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DEPARTMENTAL VISION

The department of Electronics and Telecommunication Engineering envisions developing internationally competent professionals with a sense of responsibility and social sensitivity.

MISSION

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

INDEX

MESSAGES

DEAN'S MESSAGE

Dr. Lochan Jolly
Professor & Dean
(Student & Staff Welfare)

Dear Students,
Congratulations to the team of 'Abhivarg' !They have done a wonderful job.
I also thank the co-ordinators of EXTC department that every time they give me a chance to talk to all of you through this magazine. Today I had selected the topic 'Who am I?'
Who am I? It is an age old question to enquire about, What is life? What is Existence? What is world? And etc.
It seems the answer may come through deletion, "Not this, Not this". I am not the body, I am not the mind, I am not the things of the world which I perceive. Then who am I? At best this enquiry brings one to the understanding that he was traveling down to a dead end street. He is trapped in a vicious circle due to Body, Mind, Intellect unable to reach beyond itself.
This is the maximum limit, the mind and intellect can reach and he has no other means to enquire further. This ends the story, "I do not know ". The mind gives up.
All the knowledge and experience is localized and relative and cannot attain ultimate knowledge. With this understanding , the mind is stilled and there is no further efforts and no further seeking.
The stoppage of seeking makes the mind a piece.
End of seeking is the dawn of knowledge. There is a power that runs the show, call it Aatma, Parmatma, Allah, Christ, God ……. any name. All name point to It. It is nameless but omnipotent and omnipresent.
It is one power pervading all beings. In Geeta Chapter 13 Phrase 2 Krishna says "Know myself to be the individual soul in all the beings".
It is pointed out as "That".
We are deluded by identifying with the body as individuals (ego) imagining as separate entities as doers thus create our own world.
This world is mental and dreamlike.
By a foresaid enquiry, the individuality can be dissolved and your real nature is revealed as "That".
You are that. Who am I? – I am That.
Sat-Chit Anand
"Existence, Knowledge, Bliss". You are complete Bliss.
God Bless

HOD'S MESSAGE

-Dr. Vinitkumar Dongre
Associate Professor, HOD EXTC

ABHIVARG, the Electronics and Telecommunication department magazine, yet again is a great compilation of articles and notes from our students. I would like to congratulate the whole team for their exceptional work, and appreciate all the hours and hard work put into creating and releasing this magazine.

Students of today, are of eager minds, and their eagerness to learn new things work to develop something, is what powers the development in today's technology. This magazine is a peek into what these young minds think and dream of, what is their opinion about anything and everything technically.

Reading is a great habit to have, and for all the technical minds out there, this is surely going to be an informative compilation, to amplify your minds.

FACULTY INCHARGE-ABHIVARG

Mrs. Megha Gupta
Assistant Professor

D - DECISIVE

Y- YOUTHFUL

N- NOBLE

A- ATTENTIVE

M- METICULOUS

I - INCREDIBLE

C- COMPETENT

Electronics and Telecommunications Engineering students and faculty members are dynamic, they have proved it once again. ABHIVARG is here again, covering all the domains of Electronics and Telecommunications. People from industry, Alumni, Faculty and students all are actively involved in giving their contribution for the magazine. Being connected to the institute some people from industry is showing keen interest in publishing their articles in our magazine.

Our alumni are still connected with our students and faculty members; they are working in different fields and are sharing their knowledge with our students via ABHIVARG.

Faculty has a lot to share from the pool of knowledge they have, to express the same our faculty members are finding this magazine as the best option. Our students are technically sound and they are making very good projects and participating various competitions. Such students get a good platform to get recognition via our magazine; they are also encouraged to do even better.

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INDUSTRY INVOLVEMENT

To Lead or Not to Lead?

We are a very lucky generation. We are witnessing several technological advances us. Each change is staring at us and asking, "Do you want to lead the change or follow the change?" . You cannot ignore the change for sure.

Let's do a reality check - am I taking lot of time to understand and use the features of my new smart phone or am I learning faster? Do I even need a use manual or the user interface is very intuitive? Am I doing the same thing over and over again or am I getting new gadgets and information (read insights) to perform faster and better. Is picture quality, sound clarity improving? Do I aspire for a better one?

The choice is– the same way or the better way? Each of us has tremendous potential. I am sure, each of you wants to lead a change rather than follow a change. Many of us just don't know where to start and how to start. Here is a recommendation - start observing. Identify the day-to-day problems or challenges or just laborious activities or time consuming activities. If you automate them, you take a lead. Several PhD students were using a search engine that was not efficient, but they assumed it was the way of life and nothing can be better. Somebody observed that this is not the right way and there is scope for improvement. They went ahead to develop the algorithm and created Google. There are several such examples, and I am sure many of you have read them. But, the question still remains, "How do I lead this?"

We think we need so many things to start working. But, as Jack Ma says, "You may be having many great ideas, but I just start working on them". If one waits for the best design, best time and best partners, it will never come. One will continue to wait, to get better. On the other hand, if you start small with whatever you have and whenever the idea strikes, you will hit a goldmine. This is how we hear that most huge companies started either in garage or in campus. They started small and eventually became better and bigger.

After around 20 years in industry, I still look forward to an opportunity for doing some full-time course where I will get to learn new things and have some time on my hand to do further research and develop something better. You are at that stage in this college. Believe me, this is the best time for you to try something new, try it and test it. It could be one of your projects that can also get you great marks.

The starting point for innovation is identifying a challenge / problem / issue. Just identify challenges faced in the current scenario without thinking if the solution would be easy or if you can develop the solution yourselves. The moment we start thinking about solution, we compromise on the robustness of the solution because we start diluting the problem statement based on our constraints. You will recall that the Google founders were not aware of the page rank algorithm they went ahead to develop, when they stated that the search results provided by search engine has to be better. But, many other PhD students were 'okay' with available search results. Ask yourself if you are 'okay' with the way things are or you want to lead the change.

You won't be successful each time, but each time you will be one step ahead of the rest. Even organizations appreciate these setbacks and know you are a thinker and a person who has the ability to lead a change. I would rather have a person who questions the norms, who challenges the currents state and thinks of a future state in my team. If I can give him right environment and resources, I know I can get something as against a person who just follows my instructions even if he or she does a perfect job.

- Mr. Vijay Kaulgud
Director Research and Innovations
CAPGEMINI, Vikroli

Security in Internet of Things (IOT)

With IPv6 and the wide deployment of Wi-Fi networks, IOT is growing exponentially. Researchers estimate that by 2020, the number of active wireless connected devices will exceed 40 billion. This growth can be dangerous in absence of a tightly secured device. Each of these devices can be a potential entry point for hackers. Some years back if someone would have said "I will hack your phone and use your passwords to break into your twitter account through your microwave" you would have said "you must be dreaming". Welcome to the connected world and this is very much possible.

Baby monitors have been hacked to gain access into the camera settings, allow other users to access live feeds from these cameras, thus breaching the privacy. In January 2014 Proof point found that in a large scale email attack close to a million malicious emails were sent from 1,00,000 internet enabled devices including a refrigerator! In September 2014 hackers attacked home routers to change the DNS settings and gather large amount of banking credentials. Imagine an Internet connected Pacemaker being hacked; it's the question of life and death. Connected cars are a risk of being controlled by hackers, researchers hacked into car through a laptop connected to the diagnostic port and manipulated the settings for the steering, brakes and headlights. Can you imagine driving such a manipulated car?

A car maker had to recall 1.4 million cars and trucks to install a security patch to fix the issue of the car being hacked into and controlled remotely. This whole episode was an eye opener for the entire connected devices manufacturing world.IOT security which was ignored earlier is now getting the due the importance. More than being an issue it has now become an area of concern and many leading organizations are coming together to bring solutions to the table.

Internet of Things Security Foundation formed by leading organizationsis a non-profit body that will be responsible for vetting Internet-connected devices for vulnerabilities and flaws and will offer security assistance to tech providers, system adopters and end users. Microsoft is bringing BitLocker encryption and Secure Boot technology to IOT. Bit Locker is an encryption technology that can code entire disk volumes, and it has been featured in Windows operating systems since the Vista edition. This can be crucial to secure on-device data. Secure Boot is a security standard developed by members of the PC industry to help make sure that your PC boots using only software that is trusted by the PC manufacturer. There are many such initiatives being taken and it will be difficult to cover these as part of this write-up.

Let's look at some of the aspects of Securing devices. The Five major areas of securing IOT ecosystem are Device (Physical), Network, Server, Data and operating Systems. The most vulnerable point of any device is its Physical security. Physical security of your devices is as important as physical security of your servers. Network security is seen as the weakest link in the data transfer and communications chain in IoT implementations. It's the least risky to the hacker and the method that generally pays the highest dividends in compromised data hacks. Virtual Private Network (VPNs) is one of the ways to secure the network. Servers can be secured by Secure Boot, and exposing the minimum possible services through them. Data should be stored in an encrypted manner so that its contents are jumbled to the point of diminishing returns for anyone who could collect it, transfer it, and decrypt it. Operating system security has to do with patches, strong passwords, encrypted file systems, antivirus software, antimalware software, and intrusion protection monitoring. Operating systems are also very weak link in the overall security spectrum. Lastly and more importantly security should not be an afterthought, it should be built into the device right form the conceptualization phase up to the production and use.

Mr. Narhari Mane

(Associate Director Capgemini)

ALUMNI DESK

Visible Light Communication (VLC): Transferring a b/w image from one laptop to another.

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Keywords: Visible Light Communication (VLC), Light Fidelity (Li-Fi), Wireless Local Area Network (WLAN), Wireless Data Transfer, MATLAB Arduino Interface.

Abstract

Communication is one of the basic need of today's world. VLC system by the use of simple LED bulbs and Photo detectors has been explained in this paper The concept, Flow chart and basic interface is described which can transmit B/W image from one laptop to another even when the receiver is in motion by the user of IR based detection circuit and VLC system. Transmitter and Receiver GUI are presented and range along with data rate is included.

Introduction

There is rapid development in the field of lighting and illumination. Concerns about energy consumption are leading to the phasing out of incandescent sources, and there is rapid growth in the use, and development of, solid-state sources. As the efficiency of these devices increases and their cost decreases there are predictions that they will become the dominant source for general illumination. At present they are widely used in automotive applications for indicator and tail lights, and the first LED based headlights are now becoming available. They are also commonly used in 'feature' and architectural lighting where the ability to change color, or incorporate lights into building structure, without reliability concerns, makes them preferable to alternatives. The advantages of VLC over traditional RF based communication systems are much larger bandwidth, non-hazardous, efficient and secured.

This paper presents a system which transmits a b/w image from one laptop to another. The basic principle of VLC is data transmission in the form of 1s and 0s where 1 is indicated by glowing of LED and 0 by turning off an LED. Bit toggling is so rapid that it doesn't affect the basic purpose of illumination. A detecting system is used which detects the receiving device and the communication is made possible even when the device is moving. This is achieved by using IR detecting system. The IR transmitter is attached to the receiving device and the IR receiver is attached to the LED lighting. This system helps to uniquely identify the receiver's current position and hence mobility is achieved.

VLC could be used safely in aircrafts, petrol pumps, integrated into medical devices and hospitals where the use of radio waves is banned .VLC could also be successfully implemented for underwater communication where radio waves doesn't work at all.

Proposed Work

The traditional way of communication is by the means of electric signal carrying wires. The wireless technology has emerged as a very upcoming and demanding field of communication. The RF signals are mainly used in wireless systems. These RF systems are highly expensive and inefficient.

VLC is wireless communication with the use of light emitting diodes has several prominent advantages over the conventional RF based system. The problem with this system is that it requires a line of sight communication. To overcome these problems all the other light sources have to be replaced by LEDs which can communicate with other devices.

Another important feature of a wireless system is mobility the RF based system gives a better mobility as compared to VLC. The project aims to provide mobility by the use of IR based detecting system which is a good option. The IR based detecting system uniquely identifies the receiver's position at any point of time. It finds the LED that is currently illuminating the receiver with high power. And thus uses it for the purpose of communication.

Block Diagram/Modular Description

2.1.1 Data: Data transmission is done via visible light. The data is to be transmitted is an image, text and file.

2.1.2 Data processing: The data to be transmitted needs to be processed. Data processing can be

done using MATLAB. The whole data is converted into binary format and is sent bit by bit to the receiver. The binary data which is passed to the LED makes the LED toggle and hence transmitting data to the receiver.

2.1.3 LED Togging: The converted binary codes are transmitted over to receiver taking visible light as its medium with the help of LEDs. These LEDs toggled in accordance with the binary codes received from the programmed.

2.1.4 Photo Detection: On the receiver side photodiode are used which detects the light incident on it. The analog voltage generated at the output of this detector is then given to the comparator.

2.1.5 Retrieving Data: The output of the photodiode is sent to the comparator along with the reference voltage and the appropriate result of each comparison computed to retrieve the final data.

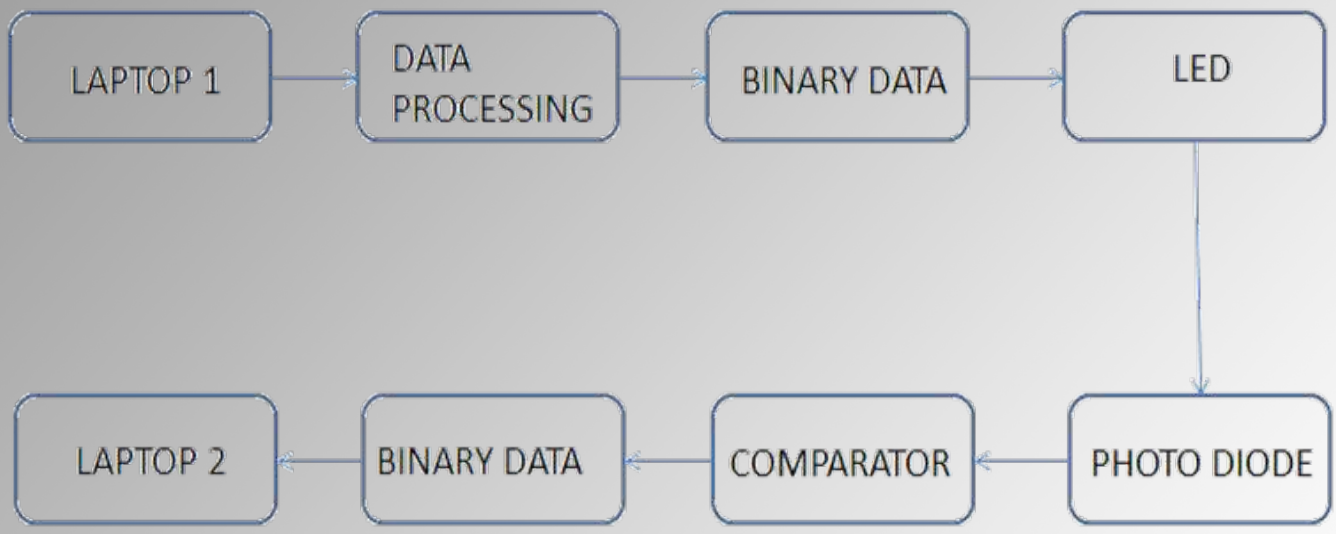

Figure 1. VLC Block Diagram.

