

DEPARTMETN OF ELECTRICAL AND COMPUTER ENGINEERING KULLIYAH OF
ENGINEERING

Final Year Project Offering Semester II 2009/2010

COMMUNICATIONS and CIE

FYP Committee



Introduction

Final year project (FYP) is a two-semester long course offered in the both Communications and CIE (Computer and Information Engineering) programmes at the Department of Electrical and Computer Engineering as an integral part of the curricula.

It is divided into two parts which is called FYP1 and FYP2 with three (3) credit hours each. However, FYP shall be considered as a special subject which is intended to provide avenue to students to actualize their dreams as graduating engineers by integrating knowledge they have acquired in the first three years of study with their spirit for intellectual pursuit. It is expected that students will gain experience to develop skills of problem solving, team work, professional responsibility and technical report writing. These skills are essential for student who wants to succeed in their professional carrier as engineer.

Students taking FYP must be fully aware that FYP requires more time and efforts compared to other subjects. FYP is an avenue whereby students are expected to behave independently and responsibly with adequate supervision.

Specifically this course has specified the following learning outcomes (LO):

Upon completion of this course, students should be able to:

1. Plan for engineering project utilizing relevant engineering principles and theories to design, built, operate, simulate and analyze to develop new product or process.
2. Propose effective engineering solutions through the application of mathematics, science and engineering fundamentals.
3. Design experiments to collect, archive and interpret data in order to make relevant decision on the performance of a communication/electronic/computer product.
4. Evaluate specific engineering design in terms of the social, cultural, global and environmental responsibilities of an engineer.
5. Practice ethical and professional norms for the implementation of engineering projects.
6. Present technical and scientific findings effectively through written and oral mode with the aid of multimedia tools.

Therefore, it is highly expected that students will carefully decide which project to take. The decision shall come from a full conscience of all the consequences and commitment required in order to complete the subject successfully.

This compilation of offered FYP titles is meant to provide students with essential information of the projects. It is expected that students will use it to find necessary literature to understand the subject before enquiring the respective candidate supervisors.

We pray to Allah S.W.T. that He guide all of us and give us strength to strive for goodness. We also pray to Allah that he guide our beloved students to excel in their completion of the FYP. May Allah accept all efforts spent in this endeavor and reward it as good deeds. Amin

FYP Committee,



Project Offering Semester II 2009/2010



TITLE: Fingerprint Authentication System using Matlab
SUPERVISOR : Dr. Teddy Surya Gunawan
SUMMARY
<p>This project will develop and implement Fingerprint Authentication System using Matlab. A fingerprint image from Microsoft Fingerprint Reader is acquired and preprocessed to enhance the image by Short Time Fourier Transform (STFT) analysis. Then, three sets of invariant moment features, as a kind of texture features, are extracted from three different sizes of Region of Interest (ROI) areas based on the reference point from the enhanced fingerprint image. Each set of invariant moments contain seven invariant moments. Fingerprint verification is realized by Euclidean distance between the two corresponding features of the test fingerprint image and template fingerprint image in the database. The fingerprint verification is a type of biometric application which can be combined with other biometric techniques to enhance the security.</p> <p>Note, only students with good Matlab programming skills need to apply.</p> <p>Keywords : fingerprint images, image processing, image verification</p>
METHODOLOGY AND TOOLS
<p>Methodology:</p> <ul style="list-style-type: none">• Literature review on fingerprint authentication system• Develop and implement the algorithms using Matlab• Optimizing the parameters• Performance evaluation <p>Hardwares/software required:</p> <ul style="list-style-type: none">• Matlab, Microsoft Fingerprint Reader
REFERENCES/BIBLIOGRAPHY
<p>[1] Sharat C., Alexander N. C. Venu G., Fingerprint enhancement using STFT analysis, Pattern Recognition, 2006. [2] Ju Cheng Yang, Sook Yoon, Dong Sun Park, "Applying Learning Vector Quantization Neural Network for Fingerprint Matching", Lecture Notes in Artificial Intelligence (LNAI 4304), Springer, Berlin, Dec., 2006. [3] Ju Cheng Yang, Dong Sun Park, "A Fingerprint Verification Algorithm Using Tessellated Invariant Moment Features", Neurocomputing, Vol. 71(10-12) pp. 1939-1946, 2008.</p>
RESOURCES



TITLE: Design of Seamless Mobility for Dual Radio WiFi_WiMAX Handover
SUPERVISOR : Dr. Rashid A. Saeed
SUMMARY
<p>This project discusses enhancements to enable optimized dual radio handovers (DM-HO) between WiFi and WiMAX technologies and extend these mechanisms for dual radio handovers between IEEE 802 wireless technologies and cellular technologies. The students will be familiar with the media access independent (MIH) standard and will contribute simple protocol for devices with dual radio mode.</p> <p><i>Keywords : Handover, WiFi, WiMAX, MIH</i></p>
METHODOLOGY AND TOOLS
<p>The project will use 802.21 MIH as benchmark for handover and develop optimized handover in dual radio mode devices.</p>
REFERENCES/BIBLIOGRAPHY
<p>[1] IEEE802.21 MIH, www.ieee802.org/21/ [2] IEEE802.16e-2007 www.ieee802.org/16/ [3] “Dual radio handovers between wimax and 3gpp description” by S. Davis</p>
RESOURCES
<p>NS-2 with WiMAX module</p>



TITLE: Design of Self Organizing Scheme for Femtocell Networks
SUPERVISOR : Dr. Rashid A. Saeed
SUMMARY
Self-Organizing Networks (SON) for femtocell is considered to enable the radio and network components to interact among themselves automatically in real time. SON is a process that involves Radio Access Networks (RAN) and Core networks to enable automatic configuration and to fine tune network parameters in order to achieve optimal performance. It helps the network operators to minimize human intervention in both deployment and operational phases. SON is crucial for femtocell because thousands of HBS will be deployed by the end users, which is difficult to keep track all of these sites by operators. In this project the students will be familiar with femtocell network architecture reference model NRM and protocols and procedures for femtocell SON system. The student(s) will come out with enhanced protocol for SON for WiMAX-femtocell.
<i>Keywords : Femtocell, SON, NRM, RAN</i>
METHODOLOGY AND TOOLS
The project is using WiMAX femtocell as benchmark. Network graph theory maybe needed to design SON. Simulation software i.e. ns-2 is needed for verification and validation.
REFERENCES/BIBLIOGRAPHY
[4] "System performance of self-organizing network algorithm in WiMAX femtocells" by Maui, Hawaii. http://portal.acm.org/ft_gateway.cfm?id=1554157&type=pdf&coll=GUIDE&dl=GUIDE&CFID=64802427&CFTOKEN=42574465 accessed in 3 Dec 2009.
[5] H. Claussen, L. T. W. Ho, and L. G. Samuel, "An Overview of the Femtocell Concept," Bell Labs Technical J., vol. 13, no. 1, pp. 221–245, May 2008.
[6] Femto Forum; http://www.femtoforum.org
RESOURCES
NS2, Network Graph theory



TITLE: Interference Analysis in OFDMA-Femtocell Systems
SUPERVISOR : Dr. Rashid A. Saeed
SUMMARY
<p>Femtocell is a new cellular evolution which will bring many advantages to the operator as well as customers. One of the serious challenges in femtocell deployment is the interference between femto-to-macro and femto-to-femto. In this project the students will study the OFDMA femtocell system and design a new technique to mitigate the mentioned interference. The new technique will be self configured by the home base station.</p> <p><i>Keywords</i> : Femtocell, Home BS, co-channel Interference</p>
METHODOLOGY AND TOOLS
<p>The project is using 3GPP and 3GPP2 femtocell as benchmark. Dataflow software maybe needed to illustrate the flow of the signals. Simulation software i.e. ns-2 is needed for verification and validation.</p>
REFERENCES/BIBLIOGRAPHY
<p>[7] H. Claussen, L. T. W. Ho, and L. G. Samuel, "An Overview of the Femtocell Concept," Bell Labs Technical J., vol. 13, no. 1, pp. 221–245, May 2008. [8] Femto Forum; http://www.femtoforum.org [9] 3GPP TS 25.367, "Mobility Procedures for HNB."</p>
RESOURCES
<p>Ns-2</p>



