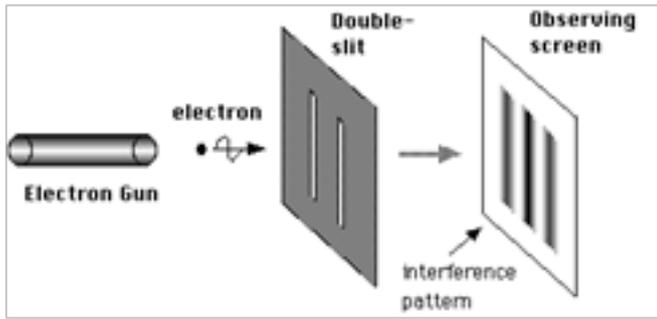


Fig 2-Arrangement of the electron gun, double slit and the screen

Young's double slit experiment and the miscellaneous results that follow this experiment have a great scope for research because very little is known to us about this subject. As time will pass we will surely know a lot more nature. I have made a small attempt to share my philosophy, which is inspired by a numerous sources along with my own perspective about the subject, to understand the results that have been observed.



# Brain Computer Interface

Kailash Choudhary

B.E. EXTC-A

## ABSTRACT:-

A brain computer interface also known as mind machine interference is a direct communication interface between an external device and brain. The signal directly goes from the brain to the computer, rather than going from the brain to the neuromuscular system to a finger on the mouse. Brain interference devices used these days require deliberate conscious thought while prospective future applications are expected to work effortlessly. BCIs are directed at augmenting, assisting, or repairing sensory-motor or human cognitive functions. It combines technologies from the fields of electrical engineering, biomedical and neurosurgery.

## BACKGROUND:-

In the 1970s, research on BCIs started at the University of California, which led to the emergence of the expression brain-computer interface. The focus of BCI research and development continues to be primarily on neuroprosthetics applications that can help restore damaged sight, hearing, and movement. The mid-1990s marked the appearance of the first neuroprosthetic devices for humans. BCI doesn't read the mind accurately, but detects the smallest of changes in the energy radiated by the brain when you think in a certain way. A BCI recognizes specific energy/ frequency patterns in the brain. Based on brain imaging technology such as magnetic resonance imaging and electroencephalography. BCI looks for patterns of activity in the brain in real time.

## INTRODUCTION:-

Brain-computer interface (BCI) is a fast-grow-

ing emergent technology, in which researchers aim to build a direct channel between the human brain and the computer, so in this way brain and computer are directly connected without the medium neuromuscular system. In BCI brain accepts and controls mechanical device as a natural part of body as hands, legs. Computer-brain interfaces are designed to restore sensory function, transmit sensory information to the brain, or stimulate the brain through artificially generated electrical signals.

## WORKING:-

BCI models acquisition of data processing i.e command sent by the brain is acquired and is given to pre-processing, enhancement; features extraction, translation algorithm and which are further given to the computer. BCI approaches are of 3 types invasive, semi-invasive, on-invasive. Invasive BCIs are implanted directly into the grey matter of the brain during neurosurgery. Electrocorticography (ECoG) measures the electrical activity of the brain taken from beneath the skull in a similar way to non-invasive electroencephalography but the electrodes are embedded in a thin plastic pad that is placed above the cortex, beneath the dura mater. Electroencephalography In conventional scalp EEG, the recording is obtained by placing electrodes on the scalp with a conductive gel or paste, usually after preparing the scalp area by light abrasion to reduce impedance due to dead skin cells. Many systems typically use electrodes, each of which is attached to an individual wire. fMRI = Functional Magnetic Resonance Imaging fMRI exploits the changes in the

magnetic properties of hemoglobin as it carries oxygen. Activation of a part of the brain increases oxygen levels there increasing the ratio of oxyhemoglobin to deoxyhemoglobin. Magnetoencephalography (MEG) detects the tiny magnetic fields created as individual neurons “fire” within the brain. It can pinpoint the active region with a millimeter, and can follow the movement of brain activity as it travels from region to region within the brain.

#### APPLICATION:-

Some of the applications are to control robots that function in dangerous or inhospitable situations

Create a feedback loop to enhance the benefits of certain therapeutic methods. Develop passive devices for monitoring function, such as monitoring long-term drug effects, evaluating psychological state, etc. Monitor stages of sleep. To keep an eye on memory upload and download, the brain can be used as a computer virtually it is a computer, the Google search can be done through brain and other computer related works can also be done.

Some of the projects are

1. BrainGate
2. BCI2000
3. Australian Bionic Eye
4. Honda Asimo Control
5. Gaming Control

#### 1. BrainGate:-

Brain Gate is a brain implant system built and previously owned by Cyber kinetix, currently under development and in clinical trials, designed to help those who have lost control of their limbs, or other bodily functions, such as patients with amyotrophic lateral sclerosis (ALS) or spinal cord injury.

#### 2. BCI2000:-

BCI2000 is a software suite for brain-computer interface research. It is commonly used for data acquisition, stimulus presentation, and brain monitoring applications. BCI2000 supports a variety of data acquisition systems, brain signals, and study/feedback paradigms. During operation, BCI2000 stores data in a common format (BCI2000 native or GDF), along with all relevant event markers and information about system configuration. BCI2000 also includes several tools for data import/conversion (e.g., a routine to load BCI2000 data files directly into MATLAB) and export facilities into ASCII.

#### 3. Australian Bionic Eye:-

The bionic vision system consists of a camera, attached to a pair of glasses, which transmits high-frequency radio signals to a microchip implanted in the eye. Electrodes on the implanted chip convert these signals into electrical impulses to stimulate cells in the retina that connect to the optic nerve. These impulses are then passed down along the optic nerve to the vision processing centers of the brain, where they are interpreted as an image.

To benefit from this technology, patients need to have a functional visual pathway

from the retina to the brain along the optic nerve, as well as some intact retinal cells. As such, the two medical conditions that this technology aims to address are retinitis pigmentosa and age-related macular degeneration.

#### 4. Honda Asimo Control:-

ASIMO, an acronym for Advanced Step in

Innovative Mobility] is a humanoid designed and developed by Honda. Introduced on 21 October 2000, ASIMO was designed to be a multi-functional mobile assistant. With aspirations of helping those who lack full mobility, ASIMO is frequently used in demonstrations across the world to encourage the study of science and mathematics. At 130 cm (4 ft 3 in) tall and 48 kg (106 lb), ASIMO was designed to operate in real-world environments, with the ability to walk or run on two feet at speeds of up to 6 kilometres per hour (3.7 mph). In the USA, ASIMO is part of the Innovations attraction at Disneyland and has been featured in a 15-minute show called "Say 'Hello' to Honda's ASIMO" since June 2005. The robot has made public appearances around the world, including the Consumer Electronic Show (CES), the Miraikan Museum and Honda in Japan, and the Ars Electronica festival in Austria.

#### ADVANTAGES:-

Eventually, this technology could:

1. Allow paralyzed people to control prosthetic limbs with their mind.
2. Transmit visual images to the mind of a blind person, allowing them to see.
3. Transmit auditory data to the mind of a deaf person, allowing them to hear.

4. Allow gamers to control video games with their minds.
5. Allow a mute person to have their thoughts displayed and spoken by a computer.

