



# FINAL YEAR PROJECT ABSTRACT BOOK

## 2017 Graduates

DEPARTEMENT OF ELECTRICAL ENGINEERING  
UNIVERSITY OF ENGINEERING & TECHNOLOGY,  
LAHORE



**IET** UET STUDENT  
CHAPTER  
The Institution of  
Engineering and Technology



**IEEE**



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# **Final Year Projects Abstract Book 2017 Graduates**

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## Chairman's Message

The Department of Electrical Engineering was established in 1923 as a part of the Maclagan Engineering College. The Department offers undergraduate and graduate degrees in Electrical Engineering with specialization in Communications, Control, Electronics and Power. Currently, the student enrollment, including both undergraduate and graduate, is around 1300. The Department has a faculty of 34 out of which 21 are Ph.D.'s and 7 have a Master degree. Faculty members with higher qualifications teach graduate courses and supervise research.

UET is one of the premier engineering institutions in the country. Our rigorous undergraduate program provides our students with the necessary tools and training to succeed at the next level. The bachelor's curriculum inculcates Physics and Mathematics fundamentals followed by an in-depth coverage of the principles of Electrical Engineering both in classrooms and well-equipped laboratories.

The curriculum is regularly revised to adapt to the dynamically changing needs of the field of engineering. To reinforce the liaison between industry and academia, a senior year project exhibition is held every year to provide the students with an opportunity to demonstrate their technical acumen. Internships in the local industry provide the students with hands-on experience on industrial equipment. Moreover, breadth is added to their technical know-how through industrial tours to the leading industries in the country. Students are encouraged to join the professional associations to widen their exposure to engineering research and to provide them with an active platform for exchange and expression of their technical ideas.

The graduate courses are aimed at bringing the students abreast with the most recent developments in their fields of specialization. Research work being carried out at the Department has direct bearing on the needs of national industry. The Department also offers consultancy services and testing facilities to local manufacturers of electrical and electronics equipment. Faculty members and graduate students regularly publish (present) in national and international journals (conferences).

I welcome you to the EE pavilion in this year's open house and career fair and encourage you to interact with the students so that you can appreciate their innovative and entrepreneurial abilities. I also urge you to visit the Department and discuss future collaboration with the faculty members.

**Chairman**

**Department of Electrical Engineering**

**University of Engineering and Technology, Lahore.**



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# *Final Year Project*

[**Brief Details**]

*Department of  
Electrical Engineering*

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| <b>2013-FYP-1</b>  | GRID TIED MULTILEVEL INVERTER WITH POWER QUALITY MONITORING                                          | <b>Dr. Syed Abdul Rahman Kashif</b> |
| <b>2013-FYP-2</b>  | SMART GRID METERING AND DATA ANALYSIS USING LABVIEW                                                  | Dr. Syed Abdul Rahman Kashif        |
| <b>2013-FYP-3</b>  | MONITORING ENERGY CONSUMPTION PATTERN IN UNIVERSITY HOSTELS                                          | Dr. Muhammad Asghar Saqib           |
| <b>2013-FYP-4</b>  | TRACKING, LEARNING AND DETECTION (TLD) BASED SEMI-AUTONOMOUS MACHINE                                 | Dr. Muhammad Tahir                  |
| <b>2013-FYP-5</b>  | ELECTRICAL SYSTEM LOAD MANAGEMENT AND AUTOMATIC BILLING                                              | Dr. Khalid Mehmood Ul Hasan         |
| <b>2013-FYP-6</b>  | SPEED CONTROL OF 20 KW INDUCTION MOTOR                                                               | Mr. Salman Fakhar                   |
| <b>2013-FYP-7</b>  | 3-D MAPPING AUTONOMOUS FLIGHT QUADCOPTER WITH INDUCTIVE CHARGING                                     | Dr. Khalid Mehmood Ul Hasan         |
| <b>2013-FYP-8</b>  | AUTOMATIC SECURITY SYSTEM THROUGH BODY ACTIONS AND FACIAL EXPRESSIONS VIA REAL TIME IMAGE PROCESSING | Dr. Kashif Javed                    |
| <b>2013-FYP-9</b>  | WHEELIEF: AN AUTOMATED GUIDED WHEEL-CHAIR                                                            | Dr. Ubaid Ullah Fiaz                |
| <b>2013-FYP-10</b> | AUTO GEARED SMART BIKE                                                                               | Mr. Arsalan A Raheem                |
| <b>2013-FYP-11</b> | POWER QUALITY ANALYZER                                                                               | Dr. Syed Abdul Rahman Kashif        |
| <b>2013-FYP-12</b> | HOME AUTOMATION AND CONTROL OF INDUCTION MACHINE FROM MAIN BLOCK                                     | Dr. Muhammad Asghar Saqib           |
| <b>2013-FYP-13</b> | INDUCTION MOTOR DRIVE                                                                                | Dr. Suhail Aftab Qureshi            |
| <b>2013-FYP-14</b> | Solar Auto Drive Car                                                                                 | Dr. Syed Abdul Rahman Kashif        |
| <b>2013-FYP-15</b> | PLC BASED SMART RESTURANT                                                                            | Mr. Habib Wajid                     |
| <b>2013-FYP-16</b> | INDUSTRIAL ENERGY MANAGEMENT SYSTEM                                                                  | Dr. Tahir Izhar                     |
| <b>2013-FYP-17</b> | POWER GENERATION USING STANDALONE WIND ENERGY SYSTEM                                                 | Dr. Suhail Aftab Qureshi            |
| <b>2013-FYP-18</b> | DESIGN AND IMPLEMENTATION OF ROBOTIC ARM THAT COPIES HUMAN ARM                                       | Mr. Umer Shahid                     |
| <b>2013-FYP-19</b> | BI-DIRECTIONAL ENERGY METER WITH DATA ACQUISITION                                                    | Dr. Suhail Aftab Qureshi            |
| <b>2013-FYP-20</b> | COMMUNICATION BETWEEN DUMB AND NORMAL PERSONS                                                        | Dr. Kashif Javed                    |
| <b>2013-FYP-21</b> | MAXIMUM POWER POINT TRACKING WITH BUCK BOOST CONVERTER                                               | Mr. Salman Fakhar                   |
| <b>2013-FYP-22</b> | WI-FI BASED SMART HOME USING MESH TOPOLOGY                                                           | Mr. Muhammad Ali Shafique           |
| <b>2013-FYP-23</b> | GPS BASED PUBLIC TRANSPORT ARRIVAL TIME PREDICITON                                                   | Dr. Ubaid Ullah Fiaz                |
| <b>2013-FYP-24</b> | DESIGN AND DEVELOPMENT OF DHU OF MICROSATELLITE                                                      | Dr. Muhammad Tahir                  |
| <b>2013-FYP-25</b> | INDUCTION HEATER USING RESONANT INVERTER WITH FEEDBACK USING PLL                                     | Mr. Habib Wajid                     |
| <b>2013-FYP-26</b> | PERSONAL ASSISTANT ROBOT                                                                             | Dr. Kashif Javed                    |
| <b>2013-FYP-27</b> | WIRELESS ELECTROCARDIOGRAPHY                                                                         | Mr. Umer Shahid                     |
| <b>2013-FYP-28</b> | A SOFTWARE DEFINED RAPID PROTOTYPING PLATFORM                                                        | Dr. Ubaid Ullah Fiaz                |
| <b>2013-FYP-29</b> | EMG CONTROLLED ROBOTIC ARM                                                                           | Dr. Ubaid Ullah Fiaz                |
| <b>2013-FYP-30</b> | POWER FACTOR IMPROVEMENT USING STATIC VAR COMPENSATOR                                                | Dr. Umer Tabrez Shami               |