TITLE: Linux-based Design for 802.11p WAVE
SUPERVISOR : Dr. Rashid A. Saeed
SUMMARY
Wireless vehicular communications (WVC) has been identified as a key technology for intelligent transportation systems (ITS) for a few years ago. IEEE 802.11p (WAVE: wireless access in vehicular environments) is the proposed standard for physical and MAC layer of WVC devices. The student will be familiar with the work at the embedded Linux kernel, GNU C and MADWiFi device drivers. Ns2 simulation maybe needed as well to simulate the network scenario. <i>Keywords</i> : WVC, embedded Linux, WAVE, ITS, Device Driver
METHODOLOGY AND TOOLS
The project is using open source software developed by wireless community. C language will be used for protocol programming and implementations. Ns 2.33 is needed as well.
REFERENCES/BIBLIOGRAPHY
[10]“FCC Report and Order 06-110: Amendment of the Commission’s Rules Regarding Dedicated Short-Range Communication Services in the 5.850-5.925 GHz Band,” July 20, 2006. [11] “IEEE P802.11p/D9.0, Draft Amendment for Wireless Access in Vehicular Environments (WAVE),” July 2009. [12]“Standard Specification for Telecommunications and Information Exchange Between Roadside and Vehicle Systems - 5 GHz Band Dedicated Short Range Communications (DSRC) Medium Access Control (MAC) and Physical Layer (PHY) Specifications”, ASTM DSRC STD E2313-02, 2002.
RESOURCES
Laptop with Proxim WiFi Card, Linux OS (ubuntu or CentOS), MADWiFi, GNU cross compiler, etc



TITLE: Development of an Emergency Medical Care Information System for Fetal ECG Monitoring
SUPERVISOR : Muhammad Ibn Ibrahimy
SUMMARY
<p>Telemedicine is producing a great impact in the monitoring of patients located in remote nonclinical environments. Pregnant women who have been identified, as being at risk of stillbirth due to fetal ECG decelerations should be using a fetal ECG monitor during maternal sleep, the time when most stillborn deaths occur. Because the mother's blood pressure is lowest during this period, and cord compression is more likely when the woman is lying down - especially in late term when there is little room for the baby to move - a monitor may have the potential to detect any dangerous fluctuation or decline in the baby's ECG in time to allow for appropriate medical intervention. To monitor such abnormalities, compact, portable, ambulatory monitoring has been proven to be mainstay of fetal surveillance during pregnancy. Connected to the Internet through a laptop computer, the monitor will be capable of sending an alert to a woman's physician.</p> <p>Keywords :</p>
METHODOLOGY AND TOOLS
REFERENCES/BIBLIOGRAPHY
<p>M. I. Ibrahimy, M. A. M. Ali, M. B. I. Reaz, "Development of an Emergency Medical Care Information System for Fetal ECG Monitoring," <i>Proceedings of the First International Workshop on Regional Innovation Studies</i>, 8 October, 2009, Japan.</p>
RESOURCES



TITLE: Detection and Characterization of ECG signal by using Cepstrum of Bispectrum
SUPERVISOR : Muhammad Ibn Ibrahimy
SUMMARY
<p>Summary</p> <p>ECG (electrocardiogram) is a test that measures the electrical activity of the heart. The ECG signal comprises by the P, Q, R, S and T waves that represents the atria and ventricular activity of the heart (depolarization and repolarization of atria & ventricles). Both duration and amplitude of each wave (P and T) or complex (QRS) are clinically important. The detection of these waves is often a difficult task as the frequency of these waves are overlapping, and the P and T waves lie in oscillations in the baseline, etc.</p> <p>A significant amount of research has been already been done to detect these waves. Most of these methods are adaptive thresholding, cross-correlation, maximum likelihood, morphological or traditional filtering based, which exhibit limitation in real application. The performance of these techniques depends heavily on the quality of ECG recording.</p> <p>In this project an advanced biomedical wave detection technique will be redeveloped and applied to real EEG signal. The algorithm uses Cepstrum of Bispectrum [1] (higher order statistics) which has advantage of noise insensitivity computation for blind system reconstruction</p> <p>Keywords : ECG, QRS complex, Bispectrum, Cepstrum, Cepstrum of Bispectrum</p>
METHODOLOGY AND TOOLS
REFERENCES/BIBLIOGRAPHY
<ol style="list-style-type: none">1. Shahid S and Walker J (2008). Cepstrum of Bispectrum -A new approach to blind system reconstruction Signal Processing, 88(1):19–32.
RESOURCES



TITLE: An Integrated Security System for Mobile Phone Users
SUPERVISOR : Khaizuran Abdullah
SUMMARY
<p>Almost every internet users has webcam with the computer. Security via webcam is a challenging issue in monitoring detection and reporting unauthorized person to the users. A technique to use webcam and GPRS has been developed. The GPRS has to be WAP enabled mobile phone for visual security purposes. The system architecture acting between webcam and its controllable base, and mobile phone are the challenging parts to be designed and developed using WML and WAP within a microcontroller base. The main base or software, which runs on PC, acts as controllable base and monitor between the webcam and the mobile phone. The system will be implemented based on a prototype room and could be further expanded for real situation</p> <p>Keywords : WAP, WML, WMS, mobile surveillance, and live webcam</p>
METHODOLOGY AND TOOLS
<p>FIRST PART: DESIGN</p> <ol style="list-style-type: none">1. The project will first study the system architecture in which that it is an interconnected or integrated circuit among the webcam, PC, and mobile phone via WAP gateway.2. The project will develop and design the system based on the architecture in part 1.3. To be able to do part 2, the students need to understand the system such as the WML and WAP coding. <p>SECOND PART: IMPLEMENTATION</p> <ol style="list-style-type: none">1. After the first part, the student should be able to implement on a prototype room.2. To develop part 1, hardware design such as wiring and PCB are necessary including handling the microcontroller on PCB.3. Testing part 2 is necessary after completion of wiring.4. After a successful task on part1 to 3, then the project would be extended for practical situation. <p>TOOLS:</p> <p>WMS software, WAP simulator, wireless webcam, microprocessor.</p>
REFERENCES/BIBLIOGRAPHY
<ol style="list-style-type: none">1. Gualdi, Giovanni, Prati, Andrea; Cucchiara, Rita, "Video streaming for mobile video surveillance", <i>IEEE Transactions on Multimedia</i>, v 10, n 6, p 1142-1154, October 20082. Manjunath, T.C., "Novel design of a wireless communication based automatic surveillance system for detection of suspicious objects", AH-ICI 2009. First Asian Himalayas International Conference on Internet, 2009. 3-5 Nov. 2009 Page(s):1 - 73. Ahmed, S.; Khan, A.; Babar, I.; "Monitoring Detection and Security Maintenance using WMS-Webcam Mobile Surveillance", ICET 2007. International Conference on Emerging Technologies, 2007. 12-13 Nov. 2007 Page(s):58 – 614. Wu, Xinyu, "Real-time surveillance system: Video, audio, and crowd detection", Ph.D. Thesis, The Chinese University of Hong Kong (Hong Kong), 2008, 124 pages; AAT 33488835. Goradia, Amit, "Planning and control of mobile surveillance networks", Ph.D. Thesis, Michigan State University, 2006, 187 pages; AAT 32641646. Sutor, S., Pujolle, G.; Reda, R., "Instantaneous mobile video surveillance: A security & quality challenge, 1st IFIP Wireless Days 2008, WD 2008, 2008,



TITLE: An Integrated Security System for Mobile Phone Users

SUPERVISOR : Khaizuran Abdullah

RESOURCES

1. IEEE Xplore, Google searching engine, Engineering Village 2, ProQuest



TITLE: Wavelet based OFDM System with an Application of Image Processing

SUPERVISOR : Khaizuran Abdullah

SUMMARY

Summary

An Orthogonal Frequency Division Multiplexing (OFDM) system is a multi-carrier system which utilizes a parallel processing technique allowing the simultaneous transmission of data on many closely spaced, orthogonal sub-carriers. In the transmitter, an OFDM symbol is mapped from binary to complex signal with amplitude and phase represented in real and imaginary number using quadrature amplitude modulation (QAM). On the other hand, the signal is de-mapped or extracted from complex signal to OFDM symbol in the receiver using QAM demodulation. Wavelet based OFDM channel is considered since it contains wavelet properties which have flexibility and ability to characterize signals accurately in many aspects of digital wireless communication systems. An image is used as input source and modulated using QAM and then transmitted via wavelet based OFDM channel. Then, in the receiver, the received signal is demodulated using QAM demodulation and an image recovery is performed at the receiver end. The performance is evaluated and simulated using bit error rate (BER) curves to observe different QAM types within biorthogonal and orthogonal wavelet families.

Keywords : QAM, Facial expression recognition, wavelet-based-OFDM, DWT-OFDM.

METHODOLOGY AND TOOLS

[Methodology and tools]

The methodology consists of:

- The image as the input source has to be converted from decimal gray code to binary code for QAM pre-processing.
- In the QAM mode, the binary signal is modulated to a complex signal into 4 levels for 4-QAM, or, 16 levels for 16-QAM, representing an OFDM symbol.
- The QAM output is then passed to wavelet based OFDM system.
- In this system, an inverse discrete wavelet transform (IDWT) block is used in the transmitter while the discrete wavelet transform (DWT) block is used in the receiver.
- The input of IDWT consists of two coefficients, low pass filter (LPF) coefficients and high pass filter (HPF) coefficients, acting as synthesizing filter. The QAM output signal is processed via the LPF filters since the transmitting signal must be in low frequency level. On the other hand, vectors of zeroes with the same length as LPF signal are padded to the HPF filters. Meanwhile, a type of wavelet family can be specified.
- Then, the IDWT output signal is multiplied with the exponential complex containing frequency carrier, and multiplexed into subcarriers featuring an OFDM frequency response.
- At the front receiver, the signal is received and multiplied with the conjugate of the exponential complex signal to get back the transmitted signal.
- The signal is then transferred to DWT block which decomposes the signal into LPF and HPF filter coefficients. The data of LPF filter is passed to QAM demodulation, whereas, the data from HPF is discarded.