Flowchart

The Data can be anything an audio file, an image or a video. It is first processed and converted into binary form. Basically this step is analog to digital conversion. This binary data is then converted in the form of varying voltage level which is then given to LEDs.

The LEDs toggle at a very high rate this flickering is noted down by receiving photodiode. The comparator is used to get A huge difference at the receiving end and thus uniquely identifying 1 and 0 to get the final data

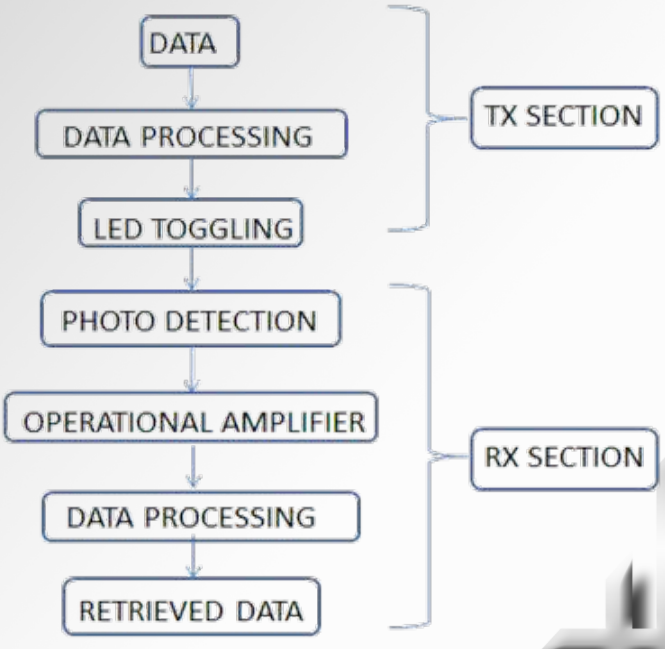

Figure 2. Flowchart.

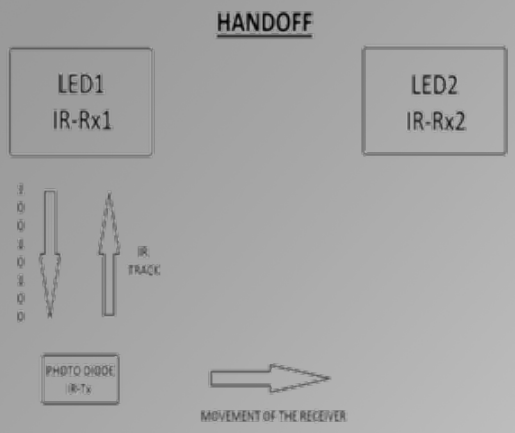

Fig. 3 Handoff Block Diagram

The first generation of mobile (AMPS) has no roaming facilities. The mobile phones were restricted to their home base station. The term handoff originated from the second generation of mobile phones (GSM).The mobile phones in second generation was not restricted to a particular base station. It will be implemented in this project as an extension to the VLC systems. An IR based system is used for the process of handoff. The IR receiver is placed near to each LED transmitter and IR transmitter is placed next to LED receiver. Initially the receiving device is in the vicinity of LED1 and thus communication takes place through LED 1 and LED2 is kept ideal (only illumination). Now the receiver starts to move from the range of LED1 to LED2 thus the received IR voltage at LED2 keeps on increasing. At a particular point of time the voltage of LED2 becomes greater than LED1 and the IR detecting system uses LED2 for communication and LED1 is kept idle(for illumination). Thus handoff is achieved.

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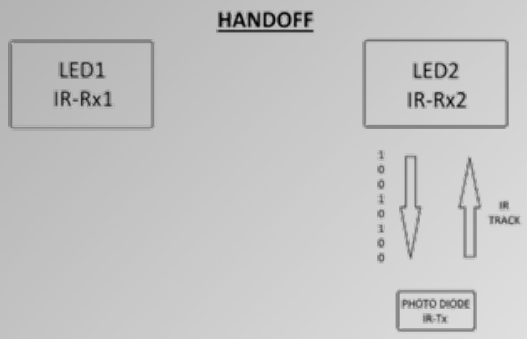

Figure 4. Handoff Block Diagram no.2

greater than LED1 and the IR detecting system uses LED2 for communication and LED1 is kept idle(for illumination). Thus handoff is achieved.

Design and Implementations

Transmitting Data using simple led

Conventionally data is transmitted from one point to other using standard radio waves which are scarce, expensive, hazardous and costly on the other hand light which is available in abundant freely and non-hazardous to health. Light is everywhere in rooms, hospitals, malls and inside airplanes. Over the years it has been observed how our lighting systems have changed from candle to bulb to tube light and now LED panels are being installed at various places.

The Project uses these LED lighting system for communication through VLC. The data which has to be transmitted is first converted from its original form into binary data i.e. ones and zeros. Thus a long run of one and zero. This is then converted

into +5 and zero voltage levels which are used to drive LED. The LEDs are drive at a very high speed such that they can be used for illumination as well as data transfer. Transmitting image using MATLAB and Arduino An image is nothing but an array of different-different grey levels. A color image consists of 3 such grey level matrix one for red one for blue and one for green. Thus any image can be broken down into its grey level matrix using MATLAB further these grey level vary from 0-255 i.e. they are 8 bit positive numbers it can further divide these matrix into bit matrices consisting of msb to lsb different-different bits this process is known as grey level slicing. MATLAB is pretty compatible with images and there are simple codes and commands to carry this out. The matrices are then taken serially bit by bit out to leds through Arduino the digital pin of Arduino gives 5v for a 1 binary logic and 0v for a 0 binary logic. This voltage levels are used to drive the transmitting leds. The photodiode receives this variation in voltage levels. The output of photodiode is given to non-inverting terminal of the op-amp which is used as a comparator to compare the photodiodes voltage with a reference voltage. The op-amp gives 5v for leds in and 0v for leds off state. This is then given to the Arduinos analog pin and voltages are read in MATLAB which then convert this voltage level into logic 0 and 1. Thus the original bit stream is got back and the data is received.

Handoff using IR system

The IR system does not interfere with the VLC system and vice-versa. The receiving device has a IR LED which continuously transmits IR rays. The two LED panel A and B both have IR receivers with them. Let's consider the user is in LED A's vicinity so the IR receiver at A will get higher voltage compared to IR receiver at B thus they are compared using op-amp and the system comes to know that the receiving device is in A's region hence LED A is used for illumination and data transfer while LED B is used only for illumination. This is the normal VLC working without mobility. Now let us consider that the receiver starts to move from A to B. thus the voltage of B starts to increase and voltage of A decreases. The op-amp compares the two and as soon as the receiver comes in B's region the voltage at B just increases above A and the comparator notifies the circuit about the same and hence now LED B is used for illumination and data transfer while LED B is used only for illumination. This is call as Handoff.

Results and Conclusion

A predefined image is transmitted and correctly received at the receiver .The dark current and interference noise was removed with the help of a comparator circuit. The light from other light source can be made ineffective by the use of a very precise threshold level. A maximum data rate of 20kbps was achieved using function generator and digital oscilloscope. Range of 3 ft was achieved by placing the setup in complete darkness and with the use of 16 Blue LED panel. The receiver is given mobility with the help of IR based detection system.

- RANGE – 3ft
- DATA RATE – 20kbps

Figure 5. GUI at the Transmitting end

The project is simulated in MATLAB and the output is close to the ideal one. A black and white binary image was selected from the transmitting computer and the data was send through LEDs. The image is received correctly through photodiode and

the errors are negligible. An ever growing interest in VLC throughout the world can be expected to lead to real world application in the future in some fields of application it poses favorable alternative to conventional solutions. The transmission is based on the assumption of direct line of sight channels and simplex channel condition. The encoding and decoding is used in the transmitter part and receiver part to reduce the error in transmission

The receiving device is given mobility and handoff is achieved with the help of IR based system which does not interfere with the LED data transmitting system. In future, the data rate can be enhanced by using fast switching multiple LEDs. The driving speed of the circuit could also be enhanced if fast switching transistors were used. It can be demonstrated that the blue LED based visible light data transmission system is indeed technically feasible. The VLC system can also replace Wi-Fi and scientists from all over the world are working to make internet and VLC compatible to create Li-Fi.

Figure 6. GUI at the Receiving end

Acknowledgments

We express our sincere gratitude to Mr. Sanjeev Ghosh our internal project guide. His consistent advice and supervision generated the enthusiasm for excellence without which it would not have been possible to achieve the present results. His sheer presence was of great importance to us.

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The Power of C++

I'm Pinesh I Menat passed out from TCET in the year of 2013. Nseit was my first company. I got placed there in the month of Nov 2013.It was off campus interview through Naukri.com. I have worked at NSEIT for 2 years in two of their important projects. One of them was Algonomics where algorithmic trading is done on designed platform i.e. orders in stock market are placed based on some complex algorithms in order to have maximum profit. Another project was electronic auction of Tea Bags in all over the India. In both of these projects, front end was developed in C# and Multi-threaded Server was designed in C++.

I'm currently working at ROLTA as a C++ Software developer. My current project is based on image processing in C++. It's a GIS (Geographic Information System) based project. It is used for defence and military purpose. Project has UI which is built in JAVA and core processing on image is done in C++.

Many people think C++ is out dated, but believes me C++ is used in many IT industries where performance is top priority. C++ is low level language very close to hardware it is next to Microprocessor Language and Before JAVA and .NET this two languages are High level languages. Some of the famous products developed in C++ are Adobe Systems, Microsoft Windows OS, Microsoft SQL Server, MAC-OS, Adobe Photoshop, MS Office, YouTube, Amazon, Games like Counter Strike, Sierra On-line: Birthright, Hellfire, Football Pro, Bullrider I & II, Trophy Bear, Kings Quest, Antara etc. and many more...

OnemessageasaquoteIwouldliketosharewithallmyjuniorfriends:-
"It is not enough to do your best; you must know what to do, and then do your best."

-Pinesh I Menat (EXTC)
Software Developer (C++).
ROLTA India Pvt. Ltd.

FACULTY CORNER

Why use simulation?

Accurate Depiction of Reality

A simulator is a collection of hardware and software systems which are used to mimic the behaviour of some entity or phenomenon. Typically, the entity or phenomenon being simulated is from the domain of the tangible -- ranging from the operation of integrated circuits to behaviour of a light aircraft during wind shear. Simulators may also be used to analyze and verify theoretical models which may be too difficult to grasp from a purely conceptual level. Such a phenomenon range from examination of black holes, to the study of highly abstract models of computation. As such, simulators provide a crucial role in both industry and academia.

Despite the increasing recognition of simulators as a viable and necessary research tool, one must constantly be aware of the potential problems which simulators may introduce. Many of the problems are related to the computational limitations of existing hardware platforms but are quickly being overcome as more powerful platforms are introduced. Other problems, unfortunately, are inherent within simulators and are related to the complexity associated with the systems being simulated.

Anyone can perform a simple analysis manually. However, as the complexity of the analysis increases, so does the need to employ computer-based tools. While spreadsheets can perform many calculations to help determine the operational status of simple systems, they use averages to represent schedules, activity times, and resource availability. This does not allow them to accurately reflect the randomness and interdependence present in reality with resources and other system elements. Simulation, however, does take into account the randomness and interdependence which characterize the behavior of your real-life business environment.

Using simulation, you can include randomness through properly identified probability distributions taken directly from study data. For example, while the time needed to perform an assembly may average 10 minutes, special orders may take as many as 45 minutes to complete. A spreadsheet will force you to use the average time, and will not be able to accurately capture the variability that exists in reality. Simulation also allows interdependence through arrival and service events, and tracks them individually. For example, while order arrivals may place items in two locations, a worker can handle only one item at a time. Simulation accounts for that reality, while a spreadsheet must assume the operator to be available simultaneously at both locations. Insightful system evaluations

Simulation tracks events as they occur and gathers all time-related data for reporting purposes. The information available about system operations is more complete with simulation than with other techniques. With static analysis techniques such as queuing theory and spreadsheets, you know the average wait time and number of items in a queue but there is no way to further examine the data. With simulation, you know the wait time, number of items, minimum and maximum values, confidence interval, data distribution, and the time plot of values. It is always more valuable to know that the number of items in a queue exceeds 10 only 5% of the time than to know that the average number waiting is 2.

Static analysis techniques allow you to use only average parameters. Such limitations can mislead you with estimates that suggest an over- or under-capacity situation. For example, spreadsheets assume that production orders move unconstrained when, in fact, an operator must facilitate the move. This can yield a wildly inaccurate capacity estimate, and can put millions of dollars at risk in unnecessary capital investment or late delivery of orders.

Rutvi Panchal
A.P. EXTC

5-G

5G offers enormous potential for both consumers and industry as well as the prospect of being considerably faster than existing technologies, 5G holds the promise of applications with high social and economic value, leading to a 'hyper-connected society' in which mobile will play an ever more important role in people's lives.

The GSMA will work for its members and with its partners to shape 5G As the association representing the mobile industry, the GSMA will play a significant role in shaping the strategic, commercial and regulatory development of the 5G ecosystem. This will include areas such as the definition of roaming and interconnect in 5G, and the identification and alignment of suitable spectrum bands. Once a stable definition of 5G is reached, the GSMA will work with its members to identify and develop commercially viable 5G applications. This paper focuses on 5G as it has developed so far, and the areas of technological innovation needed to deliver the 5G vision.