#### DISADVANTAGE:-

1. Research is still in beginning stages.
2. The current technology is crude.
3. Ethical issues may prevent its development.
4. Electrodes outside of the skull can detect very few electric signals from the brain.
5. Electrodes placed inside the skull create scar tissue in the brain.

#### CONCLUSION:-

It is a potential therapeutic tool.

BCI is an advancing technology promising paradigm shift in areas like Machine Control, Human Enhancement, Virtual reality and etc. So, it's potentially high impact technology.

Several potential applications of BCI hold promise for rehabilitation and improving performance, such as treating emotional disorders (for example, depression or anxiety), easing chronic pain, and overcoming movement disabilities due to stroke.

Will enable us to achieve singularity very soon. Intense R&D in future to attain intuitive efficiency.



# Border Alert System For Fishermen Using GPS

DEEPAK SHARMA

TE-EXTC-B

## ABSTRACT:

In day-to-day life we hear about many Tamil fishermen being caught and put under srilankan custody and even killed. The sea border between the countries is not easily identifiable, which is the main reason for this cross border cruelty. Here we have designed a system using embedded system which protects the fishermen by notifying the country border to them by using Global Positioning System (GPS) and Global system for mobile communication (GSM). We use GPS receiver to find the current location of the fishing boat or vessel. Using GPS, we can find the current latitude and longitude values and is sent to the micro-controller unit. Then the controller unit finds the current location by comparing the present latitude and longitudinal values with the pre-defined value. Then from the result of the comparison, this system aware the fishermenthat they are about to reach the nautical border. The area is divided into four zones- normal zone, warning zone, zone near to restricted zone and finally the restricted zone. If the boat is in normal area, then the LCD displays normal zone. Thus they can make it clear that the boat is in normal area. In case it moves further and reaches the warning zone, the LCD displays warning zone. If the fisherman ignores the warning or fail to see the display and move further, and if the boat enters the zone nearer to the restricted zone the alarm will turn on and the speed of the boat engine automatically gets controlled by 50%. If the fisherman did not take any reaction about the alarm and move further, then the boat will enter into the

restricted zone, the alarm continues to beep as before, and once it touches the restricted zone, the boat engine gets off by the control of fuel supply to engine.

## INTRODUCTION:

The Tamil Nadu fishermen even today invoke the historical rights and routinely stay into the International Maritime Boundary Line (IMBL) for fishing. From Tamil Nadu about 18,000 boats of different kinds conduct fishing along the India-Sri Lanka maritime border. But by accidentally crossing the border without knowledge, they get shot by the Lankan navy. This leads to loss in humans lives as well as their economic incomes. We have developed a system which eliminates problems and save lives of the fishermen.

## WORKING PRINCIPLE:

The GPS Modem will continuously give the signal which determines the latitude and longitude and indicates the position of the fishermen to them. Then it gives the output which gets read and displayed in the LCD. The same data is sent to the mobile of the fisherman and simultaneously the same data is sent to the Sea border security. An EEPROM is used to store the data, received by GPS receiver. The hardware which interfaces with microcontroller are LCD display, GSM modem and GPS Receiver. GPS (Global Positioning System) is increasingly being used for a wide range of applications. It provides

reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth. 28 satellites inclined at  $55^\circ$  to the equator orbit the Earth every 11 hours and 58 minutes at a height of 20,180 km on 6 different orbital Lanes and each one of these satellites has up to four atomic clocks on board. All we require is an accurate clock. By comparing the arrival time of the satellite signal with the onboard clock time, at which the signal was emitted, the latitude and longitudinal degree of the boat's location is determined. The current design is an embedded application, which will continuously monitor a moving Boat and once the boat goes beyond the level of the defined layer the particular operation will be done. For doing so an AT89c51 microcontroller is interfaced serially to a GSM MODEM AND GPS receiver.



Fig.1- GPS Working

#### EXISTING SYSTEM:

At the present time there are few existing systems which help to identify the current position of the boats/ships using GPS System and view them on an electronic map. For the purpose of identification the fisherman are using the GPS72h, equipment used for the navigation in sea. It provides the fastest and most accurate method for mariners to navigate, measure speed, and determines location. This system enables increased levels of safety and efficiency. It ensures whether the ship reaches its destination safely. The accurate position information becomes even more critical as the vessel departs from or arrives in port.

#### PROPOSED SYSTEM:

The proposed system uses a GPS receiver which receives signal from the satellite and gives the current position of the boat. The proposed system is used to detect the border of the country through the specified longitude and latitude of the position, not only between Sri Lanka and India but all over the world. The particular layer level i.e. border can be predefined and this can be stored in microcontroller memory. The current value is compared with predefined values and if these values are same, immediately the particular operation will be done i.e, the microcontroller gives instruction to the alarm to buzzer It also uses a message transmitter to send message to the base station which monitors the boats in the sea. The system provides an indication to both fisherman and to coastal guard. Thus it saves the lives of the fisherman and alerts the base station to provide help.

PROPOSED SYSTEM ARCHITECTURE:

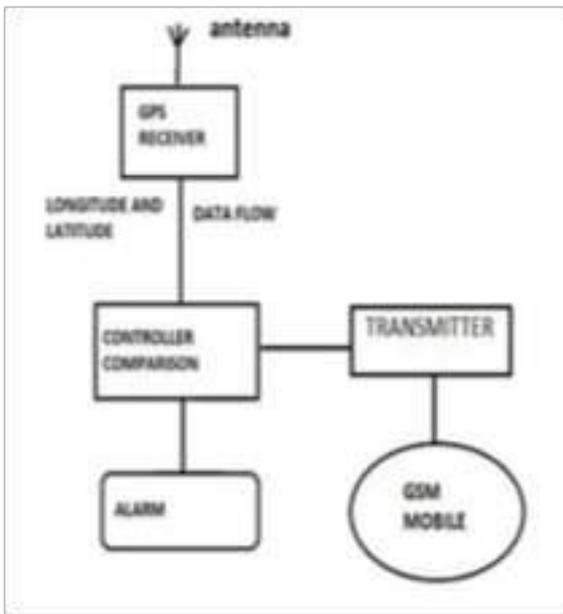


Fig.2- Block Diagram of System

The GPS receiver receives the signal and converts it into desired data message. The data is sent to microcontroller and microcontroller extracts the latitude and longitude from the data. The positions are compared with the stored Boundary latitude and longitude positions. If the vessel is found then an alarm is generated along with a message transmission by a GSM

GPS ACCURACY:

The accuracy of GPS depends on the type of receiver. Most hand-held GPS units have about 10-20 meter accuracy. Other types of receivers use a method called Differential GPS (DGPS) to obtain much higher accuracy. DGPS requires an additional receiver fixed at a known location nearby. Observations made by the stationary receiver are used to correct positions recorded by the roving units, producing an accuracy greater than 1 meter.