TITLE: Wavelet based OFDM System with an Application of Image Processing

SUPERVISOR : Khaizuran Abdullah

- BER is calculated based on the error difference between the input of QAM modulator in the transmitter and the output from QAM demodulator in the receiver.
- The final stage is the image recovery in which that the signal is decoded back to decimal gray code between 0 and 255 representing the image pixels' values.
- All steps are simulated using MATLAB program.

Tools:

Matlab.

REFERENCES/BIBLIOGRAPHY

[References/Bibliography]

- [1] R. V. Nee and R. Prasad, *OFDM for Wireless Multimedia Communications*, Boston: Artech House, 2000.
- [2] K. Abdullah and Z.M. Hussain: "Studies on DWT-OFDM and FFT-OFDM Systems," *International Conference on Communication, Computer and Power (ICCCP'09)*, pp. 382-386, 2009.
- [3] Kanade, T., Cohn, J. F., and Tian, Y.: "Comprehensive database for facial expression analysis," *Proceedings of the Fourth IEEE International Conference on Automatic Face and Gesture Recognition*, Grenoble, France, pp. 46-53, 2000.
- [4] Viola, P., Jones, M.: "Robust real-time object detection," *International Journal of Computer Vision*, 57(2), pp. 137-154, 2004.
- [5] N. Otsu and T. Kurita. "A new scheme for practical flexible and intelligent vision systems". *In Proceedings of the IAPR Workshop on Computer Vision*, pp. 431-435, 1988.
- [6] T. Toyoda and O. Hasegawa. "Texture classification using extended higher order local autocorrelation features," *Proceedings of the 4th International Workshop on Texture Analysis and Synthesis*, pp. 131-136, 2005.
- [7] Lajevardi, S. M., Hussain, Z.M.: "Facial expression recognition: Gabor filters versus higher-order correlators," *International Conference on Communication, Computer and Power (ICCCP'08)*, pp. 354-358, 2009.
- [8] R.A. Pacheco and D. Hatzinakos "BER analysis of self-heterodyne OFDM transmission scheme ", *Canadian Conference on Electrical and Computer Engineering*, Volume 4, 2-5 May 2004 Page(s):1953 - 1956.
- [9] J. G. Proakis, *Digital Communications*. 3rd Edition, New York: McGraw-Hill, 1995.
- [10] K. Abdullah, S.M Ljervardi and Z.M. Hussain: "Modulation Comparison Over OFDM Channel for Facial Expression Recognition," *IEEE International Conference ATNAC 09. Canberra. Nov 9-11, 2009.*

RESOURCES

IEEE Xplore, Google searching engine, Engineering Village 2, ProQuest



TITLE: Joint Time-Frequency Analysis Using Wavelet Transform
SUPERVISOR : Dr. Md. Raihan Sharif
SUMMARY
<p>The study of signals whose frequency contents change in time is prevalent in many academic fields. The joint time-frequency analysis is a signal processing technique in which signals are analyzed in the time domain and the frequency domain simultaneously.</p> <p>The objective of this project is to examine the use of time-frequency representations to the analysis of nonstationary signals. In particular, the short-time Fourier transform and the wavelet transform will be compared with emphasis on the wavelet transform.</p> <p><i>Keywords</i> : Time-frequency analysis, Wavelet transform</p>
METHODOLOGY AND TOOLS
Matlab Toolbox
REFERENCES/BIBLIOGRAPHY
<p>[1] Cohen L., "Time-frequency analysis," Prentice-Hall, New Jersey, 1995.</p> <p>[2] Nikolaj H. N., Wickerhauser M. V., "Wavelets and time-frequency analysis," Proceedings of the IEEE, vol. 84, no. 4, 1996, pp. 523-540.</p>
RESOURCES
NA



Title: Design and Simulation of Capacitive Transducer for Pulse Measurement
SUPERVISOR : Sheroz Khan
SUMMARY
<p>We know that capacitive transducers are widely used in industry for measurement of parameters such as pressure, liquid level and wind speed in wind tunnel. Capacitive transducers are constructed in a way such that changes in the parameter of interest cause changes in the capacitive value of the sensor.</p> <p>This project is about designing a circuit capable of implementing small pressure variations into capacitive changes. The circuit will be used for obtaining results such as those from human pulses, and a microcontroller-based board will be used to store the resulting capacitive values output transducer circuit.</p> <p>The project involves simulation using suitable software such as Cadence, PSPICE</p> <p>Keywords : Differential Transducers, GSM ,percentage change</p>
METHODOLOGY AND TOOLS
Simulation and practical implementation, error analysis, experimental results
REFERENCES/BIBLIOGRAPHY
<p>[1]. Bobby George and V. Jagadeesh Kumar, "Switched Capacitor Signal Conditioning for Differential Capacitive Sensors," IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, VOL. 56, NO. 3, JUNE 2007</p> <p>[2]. D. M. G. Preethichandra, <i>Member, IEEE</i>, and Katsunori Shida, <i>Member, IEEE</i>, "A Simple Interface Circuit to Measure Very Small Capacitance Changes in Capacitive Sensors," IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, VOL. 50, NO. 6, DECEMBER 2001</p>
RESOURCES
Laboratory, Matlab, and PIC16F877-based evaluation board



Title: Differential Transducers for Measuring Micro-level Fluid Measurement for DCS Applications
SUPERVISOR : Sheroz Khan
SUMMARY
<p>Differential transducers are extensively employed in application such oil industry and wind tunnel for monitoring and data acquisition purposes in distributed control system (DCS). They are used for measurement of physical parameters such as temperature, pressure etc through means in locations not feasible for wiring accessibility.</p> <p>This project is about to show and verify experimentally how differential circuit is used to measure a differential pressure changes. The concept is here to make measurement of two pressure values for determining an accurate pressure. For example, the liquid level in a container can be measured by using pressure transducer fitted at the bottom of the container and converting the pressure measured into a corresponding level scale. However, the accuracy is affected when the level grows and the pressure of the empty tank has got to come into effect, thus in such situations both pressures--- that of the liquid level and that of the surrounding vacuum-- are measured. A microcontroller is then programmed to sample and store the noise output from the noise generator circuit.</p> <p>Keywords : Capacitive sensor, double differential transducers, interface</p>
METHODOLOGY AND TOOLS
Simulation and practical implementation, error analysis, experimental results
REFERENCES/BIBLIOGRAPHY
<p>[3]. Ferran Reverter and Oscar Casas, <i>Member, IEEE</i>, "Interfacing Differential Resistive Sensors to Microcontrollers: A Direct Approach," IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, VOL. 58, NO. 10, OCTOBER 2009</p> <p>[4]. D. M. G. Preethichandra, <i>Member, IEEE</i>, and Katsunori Shida, <i>Member, IEEE</i> A Simple Interface Circuit to Measure Very Small Capacitance Changes in Capacitive Sensors," IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, VOL. 50, NO. 6, DECEMBER 2001</p>
RESOURCES
Laboratory, Matlab



TITLE: Performance analysis of SVC-OFDMA with adaptive coding and modulation
SUPERVISOR : Akhmad Unggul Priantoro
SUMMARY
<p>Spectrum efficiency under dynamic condition (user mobility in cellular system) can be improved by partitioning the available bandwidth into sub-bands whereby each sub-band is modulated by orthogonal carriers, same as OFDMA, as shown in [1]. However, different sub-band will have different subcarrier spacing which causes losing orthogonality among subcarriers, unlike OFDMA system. This causes intercarrier interference (ICI). Under dynamic condition, the system achieves higher spectrum efficiency thanks to the improved Doppler spread resiliency.</p> <p>This project aims to conduct performance analysis of SVC-OFDMA with adaptive coding and modulation via computer simulation. In the study we will compare the performance of SVC-OFDMA with conventional OFDMA system such as 802.16e, mobile WiMAX.</p> <p>Keywords : SVC-OFDMA, ICI, adaptive modulation and coding, spectrum efficiency</p>
METHODOLOGY AND TOOLS
<ol style="list-style-type: none">1. Study performance metrics of cellular system and effecting parameters2. Study basic multiple access system using OFDMA and build Matlab computer simulation3. Study basic SVC-OFDMA and build Matlab computer simulation4. Study adaptive modulation and coding and embed the code into the OFDMA and SVC-OFDMA simulator5. Performance analysis/comparison
REFERENCES/BIBLIOGRAPHY
<ol style="list-style-type: none">1. S. S. Das, E.De Carvalho, Ramjee Prasad., "Variable Sub-Carrier Bandwidths in OFDM Systems "in <i>Proc. IEEE ICC 2007</i>, pp. 1866-18702. M. Tahir and A.U. Priantoro, "BER Analysis of Variable Sub-Carrier Bandwidth in OFDM Systems," accepted for publication in ICEI 2010.
RESOURCES
<ol style="list-style-type: none">1. Computing laboratory with Matlab2. Online literature3. Textbooks on digital communication systems