There are currently two definitions of 5G Discussion around 5G falls broadly into two schools of thought: a service-led view which sees 5G as a consolidation of 2G, 3G, 4G, Wi-Fi and other innovations providing far greater coverage and always-on reliability; and a second view driven by a step change in data speed and order of magnitude reduction in end-to-end latency. However, these definitions are often discussed together, resulting in sometimes contradictory requirements. Some of the requirements identified for 5G can be enabled by 4G or other networks. The technical requirements that necessitate a true generational shift are sub-1ms latency and >1 GBPS downlink speed, and only services that demand at least one of these would be considered 5G use cases under both definitions. Achieving sub-1ms latency is a hugely exciting challenge that will define 5G

Delivering 1ms latency over a large scale network will be challenging, and we may see this condition relaxed. If this were to happen, some of the potential 5G services identified may no longer be possible and the second view of 5G would become less clear. This paper looks at some of the challenges that must be overcome to deliver 1ms latency.

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STUDENTS CONTRIBUTION

Image Shielding using Chaotic Functions

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Project Guide: Mrs. Kalawati Patil

Abstract— This project proposes the chaotic encryption algorithm based on 2D Arnolds cat map and 3D Chebyshev map for image encryption. Here first, the 2D Arnolds cat map is used for image pixel scrambling then 3D Chebyshev map is used for key generation that generates public as well as private key. It will provide a new access to satisfy optimum level security of interactive information requirements in the fields of military, financial and economic, national security, aerospace and so on. This proposed algorithm is to be verified for high security level. Also the time taken to perform encryption will be calculated. Several test images will be used to demonstrate the validity of the proposed algorithm.
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Keywords—Encryption, chaos, arnold, key, chebyshev.

INTRODUCTION

Nowadays, it is evident from the growing amount of information being sent over the internet that includes text, audio, image and other multimedia file where images are widely used in daily life and as a result the security of an image has become a requirement in today's world. One of the major security concerns is the protection of an image. This can be achieved by using the technique of encryption.

In an encryption process the message to be sent over the internet is encrypted using an encryption algorithm and that message then can only be retrieved back in an understandable format when it is decrypted. The encryption scheme which has become common now in today's generation is the use of pseudo-random encryption key that can be generated by an algorithm.

Multifold number of chaotic algorithms is being proposed for the image encryption. Chaos theory leads to creation of chaotic functions which found its application in the field of encryption. Chaos lacks a definite meaning; it can be referred to as a state that does not have a deterministic behavior. Chaotic systems are dependent on initial condition. The prediction becomes impossible as the system becomes completely random after a certain period of time. Chaotic theory has been summarized by Edward Lorenz as follows "When the present determines the future, but the approximate present does not approximately determine the future."

Chaotic theory which is a field of mathematics found various applications in philosophy, meteorology, economics, etc. The study of Chaos-Based techniques has been extensively done in the recent years, after realizing the potential that their properties held in cryptography. The alleviation provided by the use of chaotic cryptography scheme against the various other complex cryptography schemes has led to widespread attention to the chaos theory.

CHAOTIC FUNCTIONS

2D Arnold Cat Map

The concept of chaos we will be exploring in this paper is the chaotic mapping which is called as Arnold's cat map with the reference of Russian mathematician Vladimir I. Arnold, who discovered this concept using an image of a cat.[2]

In this an image is hit with a transformation that scrambles the pixels in an image. The most important property of Arnold cat map is that it shuffles the position of image pixel and does not change the intensity of the pixel. 2D Arnold cat map is simple and easy to implement.[2]

With the help of following matrix equation pixel disorganization can be performed.

$$\begin{bmatrix} x' \\ y' \end{bmatrix} = \begin{bmatrix} 1 & p \\ q & pq+1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} \bmod [n]$$

Here,

p ,q - positive numbers.

x, y - original location of input pixels.

x', y' - new location of input pixels.

n- Size of an image.

Depending upon p and q values different combinations can be obtained. Hence p, q and the size of an image can be considered as the secret keys.

After m iterations the same pixel position as before is obtained and thereby produces an original image. This means that Arnold cat map is a periodic transform. The number of iterations to generate original image is called Arnold period. Hence the p and q values should be chosen such that it is less than the Arnold period. The speed of this algorithm depends upon the selected key. Due to a less number of secret keys and there is a repetition of an original image Arnold cat map cannot be used for security purpose alone. So, for increasing the security system it requires further processing of an image [3].

Algorithm:

2D Arnold cat map

Step1: Start

Step 2: While there exist pixels

Step 2.1: Change location of pixel at (x, y) according to transformation.
Step 3: End loop
Step 4: End

3D Chebyshev Map

Cryptography is the science of secure communication. The secret communication was possible without any transfer of a secret key. This was shown by Diffie and Hellmann. This technique is known as public key cryptography. The following properties are possessed by public key encryption: The encryption key differs from the decryption key.

The encryption key is public.

The public key is used to encrypt the message at the receiving side by the sender; on the other side private key is used for decryption.

In this paper public key encryption algorithm is obtained using chebyshev map.
Hence for generating public key chebyshev map makes use of chebyshev polynomials.[8]

Chebyshev polynomial:

In many areas of mathematics chebyshev polynomials are of great importance particularly the approximation theory. They are sequence of orthogonal polynomials. Chebyshev polynomials of first kind are defined as:
$T_0(x)=1$
$T_1(x)=x$
$T_{(n+1)}(x)=2x.T_n(x)-T_{(n-1)}(x)$
The first few Chebyshev polynomials are
$T2(x)=2x2-1$
$T3(x)=4x3-3x$
$T4(x)=8x4-8x2+1$

One of the most noticeable properties of the Chebyshev polynomials is the semi group property:

$Tr(Ts(x))= Trs(x)$

An immediate consequence of this property is that Chebyshev polynomials commute under composition, i.e.,
$Ts(Tr)=Tr(Ts)$

Properties of Chebyshev polynomial:

The Chebyshev polynomials are useful in numerical work for the interval $-1 \le x \le 1$ because

1. $|Tn(x)| \le 1$ within $-1 \le x \le 1$
2. The values of the maxima and minima are comparable.
3. The maxima and minima are spread uniformly over the interval $-1 \le x \le 1$.
4. They are easy to compute and to convert to and from a power series form.

The approximating polynomials are produced by these properties to minimize errors in its application. The average error of the Chebyshev approximation can be large but the maximum error is reduced. Chebyshev approximations of a function are also known to be mini-max approximations of the function [10].

METHODOLOGY

This is the proposed methodology of the paper. The given algorithm is using 2D Arnolds Cat Map for image scrambling process, 3D Chebyshev map is used for generating the key.

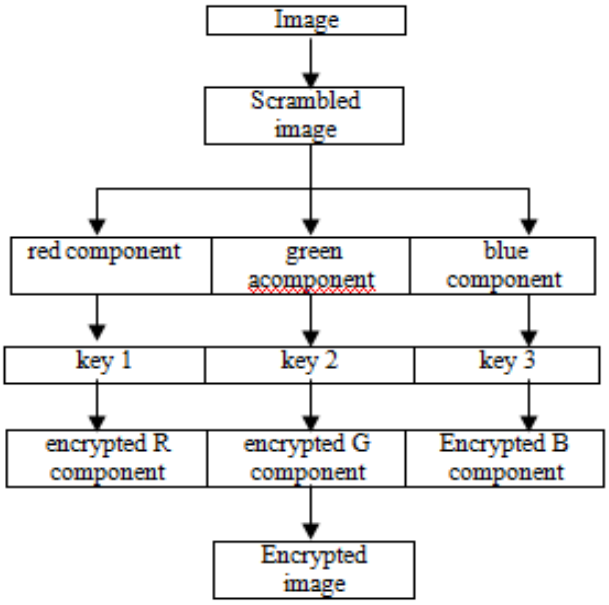

Fig.1 Proposed Methodology

Here we have considered an m x n color image. We have then processed the image using 2D Arnold Cat Map (ACM). 2D ACM is used to perform pixel by pixel scrambling of the image. This results in change in the position of the pixels in the original image [1]. The resultant image obtained is a scrambled image. To further enhance the security of the image, we segregate the R, G, B components of the scrambled image. Then encrypt these components separately with three public keys each for the components. These keys are generated using 3D Chebyshev Map.

EXPERIMENTAL RESULTS

Following are the steps:

Read an Image.

Apply 2D Arnold Cat Map.

Fig.2 Original Image

Fig.3 Scrambled Image

Seperating the R,G and B component from the scrambled image.

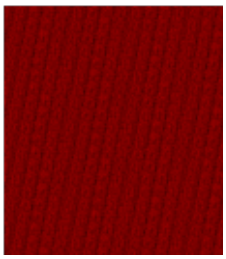

Fig.4 R component

Fig.5 G component

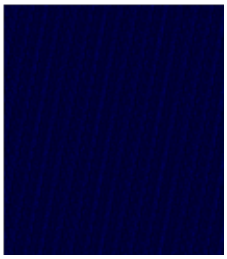

Fig.6 B component

Generating 3 keys using Chebyshev Map.

Key1: 0.1735168052

Key2: 0.8987940463

Key3: 0.1736481001

Multiplying the output obtained at step 3 with the keys generated.

Display the encrypted image.

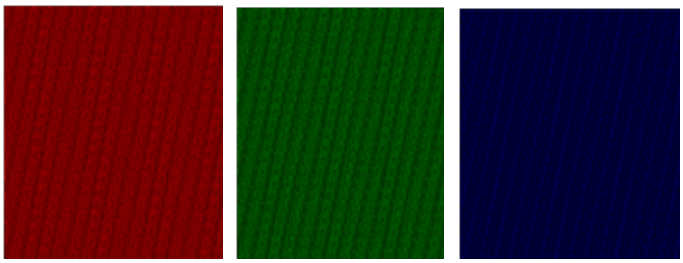

Fig.7 Encrypted R, G and B component respectively

Speed analysis

Apart from the security consideration, encryption speed of the algorithm is also an important aspect. The proposed approach makes use of simple operations which are not computationally complex. Hence the approach can offer a fast and efficient way for image encryption. The time needed to encrypt a selected image is around 0.937094 seconds

CONCLUSION

In this paper, we have achieved the image encryption as proposed using chaotic functions. The image was first scrambled which was achieved by processing the image with 2D Arnold Cat Map algorithm. To include more security the scrambled image was segregated in terms of RGB components content which was then given a separate key that was generated using Chebyshev algorithm. Thus ultimately the original image was encrypted using 2D ACM and Chebyshev algorithm making it highly for transmission. Also the processing speed obtained is around 0.937094 seconds which enhances the functionality of the algorithm.

ACKNOWLEDGMENT

With immense pleasure we are presenting a paper on "Image Shielding using Chaotic Maps". We wish to thank all the people who gave us unending support. We would like to thank the management of Thakur College of Engineering and Technology (TCET) for providing us the infrastructure and facilities. We are very grateful to our Principal Dr. B.K. Mishra for providing us with an environment. We are grateful to our Head of Department, EXTC dept. Prof. Mr.Vinitkumar Dongre for motivating us to implement innovative strategies .We would like to thank our guides Prof. Kalawati Patil for their support throughout the entire course of this project work.

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Cold Storage using Android Application

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Abstract — In this paper hybrid wavelet transform is proposed. Hybrid wavelet transform matrix is formed using two component orthogonal transforms. One is base transform which contributes to global features of an image and another transform contributes to local features. Here base transform is varied to observe its effect on image quality at different compression ratios. Different transforms like Discrete Kekre Transform (DKT), Walsh and Discrete Cosine Transform (DCT) are chosen. They are combined with one another that contribute to local features of an image. Sizes of component orthogonal transforms are varied as 16-16, 32-8 and 64-4 to generate hybrid wavelet transform of size 256x256. Type I and Type II methods were used for implementing hybrid wavelet transform. Results of different combinations are compared and it has been observed that, DKT as a base transform combined with DCT gives better results for size 16x16 of both component transforms.

Index Terms — Hybrid wavelet transform, Kekre transform DKT, DCT, Walsh transform DWT.

INTRODUCTION

Wavelet transform of a function is the improved version of Fourier transform. It is good tool to replace the Fourier transform. Fourier transform is a powerful tool for analyzing the components of a stationary signal. But it fails for analyzing the non-stationary signal. Wavelet transform allows the components of a non-stationary signal to be analyzed. Discrete Cosine Transform is widely used. It separates an image into different frequency components. Low frequency components are located at top left corner giving high energy compaction. High frequencies are located in bottom right corner. Elimination of these high frequency elements gives transformed image with few low frequency components. If image is reconstructed from such lesser number of transformed, low frequency elements, it gives compressed image without losing much data contents in original image. Hybrid transformation techniques combine properties of two different transforms. One of the application which we are doing is image compression using Hybrid wavelet Transform. HWT gives compressed image with visually perceptible image quality. In hybrid technique, one transform would be combined with another transform to incorporate the advantages of both the transforms. Then the 4x4 image matrix will be converted into 16x16 matrixes. HWT gives compressed image with visually perceptible image quality. In hybrid technique, one transform would be combined with another transform to incorporate the advantages of both the transforms. Then the 4x4 image matrix will be converted into 16x16 matrixes. Different wavelet techniques will be applied on pixels of image. Rows of transformed plane will be sorted in descending order and lowest energy rows would be eliminated. In the same way Columns of transformed plane will be sorted in descending order and lowest energy columns would be eliminated. The image is then again reconstructed. The various orthogonal transforms such as Discrete Walsh Transform (DWT), Discrete Kekre Transform (DKT), Discrete Hartley Transform (DHT) and Discrete Cosine Transform (DCT) etc. can be considered for crossbreeding to generate the hybrid wavelet transform based on the expected behaviour of the hybrid wavelet transform for particular application.