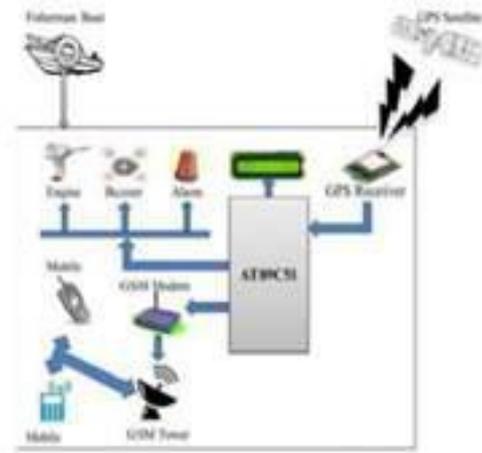


Fig.3- Internal Block Diagram

CONTROLLER:

Microcontroller receives the data from the GPS receiver through UART. The data received contains many details along with latitude and longitude. The latitude and Longitude of the current position is separated from the detailed data from GPS. The current positions are compared with already stored latitude and longitude of countries boundary locations. At first the latitude is compared with stored latitude which identifies if the current position is located near to the boundary. If the latitude matches then the adjacent latitudes and longitudes of the present latitude is retrieved from the microcontroller. The current position received from GPS is stored as S1(latitude), S2 (longitude). The latitude S1 is compared with stored latitudes. If latitude match, then adjacent latitude and longitudes (X1, Y1 and X2, Y2) are retrieved from stored table and substituted in the equation given below:

Positions	Latitude	Longitude
Position 1	12° 05' 0 N	82° 03' 0 E
Position 2	12° 05' 8 N	82° 05' 0 E
Position 3	12° 08' 4 N	82° 09' 5 E
Position 4	12° 33' 0 N	82° 46' 0 E

$(Y-Y1)/(Y2-Y1) = (X-X1)/(X2-X1)$  By simplification, we get  $ax + by = c$  Now, S1 and

S2 are substituted in above equation of line. Here two cases are possible: Case 1: If  $LHS < RHS$ , then vessel is inside country border. When vessel is inside country's border, the microcontroller gets the input from GPS receiver after a short delay loop. Latitude and longitude is extracted and manipulation with the new locations is done in the algorithm. Case 2: If  $LHS > RHS$ , then vessel has crossed border. When vessel crosses border, an alarm is generated immediately. Along with alarm a signal is also sent to GSM module for transmission of message to desired sender. Alarm continues until the vessel comes back inside the country's border.



Fig.5- Map of the Maritime Boundary



Fig 4- Layer Construction

The boundary between India and Sri Lanka in the waters from Adam's Bridge to Palk Strait shall be arcs of Great Circles between the following positions, in the sequence given above, defined by latitude and longitude.

#### MARITIME BOUNDARY BETWEEN INDIA AND SRI LANKA:

The boundary points are marked above. These points should be stored in microcontroller. The computation is done in microcontroller with these points. Thus vessel crossing the border is being calculated.

#### CONSEQUENCE:

Boat Position and Navigation System contains

- Layer1: Green LED indication
- Layer2: Red LED indication
- Layer3: Alarm indication & speed control
- Layer 4: Engine off.

#### CALCULATING THE POSITIONS:

Because GPS receivers do not have atomic clocks, there is a great deal of uncertainty when measuring the size of the Spheres. Each radius corresponds to the distance calculated to the satellite. All possible distances to the satellite are located on the circumference of the circle. If the position above the satellites is excluded, the location of the receiver is at the exact point Where the three circles intersect beneath the satellites. Although the distance to the satellites can only be roughly estimated at first, a GPS receiver can precisely calculate these distances relative to each other. Because the relative size of the spheres is known, there is only one possible point where they can intersect.

## DISPLAY UNIT:

A LCD display 16×2 is used for displaying the latitude and longitude. LCD display is connected to port 1 of the Microcontroller. Every pin of port 1 is connected to LCD display. Message is sent through commands via serial Communication

## FUTURE SCOPE:

We can use the EEPROM to store the previous Navigating Positions up to 256 locations.

We can navigate up to Number of locations by increasing the memory of EEPROM. We can reduce the size of the kit by using GPS+GSM on the same module of GPS navigator.

We can increase the accuracy up to 3m by increasing the cost of the GPS receivers.

## BENEFITS:

- The Hijack of the Ship by the pirates can be eradicated.
- The lost Ship wrecks due to natural calamities can be identified.
- By keeping the kits in the entire boats and by knowing the locations of all the boats we can use our kit to assist the traffic.
- In case of any accident on the sea. It can be detected by the system and the accident location of the boat is sent to the rescue team.

## APPLICATIONS:

- We can also use this device as bomb detector.
- Location of any lost vehicle could be determined.

## ADVANTAGES:

- Accuracy determination of the location.
- Maintenance cost is low.
- Easily replaceable.

## CONCLUSION:

Thus the fishermen can easily identify the national sea borders and therefore prevents them from entering their area. Thus saving their lives and providing good relationship with the neighboring countries. Also, the piracy of ship can be easily brought under control.

## REFERENCES:

- [1]. GPS-based vessel position monitoring and display system. Aerospace and Electronic Systems Magazine, IEEE, Jul 1990.
- [2]. [www.falcomusa.com](http://www.falcomusa.com).
- [3]. A. Michalski, J. Czajewski, The accuracy of the global positioning systems, IEEE Instrumentation & Measurement Magazine, vol. 7 (1), pp. 56–60, 2004.
- [4]. <http://www.slam.lk>
- [5]. M. Diaz, 'Integrating GPS receivers into consumer mobile.

# Wireless Power Transmission (Using Magnetic Induction)

SATYAM ANIL SINGH  
UMESH PRASAD  
RAVESH CHAUHAN  
PRADEEP YADAV  
TE-EXTC-B

Wireless Power Transmission (WPT) or Wireless Energy Transmission is the transmission of electrical energy from a power source to an electrical load, such as an electrical power grid or a consuming device, without the use of discrete human-made conductors.

Wireless transmission is useful to power electrical devices in case where interconnecting wires are inconvenient, hazardous, or are not possible

This project is not same like the wireless transmission of signals which we use in cell phones. In this mode of transmission, electrical power is transmitted in the form of magnetic rays. Micro-waves are harmful to human beings as well as other living organisms, while magnetic rays are not harmful to any living organism.

## HISTORY OF WIRELESS POWER TRANSMISSION

- The concept of wireless electricity is not new. In fact it dates back to the 19th century, when

Nikola Tesla (FIG.1) used conduction based systems instead of resonance magnetic fields to transfer wireless power.



Fig.1-Nikola Tesla

- As the method was radiative, most of the power was getting wasted.

## LITERATURE

- In 1826 Andre-Marie Ampere developed ampere's circuital law showing that electric current produces a magnetic field.

- Michael Faraday developed Faraday's law of induction in 1831, describing the electromagnetic force induced in a conductor by a time-varying magnetic flux.

- In 1862 James Clerk Maxwell synthesized these and other observations, experiments and equations of electricity, magnetism and optics into a consistent theory, deriving Maxwell's equations.

\* This set of partial differential equations forms the basis for modern electromagnetic including the wireless transmission of electrical energy.

## WHY WIRELESS POWER TRANSMISSION

- One of the major issues in power system is the losses that occur during the transmission and distribution of electrical power. As the demand increases day by day, the power generation increases and the power loss is also increased.

- The major amount of power loss occurs during transmission and distribution. The percentage of loss of power during the transmission and distribution is approximated as 26% . The main reason for power loss during transmission and distribution is the resistance of wires used for grid.