TITLE: Design and Analysis on Tuning Fork type Ultra Wide Band (UWB) antenna
SUPERVISOR : Dr. AH. Zahirul Alam
SUMMARY
<p>Alam <i>et. al.</i> proposed tuning fork type UWB antenna based on unsymmetrical feedline. However, the proposed antenna is slightly deviate from FCC UWB frequency spectrum. Therefore, it is necessary to optimize different parameters to obtain FCC UWB frequency spectrum. The type of antenna will provide room incorporating many components within the antenna thereby reducing the size of the wireless device.</p>
<p>Keywords : UWB, antenna.</p>
METHODOLOGY AND TOOLS
<p>Literature review, narrow band patch antenna design based on design equations. Modify narrow band antenna to obtain wide band by using HFSS/CST high frequency simulator which requires parametric studies. Fabrication of the antenna and compare measured result with simulated values.</p>
REFERENCES/BIBLIOGRAPHY
<ol style="list-style-type: none">1. A.H.M. Zahirul Alam, Rafiqul Islam and Sheraz Khan, "Design of a Tuning Fork type UWB Patch Antenna", <i>International Journal of Computer Science and Engineering</i> (ISSN 1307-3699), Vol. 1, No.4 , 2007, pp. 240-243.
RESOURCES



TITLE: A Wearable Reflectance Pulse Oximeter for Remote Physiological Monitoring	
SUPERVISOR	: Othman O. Khalifa
SUMMARY	
<p>To save life, casualty care requires that trauma injuries are accurately and expeditiously assessed in the field. This project investigates and design the initial bench testing of a wireless wearable pulse oximeter developed based on a small forehead mounted sensor. The battery operated device employs a lightweight optical reflectance sensor and incorporates an annular photodetector to reduce power consumption. The</p> <p>system also has short range wireless communication capabilities to transfer arterial oxygen saturation (SpO₂), heart rate (HR), body acceleration, and posture information to a PDA. It should has the potential for use in combat casualty care, such as for remote triage, and by first responders, such as firefighters.</p> <p>Keywords :</p>	
METHODOLOGY AND TOOLS	
Hardware Design	
REFERENCES/BIBLIOGRAPHY	
<p>[1]. G. S. F. Ling, B. K. Day, P. Rhee, and J. M. Ecklund, "In search of technological solutions to battlefield management of combat casualties," <i>SPIE Conference on Battlefield Biomedical Technologies</i>, SPIE vol. 3712, Apr. 1999.</p> <p>[2] D. Malan, T. Fulford-Jones, M. Welsh, and S. Moulton, "CodeBlue: An ad-hoc sensor network infrastructure for emergency medical care," <i>International Workshop on Wearable and Implantable Body Sensor Networks</i>, 2004.</p> <p>[3] U. Anliker et al., "AMON: A wearable multiparameter medical monitoring and alert system," <i>IEEE Trans. on Information Technology in Biomedicine</i>, 8(4), 2004.</p> <p>[4] Y. Mendelson and V. Floroff, "A PDA based <i>ad-hoc</i> mobile wireless pulse oximeter," <i>Proc. IASTED International Conference Telehealth 2005</i>, Banff, Canada, 2005.</p> <p>[5] Y. Mendelson and C. J. Pujary, "Minimization of LED power consumption in the design of a wearable pulse oximeter," <i>IASTED International Conference BioMED 2003</i>, Salzburg, Austria, 2003.</p> <p>[6] Y. Mendelson and C. J. Pujary, "Measurement site and photodetector size considerations in optimizing power consumption of a wearable reflectance pulse oximeter," <i>Proc. of the 25th Annual International IEEE/EMBS Conference</i>, Cancun, Mexico, 2003.</p> <p>[7] P. Branche and Y. Mendelson, "Signal quality and power consumption of a new prototype reflectance pulse oximeter sensor <i>Proc. of the 31th Annual Northeast Bioengineering Conference</i>, Hoboken, NJ, 2005.</p>	
RESOURCES	
[List of Resources]	



TITLE: IMAGE ENHANCEMENT USING LOGARITHMIC IMAGE PROCESSING (LIP) TECHNIQUE	
SUPERVISOR	: Othman O. Khalifa
SUMMARY	
<p>Traditionally, an over- (under-) exposed image is processed by the method of histogram equalization. This method works by performing a transformation that spreads out the histogram of the original image so that the levels of the equalized image will span a fuller range. However, this method is not always the best method for image enhancement [Gonzalez & Woods, pp 100-102], especially for color images where equalizing all three components, R, G, and B, may create color distortion. Therefore, linear or non-linear contrast and dynamic range stretching is used. This project implements an image enhancement algorithm that is based on a logarithmic image processing model. This algorithm is based on a mathematical structure for logarithmic image processing developed by Jourlin and Pinoli [3]. This technique is capable of simultaneously enhancing both the overall contrast and the sharpness of the image. This project will investigate the effects of each parameter on the enhanced image and compare the results obtained by this method with the traditional histogram processing method for both clean and noisy images.</p> <p><i>Keywords :</i></p>	
METHODOLOGY AND TOOLS	
Software Implementation (C/C++, Matlab)	
REFERENCES/BIBLIOGRAPHY	
<p>[References/Bibliography]</p> <ol style="list-style-type: none">1. J.S. Lee, "Digital Image Enhancement and Noise Filtering by Use of Local Statistics," IEEE Trans. Pattern Anal. Machine Intell., vol. PAMI-2, pp165-168, Mar. 19802. G. Deng, L.W. Cahill, G.R. Tobin, "The Study of Logarithmic Image Processing Model and Its Application to Image Enhancement," IEEE Transaction on Image Processing, vol 4, pp 506-512, April 1995.3. M. Jourlin and J.C. Pinoli, "A model for logarithmic image processing." J. Microscopy, vol. 149, pp. 21-35, Jan. 1988	
RESOURCES	
<p>[List of Resources]</p>	



TITLE: INTELLIGENT E-POLICE AND TRAFFIC VIOLATION AUTOMATIC RECORDER SYSTEM FOR MODERN CITY TRAFFIC USING MOST ADVANCED WIRELESS SENSOR TECHNOLOGY IN REAL TIME.	
SUPERVISOR	: Othman O. Khalifa
SUMMARY	
<p>With the rapid growth of economy, the quantity of vehicles in the city has greatly increased, as well as the number of drivers. At the same time, the situation of disobeying regulations happened more than before, which has led to great number of damages to body and economy. Many obstacles have been made in the process of building civilized city, maintaining traffic orders and protecting personal safety. How to efficiently solve the problem of traffic crowding and regulation disobeying to avoid traffic accidents and meet the requirements of smooth traffic project have been the first important issue which the traffic administration has to urgently deal with.</p> <p>“ e-police”, also called detecting and recording system, is used to catch vehicles violating traffic rules, such as over-speed driving and red traffic light violation. The traffic rule violation is main factor of traffic accidents, chaos and traffic jams. E-police system can work all day and all night to monitor violation of red light at the intersection or detecting over-speed driving at preset checkpoints on roads.</p> <p>Base on the micro Watt ultra-low power consumption technology, combined with RFID technology and wireless sensing technology, the new vehicle traffic violation detecting system have been presented.</p> <p>When a vehicle passes through an electromagnetic flux sensor, it will change the field and will lead to a change of return circuit of the field. By imbedding a wireless terrestrial magnetism detector beyond the stop line at the cross road, the detector will generate an electro magnetic field which is vertical with the road surface. When vehicle pass through the detector, it just equals as a metal surface object cutting the electromagnet filed, as the magnetic flex of the field changes, and lead to a change of return circuit of the wireless magnetism detector. When the vehicle detector installed at the crossroad receives the return circuit of the wireless terrestrial magnetism detector, every signal light is equipped with a direction and signal status encoder and transmitter. The RSE (roadside equipment) monitors status of all traffic signals and the status of vehicle on the every direction of road. As per the traffic signal vehicles are moving, when any vehicle try to violate red signal the RSE will detect the particular vehicles data and sent to remote central monitoring station of police. This system involves highly critical electromagnetic technology, state of-thr-art wireless technology in 24 GHz to ensure high speed data communication</p>	
Keywords :	
METHODOLOGY AND TOOLS	
REFERENCES/BIBLIOGRAPHY	
RESOURCES	