PROBLEM DEFINITION

There are many transforms available in image and digital signal processing to effectively represent and analyze data. Initially Discrete Fourier Transform was proposed. But it cannot detect local information in the signals. Dennis Gabor introduced a solution to overcome this drawback. It is known as Short Time Fourier Transform (STFT) or windowed transform. Later on it was named as Gabor Transform. It gives local properties at the cost of global properties. Effective transforms that came into picture for image compression are Discrete Cosine Transform (DCT) and wavelet transform. DCT shows good energy compaction property. Image is first divided into NxN size blocks and DCT is applied on each block individually. But it introduces blocking effect at the edges of the image. Larger the block size more is the blocking effect. In recent two to three decades research has been done on wavelet transforms. It proves to be better than DCT in the sense that it is applied on the whole image and not on individual block. Hence there is no blocking effect in wavelet transform and compression error is distributed uniformly over entire image. It provides higher compression ratio and better image quality than DCT. Hence it is more robust under transmission and decoding errors. Now different wavelet transforms of Walsh, Kekre, Slant, Hartley, Sine and Real DFT also have been studied. As each

wavelet transform has its own features suitable for specific applications, there is a scope to study the use of transforms obtained by combining two different transforms. Latest trend is to use such hybrid wavelet transforms in image processing applications. There are many generalizations of original orthogonal wavelet systems. In addition to construct more general wavelet system, there exists also considerable effort to optimize filter sets of underlying filter banks (FB). In this article we want to adapt existing filter sets of various wavelets to construct more general transform than DWT by mixing together bases of several DWT. Such approach we call hybridization and to the resulting transform we refer as discrete hybrid wavelet transform (HWT). Typical application of wavelets in digital signal processing is image compression. (Mostly lossy case). Because of their multiresolution signal representation they are the best candidate for progressive transmission coding (e.g. SPIHT, CREW). Recent compression methods based on wavelet approach are very successful when comparing to other methods based on block transforms, fractals or neural nets.

PROPOSED ALGORITHM

Proposed technique uses the concept of generating hybrid wavelet transform from two orthogonal transforms and extends it with different orthogonal transforms like DCT, Walsh, DKT, DST, Slant and Real FT. Here Discrete Walsh Transform (DWT) is used to represent the global properties of an image. DCT, Walsh, DST, DKT, Real FT and Slant transforms are used one by one to represent local properties of an image. Pairing these transforms with Walsh transform gives following hybrid transforms: DWT-DCT, DWT-DKT, DWT-DWT, DKT-DCT.

1. Consider colour image of size 256x256.
2. Separate R, G, B components of an image
3. Let "W1" is Walsh transform of size MxM and "W2" is DCT of size NxN, then hybrid transform of MNxMN size is generated of type I and II which is 256x256. Same procedure is repeated for other transforms as well.
4. Different combinations of "M" and "N" used. Initially select M=8 and N=32.Then M=16, N=16 and M=64, N=4. Hybrid Wavelet Transform matrix "Wlt" of size 256x256 is generated.
5. Full Hybrid Wavelet Transform of image is obtained as "F"= [Wlt]*[f]*[Wlt] T.
6. The transformed matrix of image was divided into its components namely LL, LH, HL, and HH.
7. The rows and columns were arranged in increasing order of their energy.
8. The image was then reconstructed with comparatively lower size.
9. PSNR and RMSE were calculated.

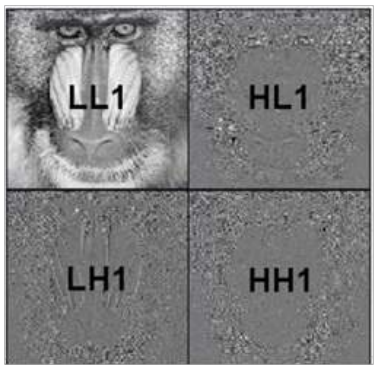

Fig 2.1 Wavelet Decomposition of image (a)

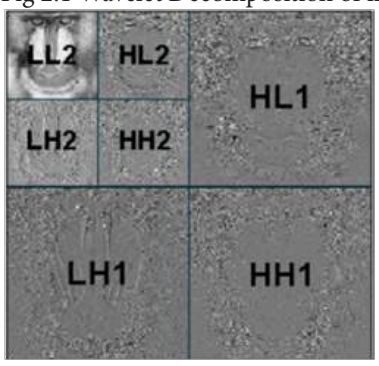

Fig 2.2 Wavelet Decomposition of image (b)

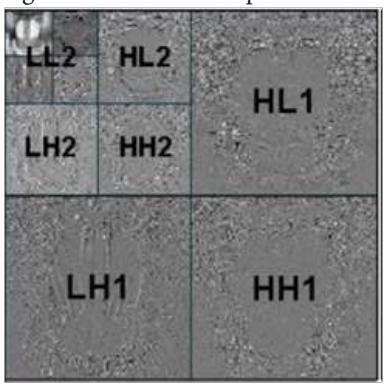

Fig 2.3 Wavelet Decomposition of image (c)

EXPERIMENTS AND RESULTS

Proposed technique is applied on an image of size 256x256. Experiments are performed using MatLab 7.0 on AMD dual core processor with 4 GB RAM. Initially two matrices were taken i.e. one was Walsh Matrix(4 x 4) and another was DCT matrix(64 x 64).Then we computed the Hybrid Wavelet Transform Type-I and Type-II and we got the Hybrid transform matrix of size (256 x 256). The Hybrid Transform matrix was multiplied with the original image and the result

obtained was again multiplied with the transpose of Hybrid Transform matrix and finally we got the coefficient of transformed matrix of image. The matrix was segmented into its component i.e. LL, LH, HL and HH. And image was reconstructed wherein we got compressed image.

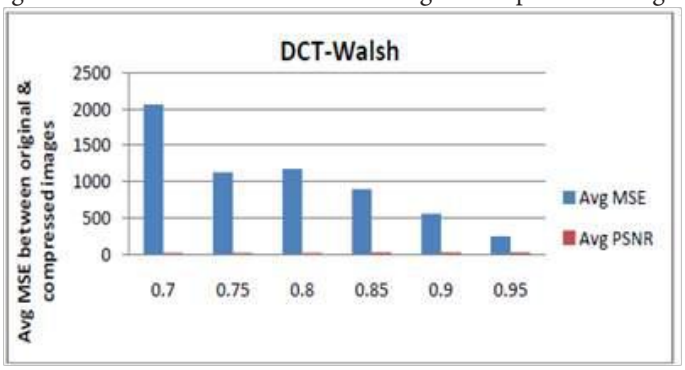

Fig 3.1 Compression Ratio (a)

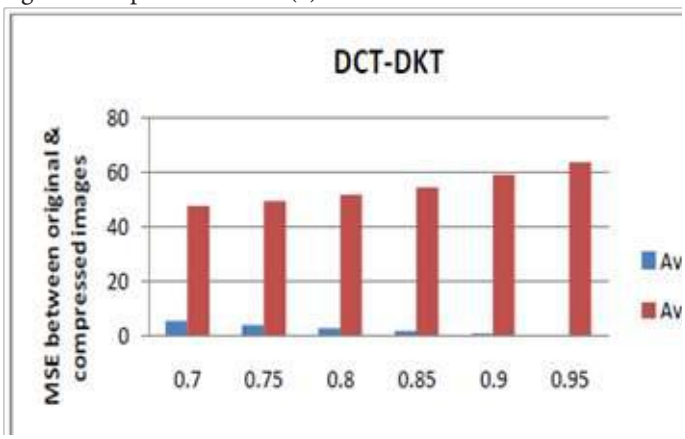

Fig 3.2 Compression Ratio (b)

CONCLUSION

In this paper, different hybrid wavelet transforms has been formed. Two component orthogonal transforms of different sizes are used to form hybrid wavelet transform. First component transform called base transform is varied and second component transform is selected as DCT and DKT and Walsh. Effect of variation in base transform with different size is observed in terms of root mean square error. It has been observed that DKT-DCT combination gives better performance. Even with variation in size of base transform, DKT-DCT proves to be superior in performance. All in average DKT-DCT performs better compared to all other combinations at size 16x16 of both component transforms. Many transforms are available to get frequency as well as time information of particular signal or image any stuff. But one or the other lacks in some aspect such as Fourier transform cannot give time information about signal. STFT which can give both but it have limited precision. Wavelets give the best information in both aspects about the signal. But some wavelet transforms are superior in some content than another. So a new method of combining two wavelets and making hybrid wavelet transform from it has been undergone by us. Discrete Walsh Transform (DWT), Discrete Cosine Transform (DCT) was used as one component transform which contributes to global properties of an image. Second component transform that contributed to local properties of image were varied and also its size were varied. For 256x256 size image, hybrid wavelet transform of size 256x256 was generated. It was generated using two component transforms of size 8x8 and 32x32 respectively, both component transforms of 16x16 and first of 64x64 and second of 4x4. From results it was observed that, whatever may have been the pair of component transforms, best results were obtained for 8x8 and 32x32 (denoted as 8x32) combination. Greater is the size of first component transform, more global features of an image are considered and less focus on local features. Larger the sizes of second component transform, global features are focused less and local features are focused more, giving better performance. Hence pair of 8x8 and 32x32 component transforms gives better results than other two combinations. This criterion is not true for DWT-DKT Hybrid Wavelet Transform as resolution changes linearly and not in power of two like other transforms. Performance of Hybrid Wavelet Transform is very much better than simple full orthogonal Walsh transform. As observed in this paper, for Hybrid Walsh Transform it is three times better than simple Full Walsh Transform. Hence reconstructed images were of much better quality.

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Implementation of Hybrid Wavelet Transform and its Application

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Abstract—Through this paper author, develop a methodology of "Cold Storage using Android Application" based on IOT which can be used to store the environmental readings and that recorded readings will be sent to the authorized personnel by means of android application. If the temperature needs to be manipulated, it could be done by using same android application. In different fields such as poultry farm, blood bank, organ storage etc. where a specific level of temperature or particular environmental parameters should be maintained or else product could be affected. To avoid such circumstances, to make our system more automated, this project is used

Keywords—IOT (Internet of Things)

INTRODUCTION

Cold Storage

It is a control system in which environmental parameters such as temperature, humidity, airflow etc. are controlled using closed loop controllers.

In today's world, cold storage is one of the most extensively used control system. Cold storage is required in many fields such as medical (Blood storage, cell storage, organ storage etc.), agricultural, chemical and food industries and many more. Cold Storage has been a breakthrough in the medical field due to application in blood storage, stem cell storage, organ storage etc. Similarly it has found its application in almost all the fields where perishable products are used and has brought great commercial value to the products by increasing its quality.

Although there are other industries that make use of cold rooms, the food industry is the first on the list of sectors in need of these special facilities. These cold storage facilities are commonly built to store perishable goods for a period of time. Due to the increasing demand in food supply, the production of perishable goods such as fruit and vegetables continues to rise. In order to preserve these types of goods, they need to be placed in cold storage facilities to make sure that they do not get spoilt

Cold rooms are very important because they help to prolong the shelf life of fresh goods. They are also effective in reducing the amount of waste and in lengthening the timeframe for marketing these foods.

Cold storage plays a very vital role in our day to day lives and thus advancement in technology keeps coming. Despite of advancement in technology, there are still many problems that need to be addressed.

Robust control is a branch of control theory whose approach to controller design explicitly deals with uncertainty. Robust control methods are designed to function properly provided that uncertain parameters or disturbances are found with some (typically compact) set. Robust method aim to achieve robust performance or stability in the presence of bounded modeling errors.

In early days, environment controlling was done manually. As the technology advanced on/off controllers came into picture. On/off controller was the most commonly used device for decades. On/off controller was then replaced by PID controllers in the fields where more precise control was required (chemical industry, pharmaceutical industry etc.)

Our project is taking environment control to next level by controlling the environment automatically using the technology called Internet of Things.

One of the major problems faced today by the cold storage facilities is the remote control of the parameters of the controllers. All the industries use a manually set parameters device. The problem arises when parameters are needed to be changed. For example temperature and humidity of poultry farms are changed according to the age of the broilers in weeks. For this manual changes in parameters are required.

Moreover, data logging is also required as it provides a track of set conditions. It also helps in

quality control as a set of data is available for finding out the reason of degradation in quality of the product. This feature is not provided until it is customized. Cloud storage technology is not used extensively as it is a very recent and new technology in this field. Data logging is done using cloud storage which requires a technically sound person to use the same. It becomes difficult for a layman to use the cloud storage technology. Also the cost increases due to usage of cloud.

All these problems can be solved, can be reduced by means of upcoming technology called Internet of Things (IOT).

IOT provides controlling of devices using the Internet. In this we create a simple to use mobile application which can be used by a layman from anywhere at any time. All the recorded data can be sent to the app via Internet. This solves the problem of cost involved with data logging. Also, all the conditions of the controllers used in the storage room can be changed/set/reset using the same application. The only thing required is a mobile phone with internet facility.

In this way by means of IOT, we are trying to solve all the weakness of existing system and also to make our system more automated.

Related work

1. Model predictive control of thermal comfort and indoor air quality in livestock stable.

Objective:

The dynamic models describing the nonlinear behavior of ventilation and associated indoor climate, by applying a so-called conceptual multi-zone method are used for prediction of indoor horizontal variation of temperature and carbon dioxide concentration.

Results obtained:

The simulation results illustrate the significant potential of MPC in dealing with nonlinearities, handling constraints and performing offset free tracking for multiple control objectives. The entire control systems are able to determine the demand ventilation rate and airflow pattern, optimize the Thermal Comfort, Indoor Air Quality and energy use.

2. Feasibility of using intelligent control in managing animal production environment.

Objective:

The problem of monitoring and control in enclosed animal production environments with emphasis on the poultry sector. Results obtained:

In this paper the author discusses reasons why it is becoming important to develop and adopt more effective monitoring and control techniques in the poultry industry and investigates the feasibility of using intelligent control for improved control of the poultry housing environment

3. Study and design of adaptive environment control system for mobile base stations.

Objective:

In order to meet the requirement of real-time monitoring of environment parameters in equipment room, such as mobile base station in severe environment condition, this paper studied and designed a kind ofenvironment control system, which combines the embedded system

Results obtained:

It adapts the temperature control strategy according to user setting by control the fan and air-condition. Experiment tests show that base station can increase the average power efficiency by 35%-55% per year.