- The efficiency of power transmission can be improved to certain level by using high strength composite over head conductors and underground cables that use high temperature super conductor. But, the transmission is still inefficient. According to World Resources Institution (WRI), India's electricity grid has the highest transmission and distribution losses in the world a whopping 27%.Numbers published by various Indian government agencies put that number at 30%,40% and greater than 40%. This is attributed to technical losses (grid's inefficiencies) and theft .

- The above discussed problem can be solved by choosing an alternative option for power transmission which could provide much higher efficiency, low transmission cost and avoid power theft.

- Wireless Power Transmission is one of the promising technologies and may be the righteous alternative for efficient power transmission.

- Using Wireless Power Transmission we can achieve maximum efficiency for the power transmission .

## WORKING PRINCIPLE

- Wireless power transmission work on the principle of mutual induction between the two coils.

- There are two copper coils as shown in fig.2 arranged one at the sender and other at the receiver end. The first coil is attached to the power source while the second coil to the receiving appliance/device.

- When the power coil is switched on the first coil converts the input power into magnetic flux, which is oscillating at a particular frequency i.e. ac source.

- The second coil at the receiver end converts the magnetic field into electricity .the surrounding environment is unaffected.

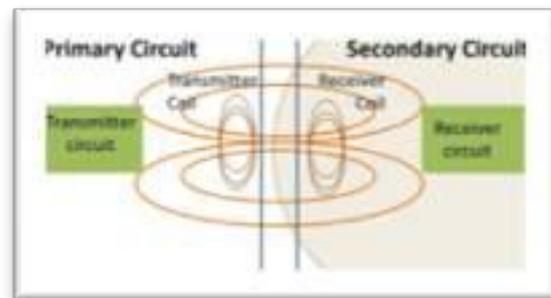


Fig.2-Working of the coils

## APPLICATION'S

- Wireless Charging for
- Cellphones
- Electric Vehicles
- Laptops
- Powering electrical appliances/devices such as light bulbs, Televisions, etc.
- It can also be used for industrial purposes where wired transmission of power is not possible.

## LIMITATION'S

- The flux condition should satisfy certain conditions; if not no power supply takes place.
- There is a loss of power transmission if there is a strong ferro-magnetic substance within the field created by the magnetic flux from transmitting coil.

## REFERENCES

- [www.wikipedia.org](http://www.wikipedia.org)
- [www.slideshare.net](http://www.slideshare.net)

# Driver Identification Tracker

SAURABH SINGH  
TARUNA TIWARI  
PRACHI SINGH  
VIDHIT TAMBE  
TE-EXTC-B

Mumbai is big. It's full of dreamers and hard-labourers, actors and gangsters, stray dogs and exotic birds, artists and millionaires. It is very well said that no one can escape from Mumbai and death, lavish lifestyle and the most common aspect here is mode of transportation. Vehicles are very important and essential component in day to day life.

Vehicles don't allow one group of people to isolate from another and has proved out to be very effective and handy in mapping up the distance. Invention of vehicle is indeed a blessing for mankind. In recent times we have come across many cases regarding theft of vehicles and there have been many questions raised over safety of vehicles in Mumbai and same issues revolve all around the globe. There have been several cases wherein fake drivers get their hands on cars of private companies like OLA , UBER and this gave rise to some serious crime. Also vehicle gets stolen and there is lot of vehicle related theft on national highways.

A major step needs to be taken regarding safety of vehicles and hence and hence taking all this severe issues in to consideration we have decided to make a Driver identification tracker so that such cases can be brought under control to a larger extent and thus guaranteeing safety of cars and society

- Driver identification tracker defines the safety of the car as well as the owner and raises the standard of security of the car. The basic application of this product is that it can be a

very essential market product which in turn will help us identify the genuine owner of the vehicle ensuring safety of vehicle in every possible way.

Now let take this article to its technical aspect and further discussing its working in detail.



Fig.1 Fingerprint Module

## 1.1 WORKING:

- To create a simple DRIVER IDENTIFICATION TRACKER to protect your car from unauthorized user, we thought of using fingerprint sensor and Arduino together. For simplicity, we modify a little bit the terms used to make it easy to comprehend for the purpose of this application.

- Basically, we will modify the starting system of the vehicle. The basic connection is IG from ignition switch will supply voltage to the voltage regulator then to Arduino to turn it on and off, within 10 seconds, scan your finger in the sensor. Finger match will activate the relay that controls the starter relay. Then you can crank the engine. After 10 seconds, the fingerprint sensor will turn off. You can turn it "on" again by cycling the ignition. No finger detected by the sensor within 10 seconds or finger image do not matched, the starting

system is disabled and no cranking will occur.

- Since every car model do not have the same starting system configuration, be sure to consult your vehicle electrician or check your car's Electrical Wiring Diagram prior to modifying your vehicle's starting system.

- Remember, fingerprint sensor will not crank your engine. It will only activate and deactivate the starter relay to either prevent or allow cranking of the engine.

## 2. COMPONENTS USED:

The components used in this project are as follows:

- Arduino Uno

- Fingerprint Sensor
- Regulated Power Supply
- Relay
- NPN transistor
- Resistor 1K ohm

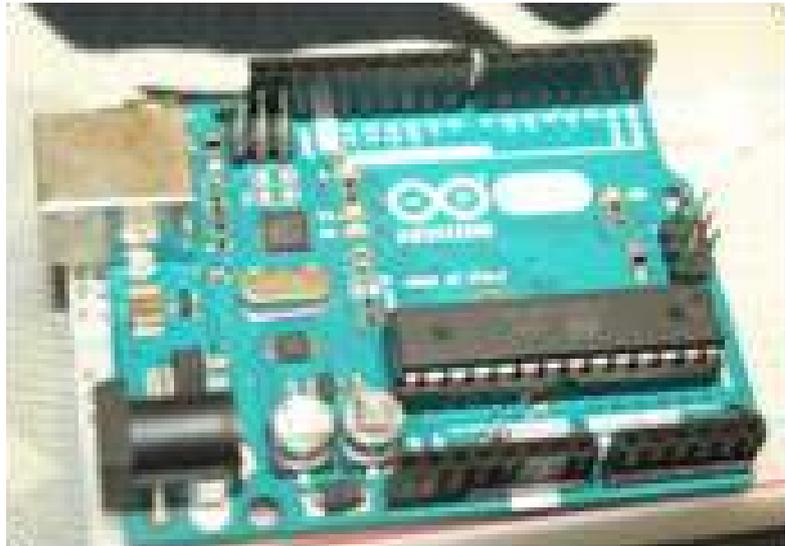


Fig.2 Arduino UNO Board

# Graphite Based Gesture Controlled Device(GGC Device)

SHARDUL SAWANTBHOSLE  
NIKITA KHATIYA  
RICHA SINGH  
RAHUL  
TE EXTC A

## ABSTRACT:

To reduce the number of switches and to use the new technology of gesture controlled device, we are using a graphite which being conductor of electricity can easily be used.

Keywords- Microcontroller, relay, current amplifier, graphite.

## INTRODUCTION

In the world of technology, switch plays an important role in controlling devices. In fact every device needs individual switch for its operation.