TITLE: SUPER RFID APPLIED IN HAJJ VISITOR GUIDE INFORMATION FOR PERSONNEL ANOUNCEMENT
SUPERVISOR : Othman O. Khalifa
SUMMARY
<p>Interactive or active RFID technology that is being used for many-advanced application from health sector to retail depending on that technology. Automatic visitor/tourist guide information announcement system, which it is designed mainly for privacy of visitors and reduce loud noise caused by common announcement.</p> <p>In an RF based application, which targeted to reach requirements and aims for particular user group or individual to listen to target within a no familiar or totally un known area without taking any help out side. Starting from the entrance gate, application guides the user until wherever the user wants to reach and in vise versa direction. During the trip , every user will get information about each spot in selected language. The advantage of the system is the visitor can get the information repeatedly by selecting the button. The small earphone connected to the RF guide system will give clear information of each spot automatically when the person approaches in to. So every visitor will get information individually without interfering next person. The announcement will change automatically when the person move in to the next section.</p> <p>In this project, we tried to explain how to develop such a solution and gave test result of the system.</p> <p><i>Keywords :</i></p>
METHODOLOGY AND TOOLS
<p>IMPLEMENTATION; the system may consists of multiple reader and information is used each person is served with one receiver. The data locator is installed in multiple locations through area. The base has a headphone unit, which announces the details about particular point. The RFID issued to the visitor has unique ID. When the reader reaches, the base unit will guide. Each reader can guide multiple accesses as per tag issued. Complex software and hardware solution have implemented in this application.</p>
REFERENCES/BIBLIOGRAPHY
RESOURCES



TITLE: AUTO FLIGHT PILOT SIMULATION APPLIED IN REAL TIME AND REMOTE MONITORING FOR UAV / FLIGHT
SUPERVISOR : Othman O. Khalifa
SUMMARY
<p>The use of Unmanned Aerial Vehicle (UAV) become vital in the modern world as the activities of UAV is unequal. The main navigation system used in the UAV is a remote controlled pilot system. The real pilot, who is sitting remotely with all control equipment and monitoring system become a real cockpit and it is necessary to control all parameters in real time at higher accuracy.</p> <p>The project mentioned here is the real time flight monitoring, position system in which all parameters are monitored at the ground station while the UAV is flying. Finding the level, height, tilt and degree of elevation is vital in the remote flying UAV. The real time parameter monitor of flight is demonstrated in this project as real time. The level, tilt and elevation temperature, fuel, and other important parameters are monitored in the ground station using a PC with special software.</p> <p>The position, tilt, and height of the UAV is displayed in the ground monitoring station and the real time image position also shown on the PC. The project utilizes all kind of latest technology in communication engineering, RF, microcontroller.</p> <p><i>Keywords :</i></p>
METHODOLOGY AND TOOLS
.
REFERENCES/BIBLIOGRAPHY
RESOURCES



TITLE: To study the weight distribution of various error control codes used in 3G data networks and its effect on their error performance.

SUPERVISOR : Prof. Dr. Mohammad Umar Siddiqi

SUMMARY

Error control coding schemes are vital for the successful deployment of 3G data networks. Error performance of the codes used is strongly dependent on their weight distribution. The objective of the project is to study various error control codes used in 3G data networks and obtain the weight distribution of these codes.

Project outcomes:

- Understanding of various error control codes used in 3G data networks
- Understanding the role of weight distribution of error control codes on their error performance
- Understanding of Matlab simulation tools
- Software package for calculating the weight distribution of various error control codes used in 3G data networks

Software package for calculating the error performance of various error control codes used in 3G data networks

METHODOLOGY AND TOOLS

The project envisages software implementation of various error control coding schemes used in 3G data networks and study the effect of weight distribution of these codes on their error performance.

The software implementation is to make use of appropriate MATLAB simulation tools.

REFERENCES/BIBLIOGRAPHY

1. 3GPP and 3GPP2 web pages
2. MATLAB simulation tools

RESOURCES

1. 3GPP and 3GPP2 web pages
2. MATLAB simulation tools



TITLE: Performance evaluation of LDPC codes for use in Digital Video Broadcasting (DVB) Standard
SUPERVISOR : Prof. Dr. Mohammad Umar Siddiqi
SUMMARY
<p>The objectives of the project are:</p> <ul style="list-style-type: none">• To understand the error control codes used for error correction in communication systems.• To understand the design philosophy behind LDPC encoders and decoders for DVB system.• To obtain the mathematical expressions for LDPC encoding and decoding processes.• To obtain MATLAB code for LDPC encoding and decoding for use in DVB systems.• To evaluate the performance characteristics of LDPC codes in DVB systems through MATLAB simulation.
METHODOLOGY AND TOOLS
<p>The project will require software implementation of the work in various stages of the study. The software implementation is to make use of MATLAB tools.</p>
REFERENCES/BIBLIOGRAPHY
<ol style="list-style-type: none">1. DVB S-2 web pages2. MATLAB Tools
RESOURCES
<ol style="list-style-type: none">1. DVB S-2 web pages2. MATLAB Tools



TITLE: Performance Evaluation of Turbo Codes for use in 3G Standards
SUPERVISOR : Prof. Dr. Mohammad Umar Siddiqi
SUMMARY
<ul style="list-style-type: none">■ To understand the use of error control codes in communication systems.■ To understand the design philosophy behind Turbo encoders and decoders in 3G systems■ To understand the mathematical expressions of Turbo encoding and decoding process.■ To obtain MATLAB code for Turbo encoding and decoding for 3G systems.■ To carry out performance evaluation of turbo codes in 3G systems using MATLAB simulation.
METHODOLOGY AND TOOLS
The project will require software implementation of the work in various stages of the study. The software implementation is to make use MATLAB tools.
REFERENCES/BIBLIOGRAPHY
<ol style="list-style-type: none">1. 3GPP and 3GPP2 web pages2. MATLAB Tools
RESOURCES
<ol style="list-style-type: none">1. 3GPP and 3GPP2 web pages2. MATLAB Tools



TITLE: To analyze the operation of “substitute byte” function used in Advanced Encryption Standard (AES) using spectral (transform) techniques.
SUPERVISOR : Prof. Dr. Mohammad Umar Siddiqi
SUMMARY
<p>AES is the most widely used/recommended standard for block encryption of sensitive information in several applications. For example, use of AES is mandatory in Wi Fi networks for WPA (Wireless Protected Access). One of the key operations used in AES is associated with the “substitute byte” function. The objective of the project is to study the operation of the substitute byte function and use transform domain techniques to analyze its role in providing data confidentiality.</p> <p>Project outcomes:</p> <ul style="list-style-type: none">- Understanding the role of AES in securing data confidentiality- Understanding the functioning of “substitute byte” function in time domain as well as transform domain.- Understanding the use of C++ or Java in a security environment.- Software package for computing forward and inverse transforms used in the study.- Software package for cryptanalysis of substitute byte function in transform domain.
METHODOLOGY AND TOOLS
<p>The objective of the project is to study the operation of the substitute byte function and use transform domain techniques to analyze its role in providing data confidentiality. Walsh-Hadamard transform is suggested for this project.</p> <p>The project will require software implementation of the work in various stages of the study. The software implementation is to make use of C++ or Java.</p>
REFERENCES/BIBLIOGRAPHY
<ol style="list-style-type: none">1. AES web pages2. C++ / Java reference books
RESOURCES
<ol style="list-style-type: none">1. AES web pages2. C++ / Java reference books





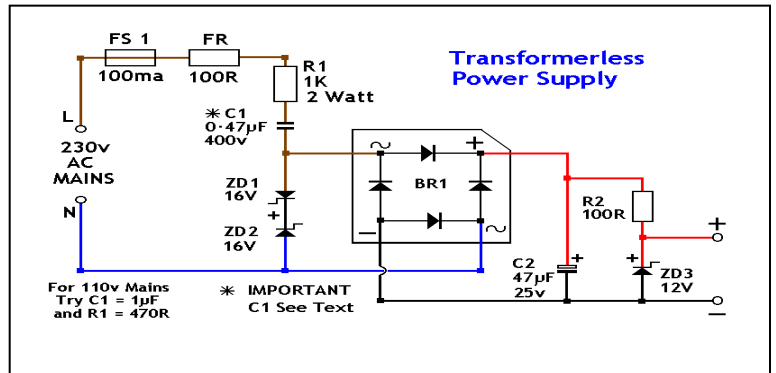
TITLE: DESIGN OF TRANSFORMER-LESS POWER SUPPLY

SUPERVISOR : Musse Mohamud Ahmed

SUMMARY

The aim of the design is to provide a cheap compact power supply for Cmos logic circuits. The circuits are to be used to control mains equipment (fans, lights, heaters etc.) through an optically isolated triac such as the MOC 3020. All circuit elements and circuit diagrams are given to start with and find better ones for comparisons. The 33mA current flowing through ZD1 & ZD2 is available for rectification. You can think of these Zeners as the secondary windings of a mains transformer. However - unlike a transformer -under "no-load conditions" the Zeners will be required to dissipate the whole of the energy available. Consequently, if your circuit is to be powered up without R2 & ZD3 or the Output Load attached, ZD1 & ZD2 will need to be at least 1-watt. The Cmos control circuits did not need a particularly smooth supply; and the choice of 47uF for C2 gave a good compromise between physical size and the degree of smoothing. If you have room - and you want more smoothing - then you can use a larger value capacitor. The output from BR1 is about 15-volts. If we want to reduce this to 12-volts using ZD3 then there must be a drop of 3-volts across R2. There is approximately 33mA flowing through ZD1 & ZD2. We cannot try to take more than this from BR1 because it would simply cause a drop in voltage choose ,R2 is chosen to pass a current of say 30mA. If your circuit only needs about 20mA then the remaining 10 mA continues to flow through ZD3 so that the voltage drop across R2 remains constant and the output stays at 12-volts.