Gap in existing system

Despite of advancement in technology, cold storage still faces many problems. There is no provision for remote control of parameters, no way of checking the status of the devices running in the system. If the quality of the product degrades, there are very few but hectic ways to find out the problem. None of the existing systems and research comprises of remotely set parameters and conditions and neither of them uses data

logging(storage).IOTwhichisthemostrecentandtrendingtechnology isnotimplementedinanyoftheexistingsystemsandresearches.

Let us consider one scenario. If the authorized person is far away from the storage room, and needs to check the current environment ratings. He can open his application on his smart phone and do the same. Now if he wants to change or manipulate the set points of the parameters to be controlled, he can do so using mobile application on his smart phone.

Humidity or temperature or any specified environmental criteria is out of predefined range and it require immediate control then in that case that authorized person can control all the parameters from anywhere at any time by means of IOT. For that, the empowered person requires a mobile with internet connectivity and also the android application installed in the mobile with the specific user id and password. All the confidentiality will be maintained so that no other person can access the information about recorded data. And with the help of internet that person can control all the parameters without any fail. Manual control is not required over here. In this way an automated control, an advanced control, time saving is possible. That person needs not to go there in industry and control. From anywhere at any time that empowered/authorized person can manage/set/reset/control all the situations, parameters, conditions of the food in the industry. In this way IOT plays very vital role in our project.

IDEA PROPOSAL AND IMPLEMENTATION

This project "Cold storage using Android Application" is totally based on IOT. We are going to implemented/proposed our idea by means of IOT.

IOT

The Internet of Things (IOT) is the network of physical objects embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. The Internet of Things allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration between the physical world and computer-based systems, and resulting in improved efficiency, accuracy and economic benefit.

Figure shows basic arrangement of IOT:

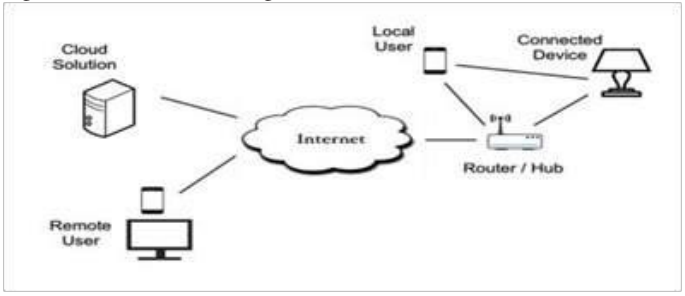


Fig 1. Basic arrangement

1.The connected device – The actual physical device we want to control and manage. It needs to be connected somehow, either wired or wireless.

2. The local user – This is the user who wants to interact directly with the device to either control it, or receive information regarding its operation.

3. The router – This is the part that connects the device to the Internet. The connection can be via ADSL, cable, cellular, etc. In some cases, there is no router where we want to place our device, or a standard router is not sufficient for the application, so you may need to provide a router of your own.

4. The Cloud solution – A Cloud solution can be simple storage of data flowing from your connected device, or can include complex analytic functions that are performed on the data coming from the device and reported to the local or remote user.
5. The remote user – The user who is not in the proximity of the device, but wants to control or receive information regarding the device from afar.

First, you can see that an IoT application involves hardware, software and connectivity components. Security is always a concern with IoT applications where the level of security required depending on the application itself. Because IoT involves several components, it's difficult to know where to begin, and since the IoT market is still in its infancy, standardization between the components has not been achieved yet. But, since we do want to develop an IoT application, let's dive in, and usually,

the best place to begin is at the connected device. As we know that in existing system, consider the example of food storage, appropriate food storage is very essential in order to maintain nutritional value of the food. In this existing food storage there is manual control of all the environmental parameters which is one of the major drawback. Manually set parameter devices are used. Authorized person is must present over there in industry near cold room so that, person get all the readings of that particular cold room. And change/set/reset of parameters that is also done by means of manual control. The solution to this is the use of our project which is based on IOT. And main strength of IOT is automation. By means of IOT there will be automated, advanced control of all the parameters of that cold room. All the readings will be sent to the mobile app having internet connectivity and if there is need of controlling the parameters then all changes will be done by means of same app only. This result is saving valuable time as there is no any manual control means the authorized one need not to go there in cold room in industry and control. Digital control is there in our project. And this project is more efficient too.

Second problem is this existing storage system is done by means of cloud. Cloud technology is not used widely. It is recent and new technology. Hence it is difficult to operate and understand for the layman. And cost is also very high as cloud is used for storage purpose. In order to reduce this problem we are introducing this project based on IOT. In this IOT optimum utilization of resources is possible. And also we are keeping the devices under surveillance. So that we can be alerted in case of breakdowns, damages to the system. In this way it is cost effective system. And for the layman it is simple to operate because that is mobile android app only which extensively used and widely known, widely adopted.

In this existing current storage, all cloud use more time and this project is introduced to save quite large amount of valuable time. Accurate result can be obtained fast; it provides better efficiency because there is machine to machine interaction. Without any human intervention environmental parameter control is possible leading to faster and timely output. IOT allows controlling and automating the environmental criteria avoiding human intervention. Hence it can maintain quality of service.

In current storage which is based on cloud there is impossible to pack large amount storage devices into a small set of data centers. There is bandwidth issue. Where in case of IOT there is no such issue, it is possible to connect billions of computers and devices to each other with fully automation.

BLOCK ARRANGEMENT

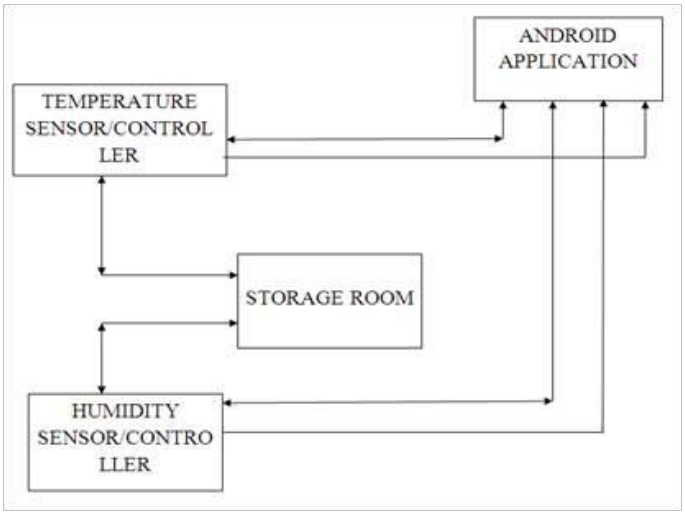


Fig 2. BLOCK ARRANGEMENT

Figure shows basic block arrangement of cold storage system using Android Application. In that it basically consists of two main sensors. Humidity and Temperature sensors

All the reading will be stored in to room called Storage room n all the ratings will be given to the authorized user on the android application over the internet. This is nothing but glimpse of our project. It basically consist of

A. Temperature sensor
B. Humidity sensor
C. Storage room
D. Android application

A. Temperature sensor

A. temperature sensor produces an analogue or digital output whose strength depends on the temperature of the sensor. Heat is conducted to the sensing element

through the sensor's package and its metal leads. In general, a sensor in a metal package will have a dominant thermal path through the package. For sensors in plastic packages, the leads provide the dominant thermal path. Therefore a board-mounted IC sensor will do a fine job of measuring the temperature of the circuit board.

B. Humidity sensor

Humidity is the presence of water in air. The amount of water vapour in air can affect human comfort as well as many manufacturing processes in industries. The presence of water vapour also influences various physical, chemical, and biological processes. Humidity measurement in industries is critical because it may affect the business cost of the product and the health and safety of the personnel. Hence, humidity sensing is very important, especially in the control systems for industrial processes and human comfort. Controlling or monitoring humidity is of paramount importance in many industrial & domestic applications. In semiconductor industry, humidity or moisture levels needs to be properly controlled & monitored during wafer processing. In medical applications, humidity control is required for respiratory equipments, sterilizers, incubators, pharmaceutical processing, and biological products. Humidity control is also necessary in chemical gas purification, dryers, ovens, film desiccation, paper and textile production, and food processing. In agriculture, measurement of humidity is important for plantation protection (dew prevention), soil moisture monitoring, etc. For domestic applications, humidity control is required for living environment in buildings, cooking control for microwave ovens, etc. In all such applications and many others, humidity sensors are employed to provide an indication of the moisture levels in the environment.

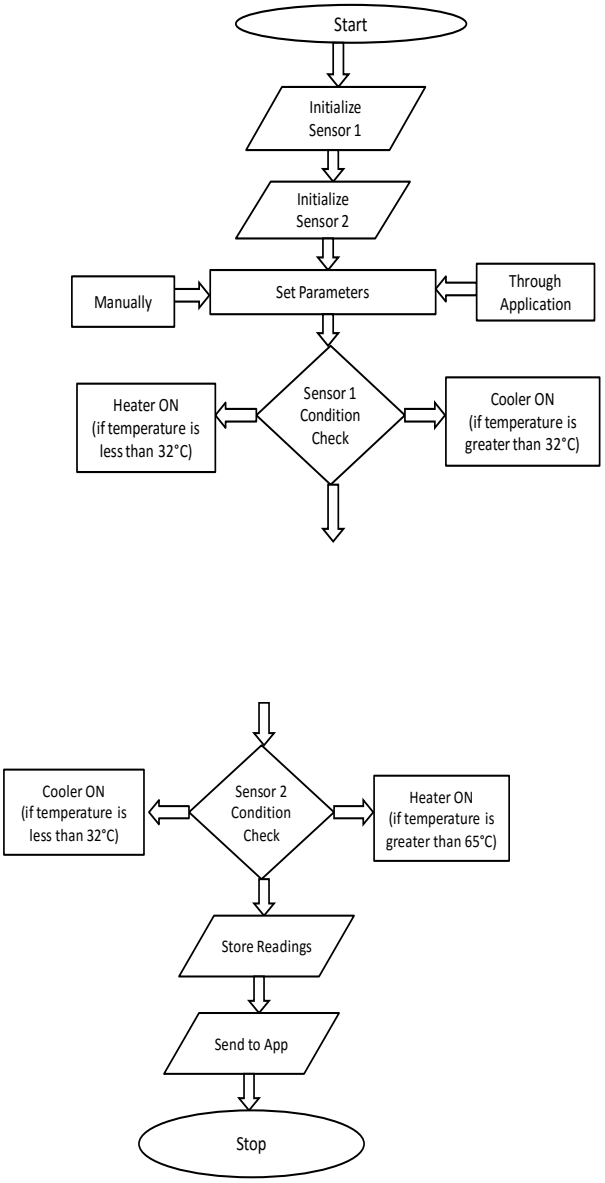
C. Storage room

Storage room is basically used to store all the parameters, readings, data, ratings, all the information, which are measured by the temperature and humidity sensors. And this storage room will further give all the information to the Android Application over the internet. So that authorized user can read all the data, readings and that user can also modify that reading using the same Application.

D. Android application

Android apps are written in the Java programming language. The Android SDK tools compile your code—along with any data and resource files—into an APK: an Android package, which is an archive file with an.apk suffix. One APK file contains all the contents of an Android app and is the file that Android-powered devices use to install the app.

PROPOSED SOFTWARE FLOW



RESULT AND CONCLUSION

In this project we have controlled the temperature and humidity of a poultry farm. We are sending all the readings of temperature and humidity per hour to the android application via internet. We can also change/set the temperature through the same application.

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Tele-presence Robot with Stereoscopic Vision using Fire bird V

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JankiBagdai, Ganesh Iyer, GauravKorgaonkar, Ishita Kothari

Abstract - Our team, using affordable sensors and actuators and virtual reality technologies like Oculus Rift and stereoscopic camera capabilities, have decided to build a platform that offers the same capabilities of a high-end tele-presence system at a reasonable cost. Our attempt is to bring true immersion to tele-operated robots, by precisely tracking the motion of your head in all six degrees of freedom and then duplicating those motions on a real robot moving around the real world. The goal is making the experience so immersive that, while operating the robot at a remote place, you'll forget that you're not actually there. At the same time this will be extremely helpful in virtual tourism for indoor areas, assistance of elderly and paraplegic. The platform is completely wireless and indoor operation is internet controlled. The use of the Fire Bird V robotic research platform will further boost the sturdiness of the platform.

Keywords – Tele-presence, Virtual Reality, Stereoscopic vision, Depth Maps, Kalman filters, Complementary filters

INTRODUCTION

As Internet has become a handy tool for major applications, video-conference is one such application which grabbed eyeballs of many. This has lead to the development of tele-presence wherein researchers were looking forward to use it to link various geographically isolated places into synergic virtual suites. The existing tele-presence systems are accurate but at the same time involve a high pre-implementation cost for the installation and setup which could not be within financial means of many. Hence there was a need for cost efficient tele-presence robotic platform for complete and immersive remote operation, with stereoscopic machine vision and suggestive feedback and ready deployment in indoor environments such as military applications, hospitals, museums etc to facilitate its varied use. Using affordable sensors, actuators, virtual reality headset and stereoscopic camera capabilities, we have decided to build a platform that offers the same capabilities of a high-end tele-presence system at a reasonable cost. Our attempt is to bring true immersion to tele-operated robots, by precisely tracking the motion of the head in all six degrees of freedom and then duplicating those motions on a real robot moving around the real world. Our goal is making the experience so immersive that, while operating the robot at a remote place, you'll forget that you're not actually there. At the same time this will be extremely helpful in virtual tourism for indoor areas, assistance of elderly and paraplegic. The platform is completely wireless and indoor operation is internet controlled. The use of the Fire Bird V robotic research platform will further boost the sturdiness of the platform.

RELATED WORK

Robotic telepresence using a remote-controlled pan/tilt camera has been previously proposed by on several mobile robots, e.g., Fiala et al. [1] or Zalud et al. [5]. These, however, did not use stereo imagery. Martins et al. [2] conducted a user study of tele-operation with a robot that had a stereo camera pair which was mounted rigidly on the robot, thus the camera orientation was coupled to the robot's pose. Their usability study yielded positive results for a searchand-rescue task. Pittman et al. [3] studied immersive control of aerial robotic vehicles using an HMD as an alternative to improving the user's immersion, semi-autonomous robot behaviour for navigation assistance has been studied by Takayama et al. [4]. Zhengyou Zhang, a principal researcher focusing on telepresence technologies at Microsoft Research in Redmond, Washington believes that

Telepresence has a great potential for getting people to work together collaboratively, efficiently, and naturally regardless of their physical location[6].The idea of a tele-operated robot for remote presence is not new (Sheridan 1989)[9], only recently have so called telepresence robots become available to the broader public (Lazewatsky and Smart 2011[7]; Takayama et al. 2011[4]; Tsui et al. 2011[8]). Current commercially available telepresence robots lack autonomy.One possible solution, assisted navigation, is investigated in (Takayama et al. 2011); the authors conclude that assisted navigation decreases the number of collisions with objects in the environment.