Sometimes it becomes tedious to ON or OFF the switch when there are multiple devices so for that we have come up with Gesture Controlled Device.

It will use properties of Graphite and a pattern will be allotted to individual devices on which they will operate.

It will automate the operation of the switch and revolutionizes the switching action.

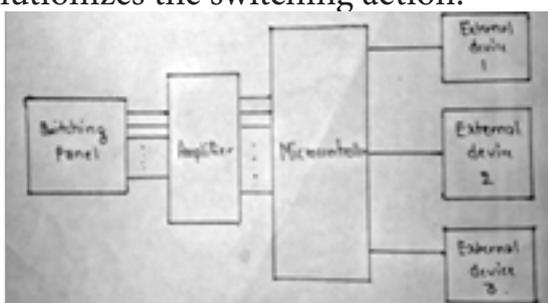


Fig. 1. Block Diagram of Project

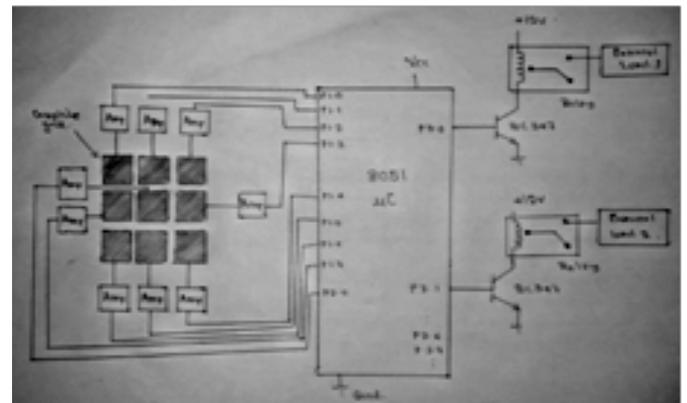


Fig. 2. -Circuit Diagram of Project

## LIST OF COMPONENTS:

1. Graphite
2. OpAmp
3. Resistors
4. Microcontroller
5. Relay
6. Connecting wires
7. Battery
8. LED

## WORKING:

The main elements of GGC Device are:

1. Graphite Grid
2. Microcontroller
3. External Devices

We all know that Graphite is a Conducting material. When we tap on any of the grid, charges from the body are transferred to the Graphite Grid. This causes a small current to flow through it. As the amount of current is very small, therefore we have used Current Amplifier.

Each of the grids is connected on the other part of the microcontroller. Tapping on any one of the grid or on multiple grids will send logic 1 pulse to its respective pins. The combination of these received pulses will be processed by the microcontroller and the port pin corresponding to the given pattern will get activated. The device connected such as bulb will glow connected to this port pins.

#### APPLICATIONS:

- Automated Homes.
- Gesture based intensity controlled device.

- We can connect many circuits with one graphite circuit.
- Paper keyboard.

#### REFERENCE:

- : <http://www.tutorialspoint.com>
- : <http://arduino.cc>
- : <https://www.academia.edu>
- : <https://github.com>
- : <http://instructables.com>

# PINE64



Kapil Sharma  
SE EXTC B

I am sure everyone has heard of Raspberry Pi .It's just a mini version of your CPU and it's self-contained. It has a USB port, HDMI port, GPU (graphics processing unit), RAM ranging from 256 MB to 1 GB and many more cool stuff .Pi 3 even have Wi-Fi on the board and Bluetooth too. It is like the cool kid in your college. I mean it's too amazing and what's more amazing is its price i.e. about Rs.3k.Yes, pretty expensive.

So as to compete this cool kid there comes something which is more cool and cheap called PINE64. PINE64 just like Raspberry Pi is a part of single board computer family, as the name of family goes PINE64 is a computer on a single board with many cool stuff more than its size. Against Raspberry Pi its RAM ranges from 512 MB to 2 GB DDR3. It supports Android 5.1 unlike Raspberry Pi. I know it's pretty cool but I didn't tell you the best part and that is its price i.e. Rs.990 (\$15) – Rs.1914 (\$29) which is pretty less as compared to Raspberry Pi. The prices range according to the RAM that the board have. That means you can get 2GB board just for almost 2k.I know I am talking a lot about money as an advantage but isn't money the base of every business? PINE64 could be cost effective for electronic

company.

After their specifications let's see how they both look.



Fig 1- PINE 64 and Raspberry Pi

Looking at these images, they both seem to look alike (other than their color). Against PINE64 where it has 2 USB ports, Raspberry Pi has 4 USB ports and Pi has Windows 10 IoT support too. Raspberry Pi can be used in big projects but on small scale you can use PINE64.

In the end it's not a war like Microsoft and Apple. Both the circuits have its pros and cons but the main aim of this article was to bring PINE64 into the spotlight and make you aware of a substitute to Raspberry Pi. I would just say,

If you can't afford a Raspberry Pi, get a PINE64.



# EVENTS



# Bridge Course on Product Designing and Implementation

Event Details: Bridge Course was conducted under Department of Electronics and Telecommunications Engineering for Second year students

Date: From 06/02/2016 to 17/09/2016

Venue: A-Block, Thakur Educational Campus, Shyamnarayan Thakur Marg, Thakur Village, Kandivali(E)-400101

Participants: 38 Students from Second year A & B div

Speakers: Dr. Mahesh Patil (IITB), Dr.Madhuri Mavinkurve, Ms. Anvita Birje, Ms. Sonia Behra, Mr. Niket Amoda & Ms. Sonali Singh

## Course Objectives

1. To make students familiar with electronic components like MOSFET, LDR, LED, Relays etc. along with other fundamental components.
2. To make student understand different types of PCB and its designing using software and manual method.
3. To give hands on working experience on PCB design and implementation.
4. To enhance product development skill among the students.
5. To encourage the students to implement innovative ideas.

## About The Event:

On 6th Feb 2016 bridge course initiated with a theory lecture on Introduction of course and design of BJT biasing Circuit which was conducted by Dr.Madhuri Mavinkurve .

The second session was on 20th Feb. 2016 which was the actual practical session in which was conducted by Mr. Niket Amoda & Ms. Sonali Singh. In this session Students were able to identify the various components and able to test it, also they made small circuits.

The 3rd session (05 March 2016) was beyond hardware part it was on “software simulation”. This session made familiar with different softwares and this conducted by Dr. Mahesh Patil (IIT Bombay). He had taken practice session on SEQUEL.



Lecture on SEQUEL

After three sessions actually beginning with syllabus part of the product that students were suppose to make at the end of the course. Design of applications and it Op-amp was taught on 19 march 2016(4th session) by Ms. Anvita Birje.



Lecture on OP-AMP

The next session was bit later from the previous session and the topic was Design of BJT, FET and Power Amplifier & its applications it was on 4th July 2016 By, Ms. Sonia Behra. On the next day the next session began on “Design of Rectifiers and Regulators Implementation of Projects/Product”. The most exciting time of the bridge course was IV. It was on 7th July 2016 to “G.M Enterprises” Mahape. The Faculty arranged this IV so that participants got the actual taste of an industry. In this IV students came to know about how the product is actually designed which includes PCB designing, how product looks like. The IV was done in two parts the 1st part was on theoretical knowledge about the PCB designing and the 2nd session was practical implementation of PCB.