Key Words: Transformer less Power Supply, Cmos, MOC 3020 & Circuit Diagram.



METHODOLOGY AND TOOLS

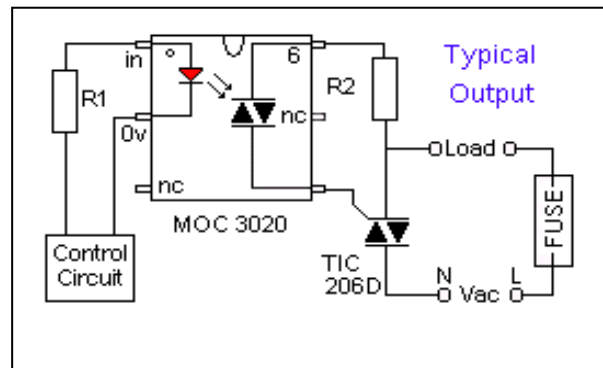
Circuit Diagrams and Formulas

$$I = \frac{E}{\sqrt{R^2 + \left(2\pi FL - \frac{1}{2\pi FC}\right)^2}}$$

- I = Current in Amps
- E = Electromotive Force in Volts
- R = Resistance in Ohms
- F = Frequency of the Current in Hertz
- L = Inductance in Henrys
- C = Capacitance in Farads

$$X_C = \frac{1}{2\pi FC}$$

- 0.47uF = 470nF
- 1nF = 10⁻⁹ Farads
- 470nF = 470 x 10⁻⁹ F



$$I = \frac{240 - 16}{\sqrt{(1100)^2 + \left(0 - \frac{1}{2 * 3.142 * 50 * 470 * 10^{-9}}\right)^2}}$$

$$= \frac{224}{6860}$$

$$= 33 \text{ mA}$$



TITLE: DESIGN OF TRANSFORMER-LESS POWER SUPPLY

SUPERVISOR : Musse Mohamud Ahmed

REFERENCES/BIBLIOGRAPHY

3. Previous Final year project at UTeM
4. Previous Final Year Project Report
5. Given circuit diagram

RESOURCES

4. Electronics/circuits/engineering labs
5. Online resources
6. Power electronics text books



TITLE: Design of a Magnetic Gun

SUPERVISOR : Musse Mohmaud Ahmed

SUMMARY

This project focuses on the design of magnetic gun which could use for military purposes. Figure 1 is a miniature magnetic gun. When optimally tuned, it will propel a small slug about 1.5 metres high, or 2.5 metres horizontally. IC1 is a 555 timer in astable mode, sending approx. 10 ms pulses to decade counter IC2. IC2 is continually reset through R3, until pin 15 is taken low through the "Fire" button. IC2 then sequences through outputs Q1 to Q7, to feed power transistors TR1 to TR4, which fire electromagnets L1 to L4 in rapid sequence. Transformer T1 secondary is 18 volts 1 amp A.C. When rectified and smoothed, this provides 25.2 V D.C for electromagnets L1 to L4. Resistor R4 drops 12 V to obtain a supply voltage low enough for IC1 and IC2. The electromagnets are wound on a 25 cm long, 3 mm dia. copper tube (available at hobby shops). Two "stops" may be cut from tin for each electromagnet, and 500 turns of approx. 30 swg. enamelled copper wire wound between them. The electromagnets should be wound on a base of reversed sellotape, so that one may slide them on the copper tube. The slug (or "bullet") is a 3 cm long piece of 2 mm dia. galvanized wire, which should slide loosely inside the copper tube. Most crucial to the effectiveness of the gun are the setting of VR1 and the positions of electromagnets L1 to L4 on the copper tube (the values and measurements shown are merely a guide). Firstly, with L2 to L4 disconnected, VR1 should be tuned and L1 positioned for optimum effectiveness (place a wire inside the tube to feel how far the slug jumps with L1). Then L2 (now connected) should be positioned for optimum effectiveness (the slug will now exit the tube). Repeat with L3 and L4. Electromagnets L2 to L4 is each found to substantially increase the range of the gun.

Keywords : Gun, Magnetic Gun, AC, DC & ICs.

METHODOLOGY AND TOOLS

[Methodology and tools]

- 1. The project uses both passive and active elements
- 2. It utilizes electronics power electronics components
- 3. Those components are very cheap

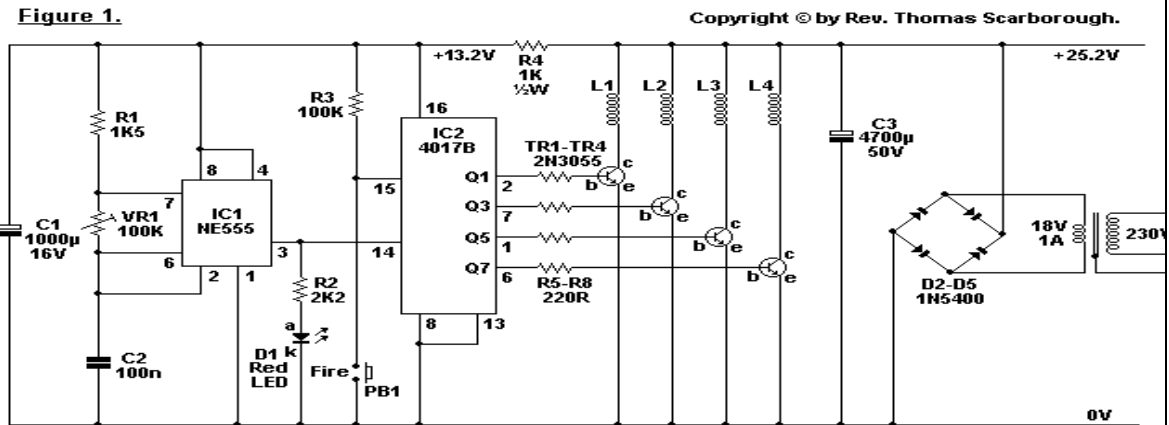
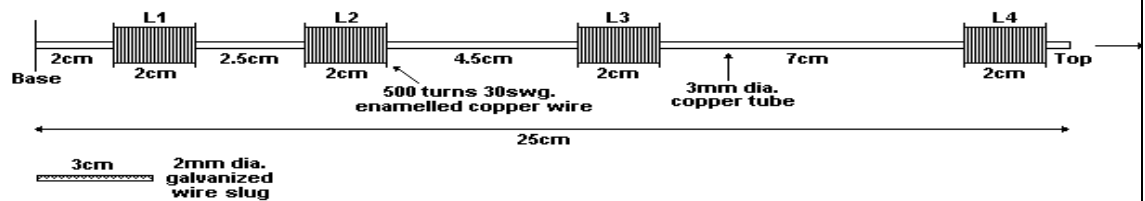


Figure 2. (Mount vertically).





TITLE: Design of a Magnetic Gun
SUPERVISOR : Musse Mohmaud Ahmed
REFERENCES/BIBLIOGRAPHY
<ol style="list-style-type: none">1. Power electronics/electronics text books2. Available Catalogues3. The Give Circuit diagrams
RESOURCES
<ol style="list-style-type: none">7. Electronics/circuits/engineering labs8. Online resources9. Power electronics text books



TITLE: Ultrasonic Detection System For Restricted Area

SUPERVISOR : Musse Mohamud Ahmed

SUMMARY

The project will apply the theory of Ultrasonic sensor that is very useful for homes, shops, cars security and military. This equipment consists of a set of ultrasonic receiver and transmitter which operate at the same frequency.

When something moves in the area covered by the circuit, the circuit's fine balance is disturbed and the alarm is triggered.

The circuit is very sensitive and can be adjusted to reset itself automatically or to stay triggered till it is reset manually after an alarm.