IMPLEMENTATION

Fig 1. Dataflow Diagram

1. The Raspberry Pi Camera Module is connected to the Raspberry Pi (Model 2B). It works on GPU and not Raspberry Pi RAM or computation, thereby requiring lesser power and processing. This camera continuously streams video (480p) from the robot on the cellphone screen, connected to the network at the user's end.

2. One USB port of the Raspberry Pi is connected by USB-UART to the FireBird V platform (Nex Robotics – IIT Bombay). So, any commands for directional control of the robot are sent from the Raspberry Pi in the form of UART commands. Based on this serial communication method, the robot moves in the required direction. With respect to power for the devices, the Raspberry is powered via an external portable usb battery. The robot has a NiMH chargeable battery pack with regulated output. Further, a 2 axis servo gimbal for camera movement and rotation is also provided. The PWM pulses for the servos are provided via the Raspberry Pi GPIO pins and power for the servos are also provided via the ATMEGA board on the platfrom.

3. The Raspberry Pi is connected to a wifi dongle. The main purpose of this is to maintain wireless connectivity to the router and the network.

4. The entire system, therefore, using the Raspberry Pi and wifi dongle are connected to the router. At this stage, the Pi is successfully hosting 2 interfaces at different ports. One is to display the continuous video stream and the second is to accept directional inputs from the user's input device (keyboard/console) for controlling the robot. These are given as pygame [10] commands to the robot.

5. The router from the user end is connected to the router at the robot end via the Internet, signifying global connection.
6. The user's desktop or laptop is connected to the user end router. The smartphone sends UDP packets indicating its accelerometer and gyroscope values, which are accepted by the Raspberry Pi and converts them to standard angles to control motion of the camera gimbal,. The smartphone placed inside the VR headset provides the head tracking information for the stereo camera pair. The stereo camera pair, mounted on the gimbal, therefore, moves based on the head tracking information with minimum latency

7. The user can now wear his headset and watch the video stream in immersive sbs 3d. Video processing may be done in one the two ways: Either the video may be split into sbs (side-by-side) 3d mode using an application in the smartphone, or a mirrored sbs video may be provided using the computer/ laptop screen. This creates a stereoscopic vision of the robot's view for the user.

The feasibility of the project was most suited for the Firebird V robotics The implementation uses communication between Python on the Raspberry Pi and embedded C on the ATMEGA2560 to control of the robot's motion.

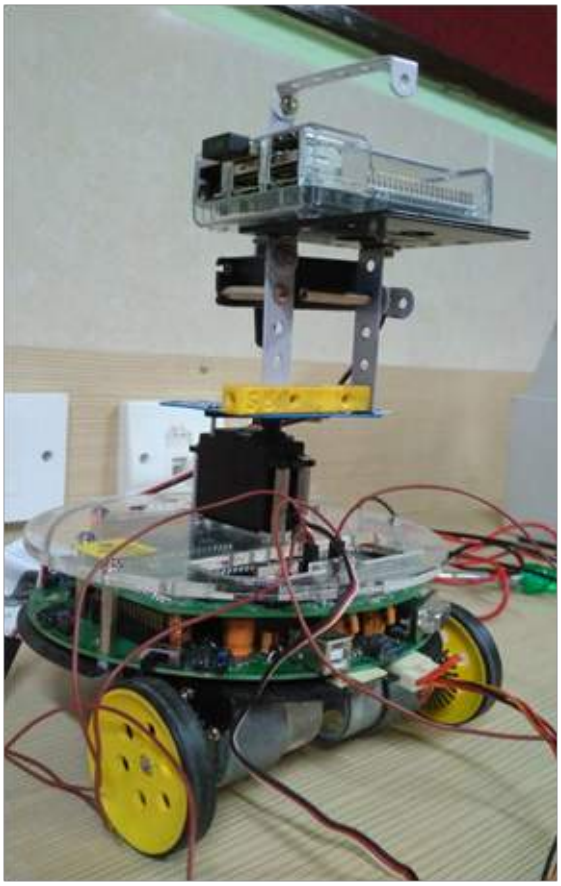

Fig 2. Robotic platform

As a Universal Robotic Research Platform, Fire Bird V provides an excellent environment for experimentation, algorithm development and testing. Fire Bird V is evolved from Fire Bird IV and Fire Bird II which are being used in IIT Bombay to teach embedded systems and robotics. Its modular architecture allows you to control it using multiple processors such as 8051, AVR, PIC and ARM7 etc. Modular sensor pods can be mounted on the platform as dictated by intended applications. Precision position encoders make it possible to have accurate position control. The platform can be upgraded to tank drive and Hexapod insect or any other desired form very easily. It is powered by high performance rechargeable NiMH batteries. A 2.4 GHz ZigBee module provides state of the art secure and multi-channel wireless communication up to a range of one kilometre. This platform provided an easy integration with the Raspberry Pi and supported servo motor based wireless camera integration using pan and tilt platform.

A. Kalman filter:

Kalman filtering is an algorithm which uses number of measurements containing statistical noise and inaccuracies and produce estimates with the help of measurements for unknown variables which tends to be more precise than a single measurement. Kalman filtering is important for motion planning and control of robots, and sometimes used in trajectory optimization.

The algorithm working is divided in a two-step process. First step includes the prediction part in which the filter produces an estimatesof the current state variables, along with their uncertainties. Depending on the outcome of next measurement the estimates are updated using weighted average.The algorithm is recursive. It can run in real time, using only the present input measurements and the previously calculated state and its uncertainty matrix; no additional past information is required.

B. Complementary filter:

The problem with accelerometers and gyroscopes
An accelerometer measures the forces that are working on the object (here cellphone). Every small force working on the object will disturb measurement completely. The accelerometer data is reliable only on the long term, so a “low pass” filter has to be used.

For gyroscope measuring angular position is very easy to obtain an accurate measurement that was not susceptible to external forces. Due to the integration over time, the measurement has the tendency to drift, not returning to zero when the system went back to its original position. The gyroscope data is reliable only on the short term.

The complementary filter
The complementary filter gives us a “best of both worlds” kind of deal. On the short term, we use the data from the gyroscope, because it is very precise and not susceptible to external forces. On the long term, we use the data from the accelerometer, as it does not drift. In it’s most simple form, the filter looks as follows:

Gyro gives the angular rates which on integrating gives angular position. This causes drift which is corrected using accelerometer and magnetometer readings. On adding the three values you get stable angular position (rotation) of the system. To separate the raw accelerometer into 2 components- gravity acceleration and linear acceleration, we used complementary filter which combines high frequency

low noise data (integrated gyro) with low frequency high noise data (accelerometer/magnetometer).

RESULTS

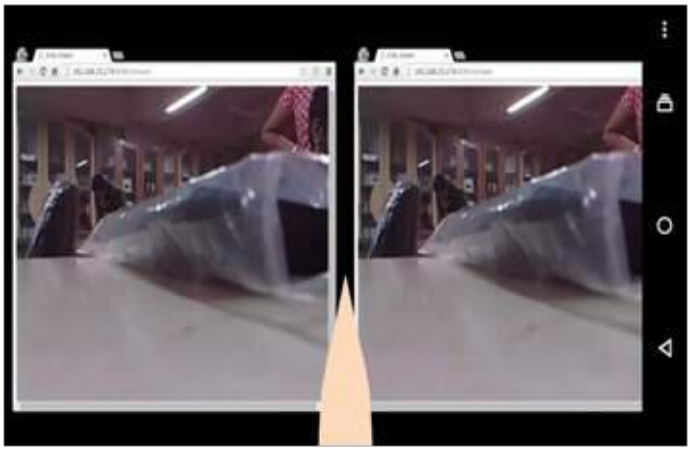

Fig 3. Result

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Introduction to Cloud Computing

Vaishnavee Rathod, Simran Thakur

Abstract: Traditional business applications have always been very complicated and expensive. The amount and variety of hardware and software required to run them are daunting. You need a whole team of experts to install, configure, test, run, secure, and update them. When you multiply this effort across dozens or hundreds of apps, it's easy to see why the biggest companies with the best IT departments aren't getting the apps they need. Small and mid-sized businesses don't stand a chance. So we have switched to advance technology called cloud computing that has changed the scenario of services provided by software to a different level in these times. This paper explores some of the basics of Cloud Computing.

Introduction:

Cloud computing is a computing paradigm, where a large pool of systems are connected in private or public networks, to provide dynamically scalable infrastructure for application, data and file storage. With the advent of this technology, the cost of computation, application hosting, content storage and delivery is reduced significantly. Cloud computing is a practical approach to experience direct cost benefits and it has the potential to transform a data center from a capital-intensive set up to a variable priced environment. The idea of cloud computing is based on a very fundamental principal of „reusability of IT capabilities'. The difference that cloud computing brings compared to traditional concepts of "grid computing", "distributed computing", "utility computing", or "autonomic Computing" is to broaden horizons across organizational boundaries. On the customers side, there is no need for upfront investment in servers or software licenses, while for the provider, the costs are lowered, since only a single application needs to be hosted & maintained basics of cloud such as: Realities and risks of the model Components in the model Characteristics and Usage of the model The paper aims to provide a means of understanding the model and exploring options available for complementing your technology and infrastructure needs. So Business applications are moving to the cloud. It's not just a fad—the shift from traditional software models to the Internet has steadily gained momentum over the last 10 years. Looking ahead, the next decade of cloud computing promises new ways to collaborate everywhere, through mobile devices.

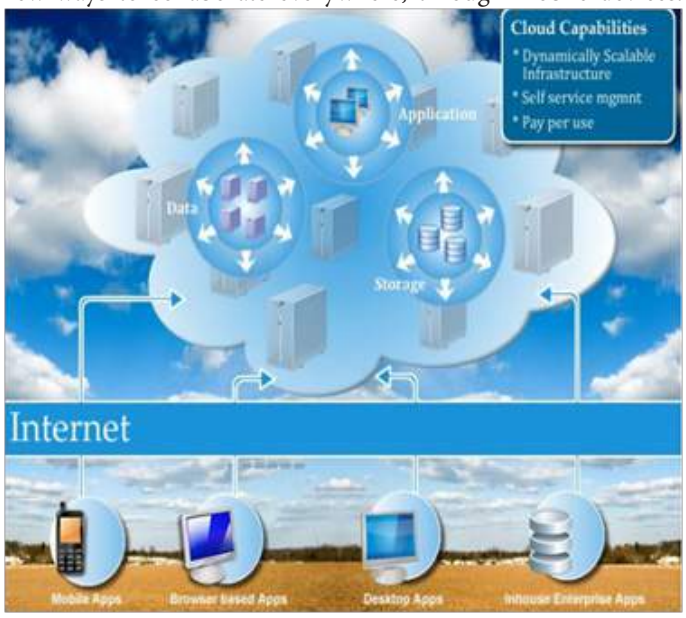

Figure1.Conceptual diagram of cloud computing

2. Cloud Computing Models: Cloud Providers offer services that can be grouped into three categories.

1. Software as a Service (SaaS): In this model, a complete application is offered to the customer, as a service on demand. A single instance of the service runs on the cloud & multiple end users are serviced. On the customers side, there is no need for upfront investment in servers or software licenses, while for the provider; the costs are lowered, since only a single application needs to be hosted & maintained. Today companies such as Google, Salesforce, Microsoft, Zoho, etc. offer SaaS.

2. Platform as a Service (Paas): Here, a layer of software, or development environment is encapsulated & offered as a service, upon

which other higher levels of service can be built. The customer has the freedom to build his own applications, which run on the provider's infrastructure. To meet manageability and scalability requirements of the applications, PaaS providers offer a predefined combination of OS and application servers, such as LAMP platform (Linux, Apache, MySQL and PHP), restricted J2EE, Ruby etc. Google's App Engine, Force.com, etc. are some of the popular PaaS examples.

3. Infrastructure as a Service (Iaas): IaaS provides basic storage and computing capabilities as standardized services over the network. Servers, storage systems, networking equipment, data centre space etc. are pooled and made available to handle workloads. The customer would typically deploy his own software on the infrastructure. Some common examples are Amazon, GoGrid, 3 Tera, etc.

Figure2.Difference between SaaS PaaS IaaS

3. Cloud Computing Benefits: Enterprises would need to align their applications, so as to exploit the architecture models that Cloud Computing offers. Some of the typical benefits are listed below:

1. Reduced Cost: There are a number of reasons to attribute Cloud technology with lower costs. The billing model is pay as per usage; the infrastructure is not purchased thus lowering maintenance. Initial expense and recurring expenses are much lower than traditional computing.
2. Increased Storage: With the massive Infrastructure that is offered by Cloud providers today, storage & maintenance of large volumes of data is a reality. Sudden workload spikes are also managed effectively & efficiently, since the cloud can scale dynamically.
3. Flexibility this is an extremely important characteristic. With enterprises having to adapt, even more rapidly, to changing business conditions, speed to deliver is critical. Cloud computing stresses on getting applications to market very quickly, by using the most appropriate building blocks necessary for deployment.