### IV to GM Enterprises

The Final session was from 8th July 2016 to 3rd September 2016 which includes 6 sessions. In the final session students had formed group of 3 members and each group were assigned a project along with a mentor and then students work on project and make it as an effective product. The final exhibition & competition was on 17th September 2016. Each and every project was displayed on this day and they were appreciated by Mr. Bhargav Thakar from ABB, India Pvt. Ltd. He analysed each product in detail and announced 3 best products as the winners.



### Final Exhibition of the Product



## List of Winners

1st Prize	Umesh	Single stage Amplifier(CE/ CC/CB)
	Satyam Singh	
	Milind Telang	
2nd Prize	Tarush Shenoy	RC Oscillator Design with Frequency Range (RC phase shift, Wien Bridge, Twin T)
	Rohit Tiwari	
	Sanath Acharya	
3rd Prize	Ratan Gupta	Summing Amplifier, Subtrac- tor, Log, Antilog, Differentia- tor, Integrator using Op-Amp
	Vivek Rai	
	Shivam Agarwal	

## Course Outcomes

After the completion of this course student will be able to

1. Select required electronic component on the basis of their characteristics
2. Differentiate between different types of PCB and its designing techniques.
3. Design an electronic circuit for open ended system.
4. Develop an innovative project on small scale.



# Industrial Visit to GM Enterprises and GM Controls

SE EXTC (A & B) students visited GM Enterprises and GM Controls (Mahape) on the 7th of July 2016 as a part of Bridge Course Activity under CII.

Objectives:-

Students should be able to understand electronic manufacturing services.

Students should be able to understand different types of PCBs and its designing using software and manual method.

G.M. Enterprises:-

G.M. Enterprises, true to its slogan, “Anything in Electronics...” offers comprehensive EMS solutions for all applications in the ambit of electronics. The company was established in the year 2000, and in a relatively short time span of a little over a decade, it has made its name as a leading EMS provider in India having four strategically located plants, to cater to its widespread customer base.

The corporate office is located in Thane, and its four manufacturing plants, with state-of-the-art manufacturing facilities are located in Mumbai, Navi Mumbai, Pune and Haridwar.

At first students were taken to the conference room where Mr. Sandip Pandore (Operation Head, EMS Business) explained to them the working process.

The customer gives an order of a product with its circuit design

Stage 1: - According to the customer requirements a bill of materials (BOM) or part list (PL) is prepared.

Stage 2: - According to the PL the raw materials are purchased

Stage 3: - These raw materials are inwardly inspected to verify whether the quality and quantity is perfect or not.

Stage 4: - These materials are stored properly.

Stage 5: - Kits of components are prepared. One kit contains all the components required for the product. Number of kits prepared is based on the demand of the customers.

Stage 6: - Using these kits the actual product is produced.

Stage 7: - The products are inspected and tested properly.

Stage 8: These products are packed properly and then stored for dispatch.

## Information of Industry used PCBs:-

The premise exploration started with their store room, where all their raw materials were kept. They had loads of bins in which various components were kept. Each and every bin had a serial number. They had an index to indicate which component associates to which bin.

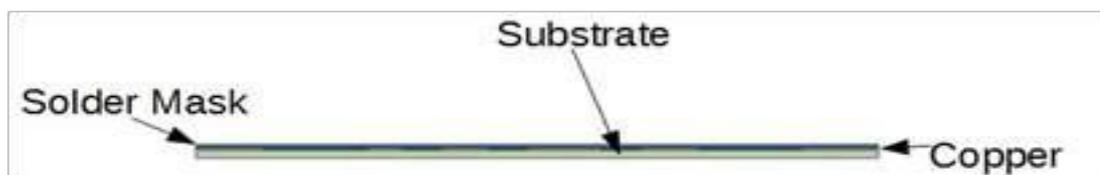
There Mr. Sandip gave the idea about two different types of components-

1) SMD: - Surface mount device

2) Through-hole devices

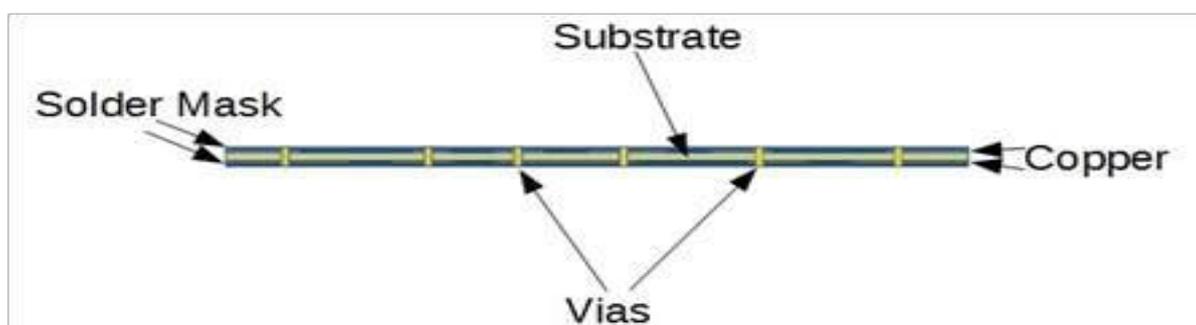
He also showed the students the different type of PCBs which are used for various devices.

### 1. Single-sided PCBs



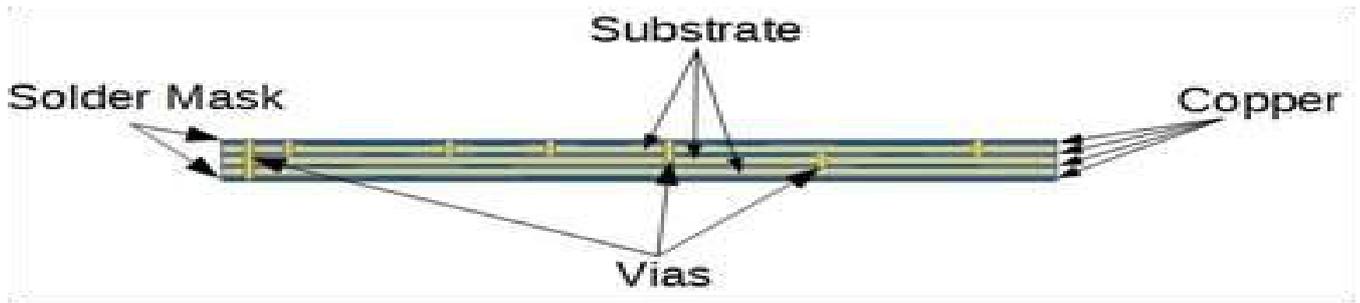
Single sided PCBs are the most basic type of PCBs. They contain only one conductive layer and thus are restricted for use in simple low density designs. Accordingly, they are low cost and well suited to simple and high volume products.

### 2. Double-sided PCB



Double sided PCBs probably are the most common type PCB. They allow for the routing of traces around each other by jumping between a top and bottom layer by way of Vias. The ability to cross paths from top to bottom greatly increases the circuit designer's flexibility in circuits designing and lends itself to greatly increased circuit densities. This type of board is relatively low cost, but only allows an intermediate level of circuit complexity and does not lend itself to electromagnetic interference reduction techniques.