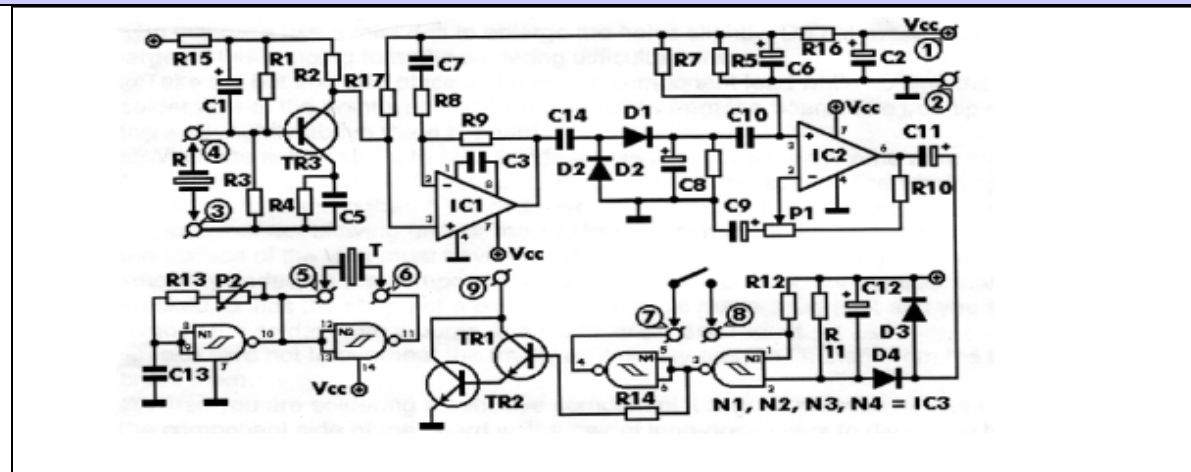
OBJECTIVES: o build a system that can detect intruder at houses or any other building structures. (especially at the main doors or gates). To build a system that can avoid cars, jeeps and lorries from getting crushed at the backside on reverse situation.

Develop a system which will detect any unwanted object to come near to the security zone.

Uses radar system for military purposes.

Keywords : Detection circuit, Ultrasonic System, Restricted area.

METHODOLOGY AND TOOLS



1. Study about the Ultra-sonic detection system from books, journals and website.
2. (2) Make a simulation using the software to make sure that the circuit can work properly.
3. (3)Find the entire component for the circuit.
4. (4) Prepare very good PCB
5. (5) Assemble the components on PCB following the circuit diagram
6. (6)Solder the entire circuit components correctly and make sure that there are nothing short-circuits at adjacent tracks on the board, especially if they are very close together.
7. (7)Recheck the board that has been done.
8. (8)Troubleshoot the circuit.
9. (9) Several testing will be done to test whether this project still operate in unexpected situation and take the results to do the summary of this project.
10. (10) Prepare for final report and presentation for final report.



TITLE: Ultrasonic Detection System For Restricted Area
SUPERVISOR : Musse Mohamud Ahmed
REFERENCES/BIBLIOGRAPHY
[References/Bibliography] 4. Power electronics/electronics text books 5. Available Catalogues 6. The Given Circuit diagrams
RESOURCES
[List of Resources] 10. Electronics/circuits/engineering labs 11. Online resources 12. Power electronics text books



TITLE: : DESIGN OF WATER TANK LEVEL CONTROLLER USING WATER LEVEL SENSOR

SUPERVISOR : Musse Mohmaud Ahmed

SUMMARY

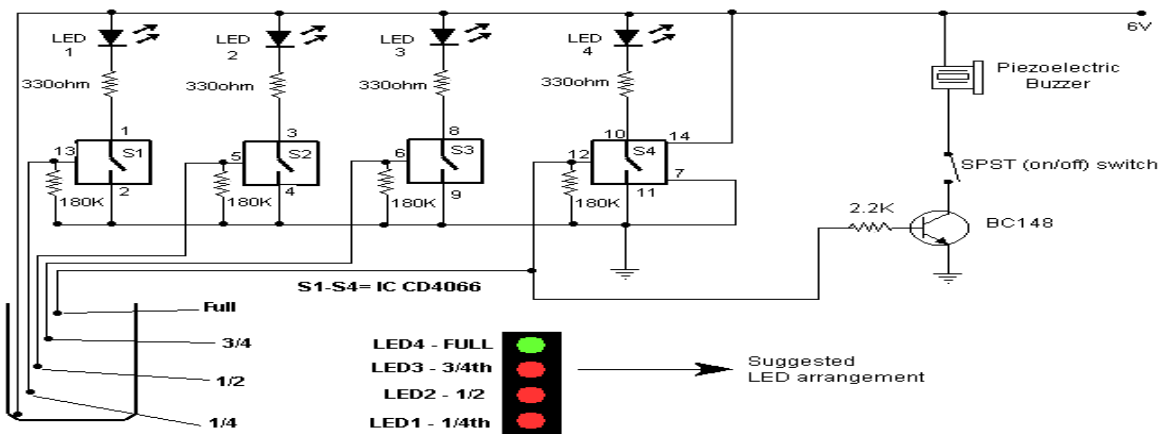
Every building must has Overhead Water Tank (OHT). Today, most of the water tank users have replaced conventional pump with electrical pumps. But they find it very inconvenient for the condition of water pump because there is no effective water level indication system. As a result, if mechanical sensor fails, there are a plenty of water waste as well as wastage of power consumed by motor pump. Solution of this problem is WATER TANK LEVEL CONTROLLER USING WATER LEVEL SENSOR.

Keywords : OHT, Water Level Controller & Water Sensor.

METHODOLOGY AND TOOLS

[Methodology and tools]

- 6. improve existing water tank system by providing water level sensor system
- 7. Increasing efficiency of water tank system.
- 8. Preventing water pump from any damages for a long term usage.
- 9. Designing a project that consumer can easily operate and understand it



This floating level will be replaced by water level sensor to detect the different water levels and alarm when the tank is full with water.



TITLE: : DESIGN OF WATER TANK LEVEL CONTROLLER USING WATER LEVEL SENSOR

SUPERVISOR : Musse Mohmaud Ahmed

REFERENCES/BIBLIOGRAPHY

[References/Bibliography]

7. Power electronics/electronics text books
8. Available Catalogues
9. The Given Circuit diagrams

RESOURCES

[List of Resources]

13. Electronics/circuits/engineering labs
14. Online resources
15. Power electronics text books



TITLE: Spectral Efficiency Assesment of LTE and WiMAX Physical Layer
SUPERVISOR : Dr. Sigit P.W. Jarot
SUMMARY
<p>Summary</p> <p>The standardization process of 3GPP Release 8 (a.k.a 3GPP LTE) and IEEE 802.16 d/e/j (a.k.a WiMax) are almost complete in this year. Some countries have proceeded with the field test and deployment phase. OFDM and MIMO technologies play a very important role in the physical layer of both systems.</p> <p>This project will analyze the performance of MIMO- OFDM systems in the physical layer, by using Matlab computer simulation. To be able to obtain the accurate and reliable results, the project will be initiated with literature survey of 3GPP and IEEE standardization document, as well as several supporting academics documents.</p> <p>Particularly, evaluation will be conducted about spectral efficiency for various MIMO scenarios considered in both mobile broadband systems.</p> <p><i>Keywords :</i></p>
METHODOLOGY AND TOOLS
<p>[Methodology and tools]</p> <ul style="list-style-type: none">- Literature survey- <u>Computer simulation using Matlab</u>- Performance Analysis
REFERENCES/BIBLIOGRAPHY
<ul style="list-style-type: none">- D. Astely, et.al., "LTE: The Evolution of Mobile Broadband", IEEE Communication Magazines, April 2009- 3GPP TS 36.300, "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN): Overall Description."- A. Furuskar et.al., "The LTE Radio Interface – Key Characteristics and Performance" IEEE PIMRC 2008.- C. Ball et.al., "Spectral Efficiency Assessment and Radio Performance Comparison between LTE and WiMAX", IEEE PIMRC 2008.- A. Larmo, "The LTE Link Layer Design", IEEE Communication Magazines, April 2009.
RESOURCES

TITLE: Physical Layer Performance Analysis of OFDM based technology in LTE and WiMAX
SUPERVISOR : Dr. Sigit P.W. Jarot