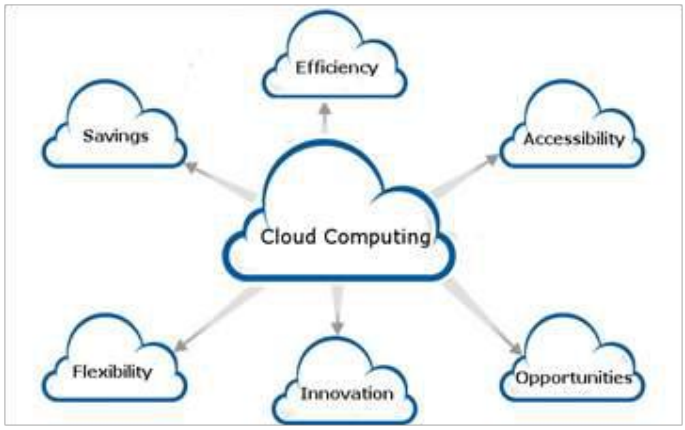

Figure3.Benefits of cloud computing

4. Cloud Computing Challenges: Despite its growing influence, concerns regarding cloud computing still remain. In our opinion, the benefits outweigh the drawbacks and the model is worth exploring. Some common challenges are:
1. Data Protection Data Security is a crucial element that warrants scrutiny. Enterprises

are reluctant to buy an assurance of business data security from vendors. They fear losing data to competition and the data confidentiality of consumers. In many instances, the actual storage location is not disclosed, adding onto the security concerns of enterprises. In the existing models, firewalls across data centers (owned by enterprises) protect this sensitive information. In the cloud model, Service providers are responsible for maintaining data security and enterprises would have to rely on them.

2. Data Recovery and Availability All business applications have Service level agreements that are stringently followed. Operational teams play a key role in management of service level agreements and runtime governance of applications. In production environments, operational teams support appropriate clustering and Fail over Data Replication System monitoring (Transactions monitoring, logs monitoring and others) Maintenance (Runtime Governance) Disaster recovery Capacity and performance management If, any of the above mentioned services is under-served by a cloud provider, the damage & impact could be severe.

3. Management Capabilities Despite there being multiple cloud providers, the management of platform and infrastructure is still in its infancy. Features like „Auto-scaling" for example, is a crucial requirement for many enterprises. There is huge potential to improve on the scalability and load balancing features provided today.

4. Regulatory and Compliance Restrictions In some of the European countries, Government regulations do not allow customer's personal information and other sensitive information to be physically located outside the state or country. In order to meet such requirements, cloud providers need to setup a data center or a storage site exclusively within the country to comply with regulations.

5. Conclusion: With cloud computing, you eliminate headaches like installment, configuring, securing and updating because you're not managing hardware and software—that's the responsibility of an experienced vendor. The shared infrastructure means it works like a utility: You only pay for what you need, upgrades are automatic, and scaling up or down is easy. Cloud-based apps can be up and running in days or weeks, and they cost less. With a cloud app, you just open a browser, log in, customize the app, and start using it. As cloud computing grows in popularity, thousands of companies are simply rebranding their non-cloud products and services as "cloud computing. This paper is based on open access references proving basic concept of cloud computing.

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[1] http://www.salesforce.com/cloudcomputing/
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[3] https://www.google.co.in/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8#q=cloud+computing+ppt
[4] www.cse.unr.edu/~mgunes/cpe401/cpe401sp12/lect15_cloud.ppt
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TRAFFIC DENSITY BASED LANE DIVIDER

In this modern era, one of the major problems we come across is the vehicular traffic. Being an engineer it is necessary to take a look at the society and understand its problems in order to get a suitable solution for it.

Even while learning the core subjects in my second year of engineering this remained my main focus. By the end of the year I came across a problem which I observed next to our college on the western express highway. I had to cross that highway daily to reach my college and I observed one unusual thing, something which bothered me.

Fig [1] Western Express Highway

As you can see in the above image above, the highway is divided by the divider for the vehicles to travel on either side. But one side of the road is jammed while the other side has a smooth flow of traffic. A possible solution to this problem came across my mind.

I told this idea to my friends and we started working on it as our 1st mini project for third year (semester 5). Now you might think that what is the role of the divider in connection with traffic? Vehicular traffic is typically controlled by traffic lane dividers. The function of traffic divider to ensure that traffic moves as smoothly and safely as possible which is not always true. This project is developed to meet the requirements of solid state traffic divider controller by adopting microcontroller as the main controlling element, and LEDs as an indication of light and motor to move the divider. A microcontroller is interfaced with the LEDs and motor to provide for centralized control of the traffic signals. Microcontroller is programmed in such a way so as to adjust their timing and phasing to meet changing traffic conditions.

Microcontroller AT89c51 is the brain of the project which initiates the traffic signal at a junction. The LEDs are automatically turned on and off by making the corresponding port pin of the micro controller high. A seven segment display also connected to display the timing of each signal. At a particular instant only one green light holds and other lights hold at red. During transition from green to red, the present group yellow LED and succeeding group yellow LED glows and then succeeding group LED changes to green. This cycle continues.

The IR sensors detect the traffic density and give the signal accordingly. So basically the project consists of IR sensors, 8051 microcontroller, LEDs and oscillator to give the timing signal. As shown in the circuit diagram (Image [2]), the transmitters are placed on one side and receivers on other. If the signal is not received by all the receivers for a few seconds the signal goes red.. IR sensors are connected to the PORT C (PC0, PC1, PC2, and PC3) of the microcontroller and traffic lights are connected to PORT B and PORT D. If there is traffic on road then that particular sensor output becomes logic 0, otherwise logic 1. By receiving these IR sensor outputs, we have to write the

program to control the traffic system. If you receive logic 0 from any of these sensors, we have to give the green signal to that particular path and give red signal to all other paths. Here continuously we have to monitor the IR sensors to check for the traffic. This circuit consists of 4 IR sensors, atmega8 microcontroller, 4 traffic lights. IR transmitter looks like an LED. This IR transmitter always emits IR rays from it. The operating voltage of this IR transmitter is 2 to 3v. These IR (infra red) rays are invisible to the human eye. But we can view these IR rays through camera. IR receiver receives IR rays that are transmitted by IR transmitter. Normally IR receiver has high resistance in order of mega ohms, when it is receiving IR rays the resistance is very low. The operating voltage of IR receiver is also 2 to 3V. We have to place these IR pair in such a way that when we place an obstacle in front of this IR pair, IR receiver should be able to receive the IR rays. When we give the power, the transmitted IR rays hit the object and reflect back to the IR receiver.

Instead of traffic lights, you can use LEDs (RED, GREEN, YELLOW). In normal traffic system, you have to glow the LEDs on time basis. If the traffic density is high on any particular path, then glows green LED of that particular path and glows the red LEDs for remaining paths. In normal traffic system, we allow the traffic for a time delay of 1 minute for each path. Here 330 ohm resistor is used to drop the voltage otherwise IR transmitter may get damaged. To vary the obstacle sensing distance, we have used a potentiometer. We have taken the output from transistor collector. This sensor gives the digital output.

Then the Divider circuit is implemented as given below:-

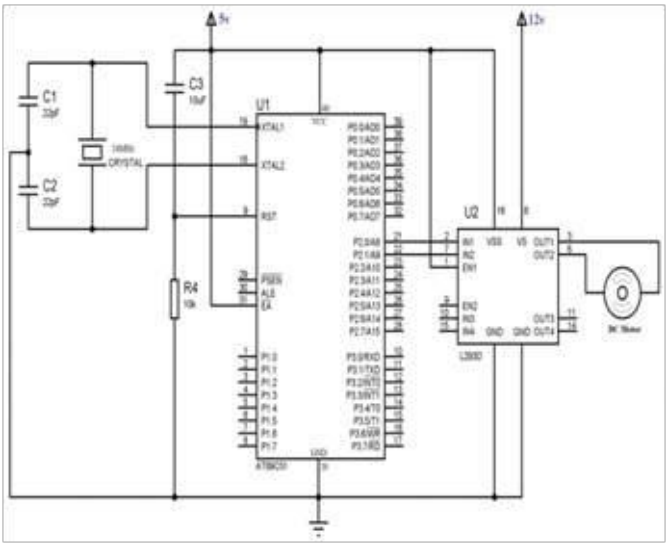

Fig 2 Circuit Diagram

This circuit is initiated a few seconds after the signal turns red. It consists of IC L293D and DC motor. The current required by the motor is very high for the microcontroller to be directly connected to the motor. So the IC is needed to control the motors. The IC is further controlled by the 8051 microcontroller. The motor is connected to the divider wheels. Thus, the divider can be shifted by the required lanes. Thus the jammed side of the road will get the additional lanes from the side which has less traffic. Hence the traffic will get reduced in less time and there will be a smooth flow.

In some of the electronics projects you may want to control a DC Motor with 8051 microcontroller. The maximum current that can be sourced or sunk from a 8051 microcontroller is 15 mA at 5v. But a DC Motor need currents very much more than that and it need voltages 6v, 12v, 24v etc, depending upon the type of motor used. Another problem is that the back emf produced by the motor may affect the proper functioning of the microcontroller. Due to these reasons we can't connect a DC Motor directly to a microcontroller..
To overcome this problem the L293D driver IC is used. It is a Quadruple Half H-Bridge driver and it

solves the problem completely. You needn't connect any transistors, resistors or diodes. We can easily control the switching of L293D using a microcontroller. There are two IC's in this category L293D and L293. L239D can provide a maximum current of 600mA from 4.5V to 36V while L293 can provide up to 1A under the same input conditions. All inputs of these ICs are TTL compatible and clamp diode's is provided with all outputs. They are used with inductive loads such as relays solenoids, motors etc.

L293D contains four Half H Bridge drivers and are enabled in pairs. EN1 is used to enable pair 1 (IN1-OUT1, IN2-OUT2) and EN2 is used to enable pair 2 (IN3-OUT3, IN4-OUT4). We can drive two DC Motors using one L293D, but here we are using only one. You can connect second DC Motor to driver pair 2 according to your needs.

In this way we can have a modernised way of controlling traffic. This project can be made manual if we remove those IR sensors by checking the density of the traffic and making adjustments of the divider as per requirements. If this is implemented successfully, many problems can be reduced. Traffic congestion is a severe problem in many modern cities around the world. It directly impacts many companies. Due to traffic congestion there is a loss in productivity from workers, trade opportunities are lost, delivery gets delayed, and thereby the costs go on increasing. Also if an ambulance gets stuck in such traffic, this method of controlling traffic can prove to be of much use. To solve these congestion problems, we have to build new facilities & infrastructure but at the same time make it smart and I think this idea meets the requirements. There are many things to be checked if implemented on a large scale. This project has many advantages as mentioned above but when I think of it on a large scale one demerit which must be overcome is its power consumption. Otherwise this project idea is something that can be worked on for real time use.

MAYUR HEGISHTE
TE EXTC

Offshore Wind Farms

The demand for the power is increasing day by day. The only one solution for this is to use the renewable sources of energy like wind, solar, water etc. Among this wind can produce major amount of power. Since the wind farm requires a lot of space and adequate amount of wind, it's much challenging to find out such a place in shore because of increasing population and civilization needs in general.

This compell us to make use of offshore wind farms. A substantial amount of energy is being generated by harnessing the power of offshore wind. However, there are still challenges in bringing the power from the offshore wind farm to the shore and then to the utilites.

The size of the wind farm varies from 400 MW and 1200 MW and thier distance from shore is between 50 and 400 km. Technologies

There are three different technologies in focus, and I will take a close look up on the third one – HVDC VSC.

1. HVAC (High voltage AC)
2. HVDC LCC (High voltage DC with line commutated converters)
3. HVDC VSC (High voltage DC with voltage source converters)

HVDC VSC in general

HVDC transmission based on VSC is a relatively a new technology since it uses IGBTs (Insulated Gate Bipolar Transistor). Major companies that promote HVDC VSC are ABB and Siemens. HVDC VSC is prompted as HVDC light by ABB and as HVDC Plus by Siemens.

The major components of HVDC VSC based transmission for offshore wind farms are:

1. Converter Stations (Both offshore and Onshore)
2. Cable pair (Polymeric extruded cables)

HVDC VSC Converter Station

The scheme of the VSC Converter Station is shown in the figure below. The important component of the system is VSC unit. In this unit AC converts to DC and vice-versa. Conversion takes place.

It uses IGBT so that it can reach high level of converted power due to evolution of semiconductor technology. As the switching frequency increases the number of harmonics also reduces thus the number of filters. But it increases the power losses and inefficiency of the system.

A transformer connects the AC system to the converter in order to step up the voltage to the level of the VSC input side. The transformer also provides an reactance in between AC system and VSC system so that the zero frequency current flow is prevented between AC system and Converter.

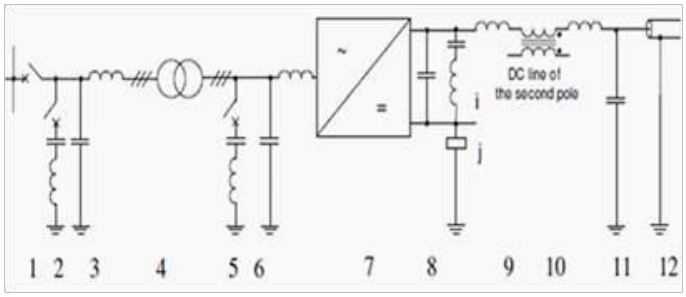

Fig.1 Scheme of the VSC Converter Station

A lot of filters are used in both sides in order to reduce the harmonics in the system thus to improve overall performance of the system.

Fig.2 Schematic of 2-level HVDC converter

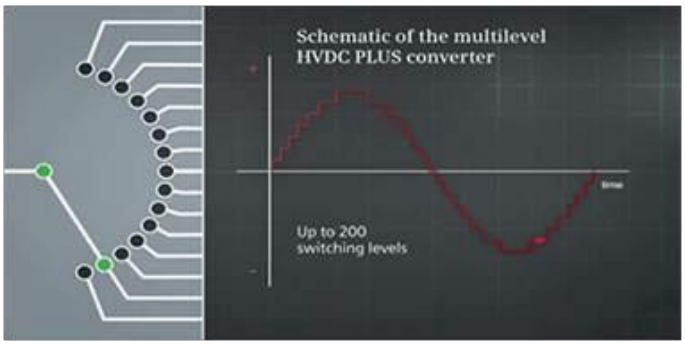

Fig.3 HVDC plus multilevel inverter

Cables

Extruded polymeric insulated cables are used instead of oil filled cables to get better thermal characteristics. The extruded cables have good mechanical flexiblity and they can be installed also at high depth submarine applications.
Advantages of HVDC VSC Systems
#Independant control of active and reactive power in each converter station is possible, offshore and onshore.