### 3. Multilayer PCBs



Multilayer PCBs further increases the complexity and density of PCB designs by adding additional layers beyond the top and bottom layers seen in a double sided configuration. With the availability of over thirty layers in multilayer PCBs configurations, multilayer PCBs allow designers to produce very dense and highly complex designs. Quite often the extra layers in these designs are used as power planes, which both supply the circuit with power and also reduce the electromagnetic interference levels emitted by designs. Lower EMI levels are achieved by placing signal levels in between power planes. It's also of note that increasing the number of power planes in a PCB design will increase the level of thermal dissipation a PCB can provide, which is important in high power designs.

Process of Mounting of components:-

The next section was about the Process of mounting components where the students were explained about how these circuits are produced and how components are mounted on these different types of PCBs.

Starting with the SMD components mounting on single sided PCBs. They are first inserted in the DEK printer where the solder is placed on the spot where the SMD component is to be placed. This PCB is then inserted to a pick and place machine where the machine is programmed such that it will place the required component at its perfect place by using the coordinates that is entered by the programmer. In this machine SMD components are only placed on the PCB. After this, the PCB is put into a curing machine which heats up to 240 to 260 degree Celsius, which perfectly mounts the SMD components on the PCB.

For double sided PCBs the DEK printer is used on one side and a glue paste is used at the other. The SMD components at one side of the PCB are mounted by the same technique as that of single side where as the other side is initially glue pasted and then inserted to the wave machine where a solder bar is put, which is melted and the other side is soldered accordingly.

On the first floor there was an area where the process of mounting the through-hole components was being performed by a similar kind of pick and drop machine. The machine here just mounts the devices in one direction of the table on which the PCB is kept, and then is moved in the other directions. These through-hole PCBs are then soldered by the wave machine.

Some components are quite big. These cannot be mounted by the machines, and thus have to be mounted manually by the workers.

Each and every PCB is then tested manually by the workers. They have to wear a wrist band which reduces the effects of body charges which may damage a component while checking them.

This concluded the visit to GM Enterprises.

The visit to GM Controls, followed next.



#### GM Controls:-

This facility is used for manufacturing bare PCBs, both single-sided and double-sided. At GM Controls the students were guided by Mr. Manohar Sakpal who explained various steps of PCB manufacturing to the students.

The Manufacturing Process is of several different steps as stated below:-

- 1) The required Design is acquired by the company from the customer.
- 2) The Design is then sent to Engineers who use CAD/CAM technologies to create the design on the computer.
- 3) The Design is then transferred on a paper which is pasted on the Copper Clad.
- 4) The Copper Clad is taken by the company on a wholesale basis and is then cut to the required size by the use of Manual Machines.
- 5) The Clad is then polished to remove any impurity on the surface of the Clad.
- 6) The Design is then pasted on the Clad using a UV machine.
- 7) The required holes are drilled on the clad using CNC drilling machines. The holes are only drilled for PCBs using Through-Hole components.
- 8) After drilling, the PCBs are sent for the Etching process. In the Etching process, everything except the track and the holes become devoid of Copper
- 9) The Tracks are then soldered using a machine.
- 10) The Tracks go through a masking process. The masking process protects the tracks from any external stimulus and increases the PCBs life. The masking colour is specified by the customer. The colours which are generally used are Green, Red and Blue.
- 11) The holes are then soldered using a machine which completes the process for Single-Sided PCBs.
- 12) For Double-Sided PCBs the process is again repeated for the other side.
- 13) The PCBs are tested using a Test Board. On the Test Board there are pins which are corresponding to the Track. If the PCB goes through and through, the PCB is considered as OK. It is then supplied to the required Customer.

#### Outcomes:-

The students are able to understand electronic manufacturing services such PCB assembly, soldering process, solder paste printers, Pick & Place Machines.

The students are able to differentiate between different types of PCB and its designing techniques. The students have also gained an insight about how the PCB manufacturing industry works.



# Technical Seminar on 4G/5G

A technical seminar was conducted for SE, TE & BE EXTC students on 4th August (for SE EXTC) and 5th August (for TE & BE EXTC) students respectively. The topic for SE students was “Smart Homes” which was conducted by the resource person, Mr. Priyank Mehta, Proprietor, Fortis Technologies. There were a total of 115 students who took benefit of this seminar. In the first half of the seminar, students were explained the basic meaning of IOT, its history, timeline, perspective and the future scope of IOT. In the second half, students were introduced with enticing offers of certificate courses from NSTP-2016, which would not only enlighten them in the field of IOT but also help them improve their resume. Each policy was associated with the ED cell of IIT Roorkee and Finland Labs and Revert Technology which made the students even more exuberant. The students could either enroll in the Embedded Systems and Robotics training course or in the Raspberry Pi Development course, each of duration of 7 days. Each course was explicitly explained to the students with its fees and benefits highlighted. Any interested student, of any stream could attend the training course. Finally, Mr. Mehta engaged the students in a fun activity where they were divided into 4 groups, and each group had to present a problem faced by man everyday and to come up with a solution with the help of IOT. All the groups came up with innovative solutions to daily problems which showcased the immense potential in the future engineers, to the resource person.

The topic for TE & BE students was ‘4G/5G The new wave of Telecommunications’ which was conducted by the resource person, Mr. Vinod Johri, General Manager, Reliance Jio. A total of 270 attended the session. It was a very informative seminar, in which the students were told about the various recent developments in the field of telecommunication and also briefed about the problems that the company had to face during its transition from a ‘Telecommunication company’ to a ‘Digital company’. In the initial part of the seminar, a basic idea as to how 4G works and the major advantages of 4G was given. In the later part, the speaker explained the importance of the current advancements in the field of networking and technology. Apart from the main topic of 4G and 5G, he also explained to the students - how IOT could change the way of living. Numerous examples of simple day to day activities being transformed completely by the uses of IOT were discussed. One of the many examples was that of an automatic bus (made by Reliance Jio), which could drive itself around without any human to drive it. Other examples discussed included automated homes, smart appliances etc.

Overall, the seminar was a wonderful experience. It was thoroughly enjoyed by all the students and they gained a lot from it.



An Activity, "Step into the world of technology", was conducted under IEEE on 5th August 2016 from 3.30-5.30 in the slot provided for Extra and Co-Curricular Activities. The Activity was conducted for both SE EXTC and TE EXTC.

Activity for SE:



SE students had to present their projects to the faculties. The students were divided into groups of 3-5. 50 students participated in this activity. A total of 10 projects were presented on that day. The best three projects were declared as Winners.