TITLE: Physical Layer Performance Analysis of OFDM based technology in LTE and WiMAX
SUPERVISOR : Dr. Sigit P.W. Jarot
SUMMARY
<p>Summary</p> <p>The standardization process of 3GPP Release 8 (a.k.a 3GPP LTE) and IEEE 802.16 d/e/j (a.k.a WiMax) are almost complete in this year. Some countries have proceeded with the field test and deployment phase. OFDM technology is playing a very important role in the physical layer of both systems.</p> <p>This project will analyze the performance of OFDM systems in the physical layer, by using Matlab computer simulation. To be able to obtain the accurate and reliable results, the project will be initiated with literature survey of 3GPP and IEEE standardization document, as well as several supporting academics documents.</p> <p>Particularly, evaluation will be conducted about BER/PER performance for various channel conditions considered in both mobile broadband systems.</p> <p><i>Keywords :</i></p>
METHODOLOGY AND TOOLS
<ul style="list-style-type: none">- Literature survey- <u>Computer simulation using Matlab</u>- Performance Analysis
REFERENCES/BIBLIOGRAPHY
<p>[References/Bibliography]</p> <ul style="list-style-type: none">- D. Astely, et.al., "LTE: The Evolution of Mobile Broadband", IEEE Communication Magazines, April 2009- 3GPP TS 36.300, "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN): Overall Description."- A. Furuskar et.al., "The LTE Radio Interface – Key Characteristics and Performance" IEEE PIMRC 2008.
RESOURCES
[List of Resources]

TITLE: Design of Randomized Signal Constellation for OFDM Physical Layer Security
SUPERVISOR : Dr. Sigit P.W. Jarot



TITLE: Design of Randomized Signal Constellation for OFDM Physical Layer Security
SUPERVISOR : Dr. Sigit P.W. Jarot
SUMMARY
<p>Summary</p> <p>Recently there is new research trend to enhance the security level of wireless communication systems from the lowest level, i.e., physical layer. One of the approaches is by adopting the idea used in securing wired communication systems. The method relies on manipulating the signal constellation according to a cryptographic pseudorandom number generator and adding a small amount of truly random noise at the transmitter.</p> <p>This project will consider some possible candidates of random signal design for particular signal constellation, and evaluate their performance in OFDM systems in terms of security enhancement.</p> <p><i>Keywords :</i></p>
METHODOLOGY AND TOOLS
<ul style="list-style-type: none">- Literature survey- <u>Computer simulation using Matlab</u>- Performance Analysis
REFERENCES/BIBLIOGRAPHY
<ul style="list-style-type: none">- D.Reilly, "Noise-Enhanced Encryption for Physical Layer Security in an OFDM Radio", RWS 2009- Morten Lisborg Jørgensen, Boyan Radkov Yanakiev, Gunvor Elisabeth Kirkelund, Petar Popovski, Hiroyuki Yomo, and Torben Larsen "Shout to Secure: Physical-Layer Wireless Security with Known Interference" IEEE GLOBECOM 2007 proceedings.- Satashu Goel, Rohit Negi "Guaranteeing Secrecy using Artificial Noise" IEEE Transactions on Wireless Communications, vol. 7, no. 6, Jun 2008.
RESOURCES



TITLE:	Development of wide-band Optical Amplifier
SUPERVISOR:	Dr. Ahmed Wathik Naji
SUMMARY	
<p>In Erbium-Doped Fiber Amplifier (EDFA), it has several parameters which play significant role in communication system. These parameters are: fiber length, total atom density and pump power. They are related to each others, while varying them will affect one another. Practically to achieve optimal design in EDFA, the problem is high cost and time consuming in conducting the experiment. So, software MATLAB would be best choice for modeling the single-pass EDFA. In this project, the affect of Erbium ions concentration, pump power, signal power and ASE power are investigate and analyze.</p> <p>The objective of this project is to design a reliable modeling EDFA system using MATLAB. The project can model the system with flexible and variable parameters, which can obtain correct result as per other researcher done.</p> <p>Keyword: EDFA, optical amplifier, ASE and Erbium ions concentration</p>	
METHODOLOGY AND TOOLS	
<p>In this project, rate equations for two levels Erbium energy system will be derived. By then, the transition rate between level 1 and level 2 is determined in term of transition probabilities which comprises of pumping rate, stimulated absorption rate, stimulated emission rate and spontaneous emission rate. After that, these transition rates will be calculated based on specific conditions such as cross section of fiber, effective core area of the fiber and overlap factors of the erbium ion profile. After that equation that predicts the amount of exponential growth of an incident signal passing through a fiber based on specific conditions of both the signal and fiber. These include the signal frequency, the value of stimulated emission cross section of the amplifier, the population densities of the upper and lower laser levels and the length of the fiber.</p>	
REFERENCES / BIBLIOGRAPHY	
<p>E. Jaunart, P. Crahay, "Accurate EDFA modeling using a simple method", Optical and Quantum Electronics 27 (1995) pg881-886.</p> <p>E. Desurvire, "An Explicit Analytical Solution for the Transcendental Equation Describing Saturated Erbium-Doped Fiber Amplifiers", Optical Fiber Technology 2, pg367-377_1996. Article No. 0042</p> <p>A. Laliotis, E. M. Yeatman, "Modeling Signal and ASE Evolution in Erbium-Doped Amplifiers With the Method of Lines", Journal of Lightwave Technology, Vol. 24: No 3, March 2006.</p>	
RESOURCES	
MATLAB Software	



TITLE:	Design and Implementation of Automatic Electrical Power Meter
SUPERVISOR:	Dr. Ahmed Wathik Naji
SUMMARY	
<p>Due to the high communication flow today, power line communication technology has becoming more popular for its advantage of using an existing cable infrastructure that connects to almost every building to communicate. As a result from that, many applications are developed to utilize this technology. One of the famous applications is the automatic meter reading (AMR) system. This system uses the power line as the medium to transmit the data of the meter reading to the nearby host. The objective of this project is design an IP based electrical power meter using power line communication. The concept of this project is based on Automatic Meter Reading idea where each electrical power is assigned with a unique IP address and these power meters can be accessed by using power line communication. A computer can access web server through internet. It can be imagine that power meter as web server, power line communication as internet.</p> <p>Keyword: PLC, automatic meter reading and power line communication</p>	
METHODOLOGY AND TOOLS	
<p>The project may have a simulated power meter with 8 logic output. This simulated power meter is connected to an Ethernet supported development board and connected through a power line modem. This project is simulating in a small scale which can be simulate in a house or lecture room. A computer can access the simulated power meter through Ethernet connection to power line modem.</p>	
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<p>Tom D. Tamarkin (September-October 1992) Automatic meter reading by Tom Tamarkin [Online] Public Power magazine <http://www.energycite.com/amr.htm> Oksa, P.; Soini, M.; Sydanheimo, L.; Kivikoski, M, Considerations of Using Power Line Communication in the AMR System, IEEE CNF, 26-29 March 2006. Park, B.S.; Hyun, D.H.; Cho, S.K., Implementation of AMR System Using Power Line Communication, IEEE/PES Volume 1, Digital Object Identifier 10.1109/TDC.2002.1178253, 6-10 Oct. 2002 Mak, S.T., Power delivery infrastructure differences and their impacts on different types of power line communications for automatic meter reading. IEE Conf. Publ No. 482, 2001</p>	
RESOURCES	



TITLE:	Development of wide-band Optical Amplifier
SUPERVISOR:	Dr. Ahmed Wathik Naji
SUMMARY	
<p>In Erbium-Doped Fiber Amplifier (EDFA), it has several parameters which play significant role in communication system. These parameters are: fiber length, total atom density and pump power. They are related to each others, while varying them will affect one another. Practically to achieve optimal design in EDFA, the problem is high cost and time consuming in conducting the experiment. So, software MATLAB would be best choice for modeling the single-pass EDFA. In this project, the affect of Erbium ions concentration, pump power, signal power and ASE power are investigate and analyze.</p> <p>The objective of this project is to design a reliable modeling EDFA system using MATLAB. The project can model the system with flexible and variable parameters, which can obtain correct result as per other researcher done.</p> <p>Keyword: EDFA, optical amplifier, ASE and Erbium ions concentration</p>	
METHODOLOGY AND TOOLS	
<p>In this project, rate equations for two levels Erbium energy system will be derived. By then, the transition rate between level 1 and level 2 is determined in term of transition probabilities which comprises of pumping rate, stimulated absorption rate, stimulated emission rate and spontaneous emission rate. After that, these transition rates will be calculated based on specific conditions such as cross section of fiber, effective core area of the fiber and overlap factors of the erbium ion profile. After that equation that predicts the amount of exponential growth of an incident signal passing through a fiber based on specific conditions of both the signal and fiber. These include the signal frequency, the value of stimulated emission cross section of the amplifier, the population densities of the upper and lower laser levels and the length of the fiber.</p>	
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<p>E. Jaunart, P. Crahay, "Accurate EDFA modeling using a simple method", Optical and Quantum Electronics 27 (1995) pg881-886.</p> <p>E. Desurvire, "An Explicit Analytical Solution for the Transcendental Equation Describing Saturated Erbium-Doped Fiber Amplifiers", Optical Fiber Technology 2, pg367-377_1996. Article No. 0042</p> <p>A. Laliotis, E. M. Yeatman, "Modeling Signal and ASE Evolution in Erbium-Doped Amplifiers With the Method of Lines", Journal of Lightwave Technology, Vol. 24: No 3, March 2006.</p>	
RESOURCES	
MATLAB Software	