#A windfarm can create problems if it is connected to the weak grids due to the variations of the wind and the produced power.

#Possible to function as STATCOM supplying or consuming reactive power without absorption or generation of active power.

Wind power outlook in India:2015

In the global wind energy basket ,India is the fifth largest producer after Germany,Spain,USA and China .Wind energy accounts for over 71% (14GW) of the total 20GW of installed renewable energy generation capacity in India as of March 2011.India's total wind power potential has been assessed at 48,500 MW

by the Centre for Wind Energy Technology (C-WET).This shows that till now onlu about 29% of the total gross potential for wind power development has been installed in India as of March 2011. And out of which only 32% is considered technically feasible.

From 2002 till 2010,
The cumulative wind capacity has grown by a CAGR of 27.7 percent.The rapid building of capacity was catalysed by combined efforts of :

a)The government entities in creating the necessary policy environment.

b)The private sector in capacity building in project engineering,construction,component manufacture,installation and operation and in mobilising investments.

c)Financial institutions extending their expertise and funds.

-Pratik Agarwal
TE EXTC A

Electricity with Pencil and Tape

Introduction:

Researchers from EPFL (Ecole Polytechnique Federale de Lausanne) together with a team from the University of Tokyo have been able to make an 8cm2 device that can generate more than 3V using only a cardboard, Teflon tape and pencil. According to them, eco-friendly and inexpensive system can produce the same current as two AA batteries, enough to operate a remote control.

Principle:

It all starts with static electricity.
The principle underlying this system is well known-static electricity. When two insulators such as paper and Teflon come into contact, they gain or lose electrons. The system is made up of small cards, where one side of each card is covered in pencil. The carbon serves as the electrode.

Teflon is then applied to the opposite side of one of the cards. When brought together, they make a sandwich: two layers of carbon on the outside, then two layers of paper and one layer of Teflon in the middle. They are then taped together in such a way that cannot touch, giving the system a configuration that makes it electrically neutral.

By pressing down with your finger on the system, the two insulators come into contact. This creates a charge differential: positive for the paper, negative for the Teflon. When you release your finger and the cards separate, the charge passes to the carbon layers, which act as electrodes. A capacitor placed on the circuit absorbs the weak current that is generated.

To boost the device's output, Xiao-Sheng Zhang, a postdoc at EPFL's Microsystems Laboratory and the University of Tokyo, used sandpaper. Pressing the sandpaper firmly against the cards gives them a rough surface. If you press your finger on the cards at a rate of 1.5 times per second for a short period of time the capacitor will release the same amount of voltage as that supplied by two AA batteries. This is enough to power Micro or Nano sensors, which need only a little electricity to run.

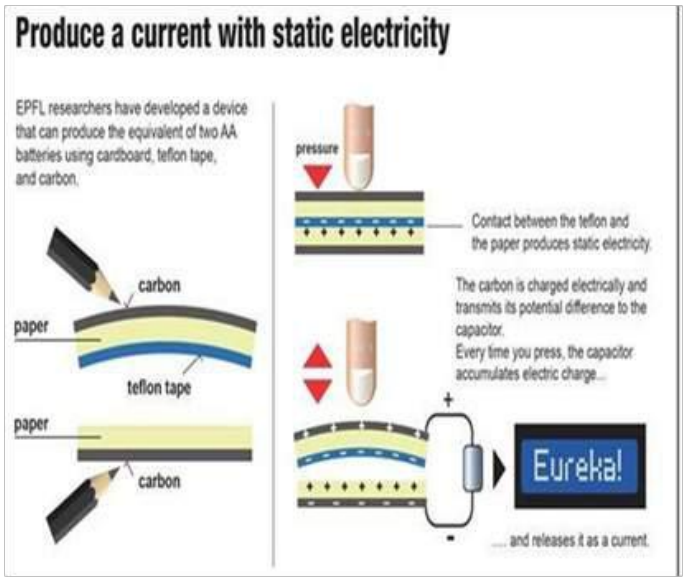

Fig1: Construction and Working

EPFL says:

"When brought together they make a sandwich, two layers of carbon on the outside, then two layers of paper, and one layer of Teflon in the middle. They are then taped together in such a way that they do not touch each other, giving the system a configuration that makes it electrically neutral.

By pressing down with your finger on the system the two insulators come into contact. This creates a charge differential-positive on the paper, negative on Teflon. When you release your finger and the cards separate, the charge passes to the carbon layers, which acts as an electrode. A capacitor placed on the circuit absorbs the weak current that is generated."

References:

[1] www.treehugger.com

Atul U. Kadam
SE-EXTC B

Touch screen

Today the world is revolutionised with the touch screen phones in the market. All most every person today uses a touch screen phone.

But you may have noticed the initial touch screen phones were very rigid you had to press with a considerable amount of pressure to make it actually work. But today the scenario is different you don't have to apply any pressure just a touch and things work.

We always wonder how such things happen ... what is the science behind it well let's see.

There are many touch screen technologies
The most commonly used are

1) Resistive (refer fig 1 and 2)

In this type of touch screens we have to apply a considerable amount of pressure. It contains 2 layers the conductive layer and the resistive layer both these layers are separated by tiny particles called spacers.

Current continuously flows through the conductive layer. As soon as we apply pressure on the screen the resistive layer comes in contact with the conductive layer. The resistance causes the current to decrease and the function corresponding to that point is carried out. Simple isn't it ?

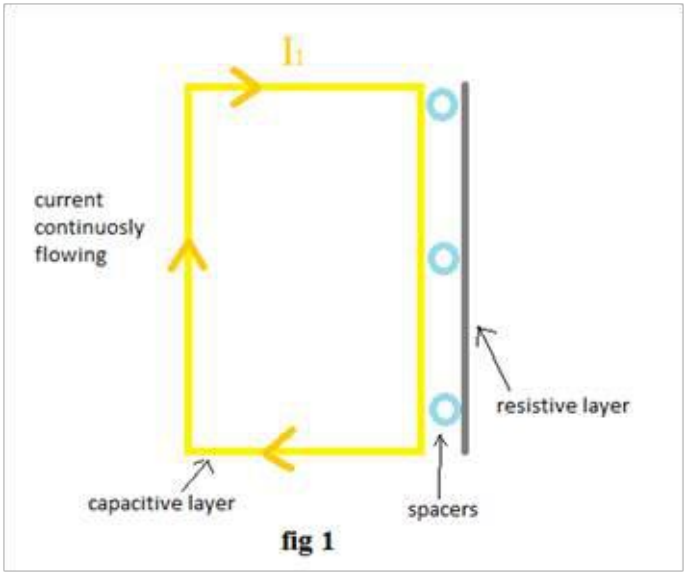

fig 1

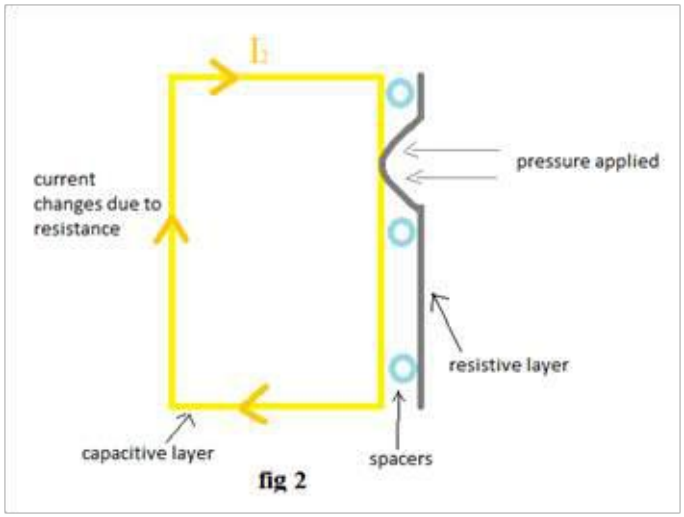

fig 2

2) Capacitive (refer fig 3)

These screens are made up of copper or indium tin oxide which store electric charges in a electrostatic grid of very small wires. There's a glass substrate a conductive layer a protective coating and a controller and electrodes at the corners. The electrodes apply a low voltage to the conductive layer creating a uniform electrostatic field. When our finger touches the screen a tiny electrical charge is transferred to the screen and the circuit is complete. (This is only because we have very small charge in our screen. Notice that this screen won't work if you try any other thing that doesn't contain charge.) This causes a voltage drop at that point on the screen which is recorded by the controller and the work is done ..

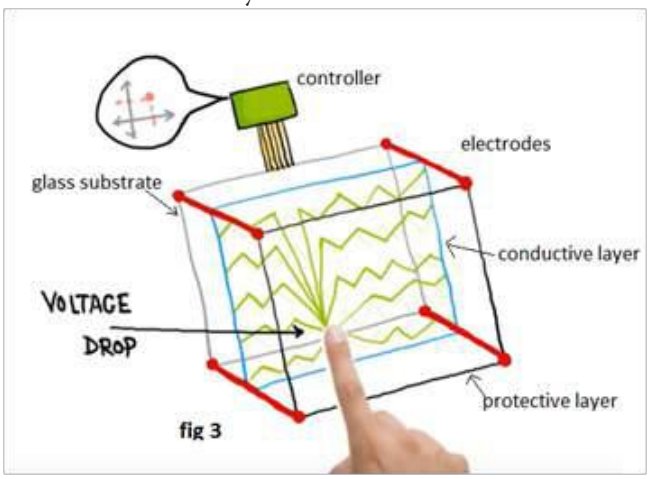

fig 3

Reference:
[1] the curious engineer youtube video

Pratik Jain
SE EXTC A

THE HAM RADIO

INTRODUCTION

HAM radio is generally called The Amateur Radio. HAM stands for Hertz-Armstrong-Marconi. The HAM Radio is used for short and long distance communication. The radio is built from simple electronic components like resistors, inductors, capacitors, etc. It is a two way radio which is used for non-commercial exchange of messages, emergency messages and also as a recreation activity. The Amateur Radio service is established by the International Telecommunication Union (ITU) and is officially represented and coordinated by the International Amateur Radio Union (IARU).

Fig 1. An example of an amateur radio station with four transceivers, amplifiers, and a computer for logging and for digital modes.

Following were the questions posed to Mr. Jayesh Banatwala an Amateur Radio operator:

Q. How to get a HAM Radio?
A. To acquire a HAM radio one must acquire the license from the government. The license is acquired by giving a test organised by The Government of India which consists of 3 parts- Basic electronics, Protocol and Morse. After this, the paper is checked by a number of agencies which decide whether or not to grant you a license. After attaining the license you can choose a call-sign with which you wish to communicate with others.

Q. What is a call-sign?
A. An amateur radio operator uses a call sign on the air to legally identify the operator or station. The call-sign allows you to conceal your identity. You can choose a call-sign of your liking as long as it satisfies all the protocols. An example of a call-sign is KF5BOC.

Q. What are the most common modes of transmission in Amateur Radio?
A. The 2 most common modes of voice transmission are Frequency Modulation (FM) and Single Sideband (SSB). However the most commonly used wireless transmission method is Continuous Waves (CW) or very commonly known as "The Morse Code". Morse code is a type of non-vocal communication.

Q. How far can we communicate using the Radio?
A. The radio is powerful enough to communicate with astronauts in the International Space Station (ISS) and can also communicate as far as the Moon. NASA has used this radio to communicate with their astronauts in the past using Very High Frequencies (VHF) and Ultra High Frequencies (UHF).

Q. What is the cost of buying a HAM Radio?
A. A good Japanese HAM Radio could cost INR 3 – 4 lakhs. Out of which the majority of the amount goes towards buying a good antenna. However, one can homebrew the antenna for INR 500 but it will lack quality and you would have to compensate on some factors.

Q. What is the advantage of HAM Radio over other modes of voice communication?
A. HAM Radio uses Morse code for communication. In voice communication we use a lot of power to transmit our voice using carrier waves. By using Morse code we decrease the amount of power used for transmitting the data. The data in Morse code is transmitted by punching in the keys. This requires less amount of power than voice communication. We can communicate between two ends of the world by using just 1W of power using Morse.

Article By- Dhruv Bal , Karan Parikh

EVENTS

REPORT ON TECHNICAL SEMINAR

The technical seminar on "Industrial Automation" was conducted for TE & BE EXTC students, on 27th January, 2016 by Mr. Sarang Pimpalkar and Mr. Shrinivas Kulkarni, who are working with Prolific Systems & Technologies Pvt. Ltd., Thane. There were total 206 number of students who took benefit of this seminar. In the first half of the seminar, the students were given a background of Automation & detailed description of typical installations using PID Controllers & the various configuration of PLC. In the second half of the seminar job prospects for fresher's in Industrial Automation were discussed.

For SE EXTC A & B students, technical seminar was conducted on topic "Basics of Networking" on 28th January, 2016 by Mr. Nitesh Sharma, who is Software engineer in GE Oil & Gas. He has explained Basic Networking Concepts, Types of Networks and different Network Topologies. He also explained OSI (Open Systems Interconnection) Data Model and its 7 layers. There were total 92 students who attended this seminar.

Overall response of the students was very good & students thoroughly enjoyed the seminar.

Prepared by,
Ms. Anvita Birje
(SDP Coordinator)

Ms. Amruta Naik
(SDP Coordinator)

TOPPERS OF DEPARTMENT

SR No.	Name	Pointers	Class
1	Paritosh Sahay	8.81	BE EXTC A
2	Swapnil Choudhary	8.81	BE EXTC A
3	Kripal Singh Shekhavat	9.41	BE EXTC B
4	Khushbu Thakur Ishwar Suryavansi Rudresh Tiwari	8.81 8.81 8.81	BE EXTC B BE EXTC B BE EXTC B
5	Rajan Gupta	9.56	TE EXTC A
6	Shyam Sunderr	9.30	TE EXTC A
7	Darshana Sapale	9.56	TE EXTC B
8	Arshdeep Kaur Sood	9.11	TE EXTC B
9	Dhruv Bal Nikita Khatiya Sumit Kushwaha	10 10 10	SE EXTC A SE EXTC A SE EXTC A
10	Karan Parekh	9.93	SE EXTC A
11	Tarush Shenoy	9.85	SE EXTC B
12	Pooja Gupta	9.77	SE EXTC B

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, it's 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