These Projects are going to be used for an exhibition at a School to inspire students to gain Technical knowledge and join the Technical field in the future. The winners had following project titles:-

- 1st Prize- Static Electricity
- 2nd Prize- Mini Generator



Students Presenting Their Projects



Activity for TE:

TE students were asked to present projects which were a technological solution to a Social Problem. 10 Students participated in this activity. It was an Individual Presentation. Projects which were cost efficient and feasible were reviewed for further development. The winners had following project titles:-

1st Prize- Biometric Security by Ashishkumar Jaiswal

2nd Prize – Voice activated chair by Ravi Pandey



# Industrial Visit to El-Guard Security Locks Workshop

- Event Details: Industrial Visit under Department of Electronics and Telecommunications Engineering for Second year students
- Date: 16th September 2016
- Venue: 36-C, Kandivali Co-op Industrial Estate Ltd, Charkop, Kandivali(W) Mumbai-400067
- Participants: Dr. Lochan Jolly (Dean SSW), Dr. Madhuri Mavinkurve, 14 second year EXTC students
- Objectives:
  1. Students will be able to observe the practical aspects of systems.
  2. Students will be able to correlate theoretical concepts with real time practical products.
- Staff Involved:
  1. Dr. Lochan Jolly - Dean, SSW.
  2. Dr. Madhuri Mavinkurve - Faculty.

## THE BACKGROUND

On 16th September 2016, 14 students and 2 faculties went for industrial visit to El-Guard, an electronic safety company that produces security locks at their workshop/factory in Charkop, Kandivli. The entire visit took about 2.5 hours.

## ABOUT EL-GUARD

The mechanical lock industry has undergone a transitional period in which locking solutions have become more secure as well as more sophisticated. EL-GUARD INDIA Pvt. Ltd. established in the year 1992, has very well adapted to this transition, manufacturing and marketing electronic safes and various Electronic Security products, their motto being 'Trust, Reliability & Innovation'. El-Guard manufactures three main classes of products:

1. Commercial/Home Safes
2. Hotel Safes
3. Customized and Special Application Products

## THE VISIT



We were greeted by the owner on reaching the premises and we learnt that it was the first time they were having students visiting them. Later we got to see the making of the safes/locks as we were taken through the entire process and guided by said person.

The following things were explained to us in great detail during which students asked questions and we look at different scenarios surrounding safety and electronics of the security system:

- The basic circuitry of the lock system including the processing chip, the actuator circuit, lock alarm triggers and other SMD components.



The demonstration of a finished product

- The functionality of the keypad: the admin-->master-->user structure, door open warning functionality etc and all the various scenarios surrounding it like cases of emergencies and use of the keys.
- The security features of their models showing how access to the hardware can make the safe vulnerable to hacking, the dialer module which further led us to understand the difference between GSM connected devices and IoT.
- The brand is quite innovative and they have added many special features which the customer can opt for or not like the RFID ibutton which works as a key to unlock the safe. The ibutton is advantageous over RFID tags as it works as a circuit completer, inducing a voltage when brought near the lock. This helps save battery.
- Similarly, they have a lighting system fitted for safes that are used in banks. LEDs are used here to save power and it lights up only when the door is opened.
- About the battery life: It was interesting to know, in contrast to normal assumption that the battery lasts over a year. The circuits have been design in a way which uses battery efficiently.



The place where the chips are programmed

- 
- Some feature that I think should be added is compact size. The whole kit looked very bulky. Although, the door of the safe should be bulky, the keypad size can be further made compact
  - The hex files are preloaded to the software which is a used to select the desired functions/features.

## CONCLUSION

The latest technologies have revolutionized the simple lock and brought us locks that work on encrypted digital code system, which is virtually impossible to hack, as it has trillions of combinations, and at the same time the codes can be changed as and when one wants, thereby, increasing the safety level many folds. These Safes sound user friendly, and the digital code is always in the memory of the user. This eliminates the requirement of carrying keys altogether.

# Industrial Visit to Reliance Jio Corporate Park

On September 30, 2016, the department of Electronics and Telecommunications had organized an industrial visit for students of BE-Semester 7 who were accompanied by five Faculty-coordinators (Ms. Sujata Kulkarni, Ms. Megha Gupta, Ms. Kalawati Patil, Ms. Sukruti Kaulgud and Ms. Aradhana Manekar) of the department. The visit was to the Reliance Jio Corporate Park, Ghansoli.

Students were asked to report in college at 8:00 a.m. after which the visit started at 9:00 a.m. with the mode of transportation being two buses for separate divisions of the department. Ghansoli, a suburb, is also one of the nodes of Navi Mumbai.



Reliance Jio Corporate Park, Ghansoli

The group was first given visitor passes after reaching the Corporate Park and then taken to the Training hall of the Learning Centre at 12:00 p.m. Within the industry premises, Mr. Saurabh Srivastava of the Training Department took charge and briefed the students up with a very informative introduction about the evolution of telecommunication networks from 2G to 4G as well as the technologies that have been updated in association with each, describing every phase in detail. He also informed them about the various departments within the Reliance Jio industry. At the end of the introduction, the curiosity of the students was finally satisfied when a question answer session was conducted by Mr. Saurabh. The students were provided with a deep insight about the working of the Jio industry and each and every question was patiently answered by him. After a short break for refreshments, the group was taken to the Cell Site which had the eNode B consisting of a tower and its various equipment. The third and the final stoppage was the NOC, that is, Network Operations Centre. From the NOC, the telecommunication network over the entire country is monitored. It has two sections, namely, Networks Section and the Services Section on two different floors. The NOC comprises of three teams within it, the Transport team, team to monitor the eNode B by remote login and the Field Operations team. All the teams are available on a 24 x 7 basis where the employees work in shifts.



Network Operation Centre

Students were amazed at the speed with which the process occurred and also at the efficiency of the whole system that has been set up. The visit concluded by late afternoon. The industrial visit to Reliance Jio Corporate Park was an enriching experience for students in getting live exposure of telecommunication networks which can help them greatly in their projects, internships as well as career enhancements.



**DEPARTMENT  
TOPPERS**

# TOPPERS OF THE DEPARTMENT

## 4th Semester

SR. NO.	NAME	CLASS	FINAL GPA
1	PARIKH KARAN KAMLESH MEENAKSHI	SE EXTC A	9.81
2	SHENOY TARUSH GANESH SONALI	SE EXTC B	9.71
3	KUSHWAHA SUMIT LALAN ANITA	SE EXTC A	9.54

## 6th Semester

SR. NO.	NAME	CLASS	FINAL GPA
1	BHARDWAJ SMRITI RAJESH PURNIMA	TE EXTC A	9.67
2	GUPTA RAJAN UMESH SANJU	TE EXTC A	9.57
3	SAPALE DARSHANA AVINASH SMITA	TE EXTC B	9.54

## 8th Semester

SR. NO.	NAME	CLASS	FINAL GPA
1	SAHU NARAYAN GORAKHPRASAD SARASWATIDEVI	BE EXTC A	9.06
2	KOTHARI ISHITA RAKESH ANISHA	BE EXTC A	8.98
3	SAXENA ABHISHEK GIRISH ARADHANA	BE EXTC A	8.88

# CODE OF ETHICS

- Engineers shall hold paramount the safety, health and welfare of the public in the performance of their professional duties and disclose promptly factors that might endanger the public or the environment.
- Engineers shall perform services only in the areas of their competence.
- Engineers shall issue public statements only in an objective and truthful manner.
- Engineers shall treat all persons fairly and not engage in acts of discrimination based on race, religion, gender, disability, age, national origin, sexual orientation, gender identity or gender expression.
- Engineers shall strive to improve the understanding of technology, its appropriate application and potential consequences.
- Being honest and impartial, and servicing with fidelity the public, their employers and clients.
- Striving to increase the competence and prestige of the engineering profession.