|                    |                                                                                                      |                             |
|--------------------|------------------------------------------------------------------------------------------------------|-----------------------------|
| <b>2013-FYP-31</b> | HOME AUTOMATION                                                                                      | Mr. Salman Fakhar           |
| <b>2013-FYP-32</b> | MICRO HYDRO POWER PLANT DUMMY LOAD CONTROLLER                                                        | Dr. Tahir Izhar             |
| <b>2013-FYP-33</b> | ROBOT LEARNING FROM DEMONSTRATION                                                                    | Dr. Kashif Javed            |
| <b>2013-FYP-34</b> | BURRIED BODY DETECTION UNDER EARTHQUAKE RUBBLE                                                       | Dr. Muhammad Tahir          |
| <b>2013-FYP-35</b> | DESIGN, IMPLEMENTATION AND POWER QUALITY ANALYSIS OF SIX DIFFERENT AC REGULATION CONTROL TECHNIQUES. | Dr. Tahir Izhar             |
| <b>2013-FYP-36</b> | INTELLIGENT SOFT STARTER INVERTER FOR CONVENTIONAL AIR CONDITIONER                                   | Mr. Arsalan A Raheem        |
| <b>2013-FYP-37</b> | IMPLEMENTATION OF HIGH VOLTAGE DC SUPPLY                                                             | Dr. Muhammad Asghar Saqib   |
| <b>2013-FYP-38</b> | AIR CONDITIONER INVERTOR AND FREQUENCY CONTROL THROUGH CLOSED LOOP SYSTEM                            | Dr. Tahir Izhar             |
| <b>2013-FYP-39</b> | SURVEILLANCE AND SECURITY ROBOT                                                                      | Dr. Khalid Mehmood Ul Hasan |
| <b>2013-FYP-40</b> | DESIGN AND IMPLEMENTATION OF ON BOARD COMPUTER OF MICRO LEO SATELLITE                                | Dr. Muhammad Tahir          |
| <b>2013-FYP-41</b> | IMPLEMENTATION OF SHORT-TERM LOAD FORECASTING USING ANN                                              | Dr. Suhail Aftab Qureshi    |
| <b>2013-FYP-42</b> | NEXT GENERATION CANCER MODELLING PLATFORM                                                            | Dr. Khalid Mehmood Ul Hasan |
| <b>2013-FYP-43</b> | COMPUTER CONTROLLED THREE PHASE AC MULTI-LEVEL INVERTER DRIVE                                        | Dr. Umer Tabrez Shami       |



# *Final Year Project*

[Abstracts]

*Department of  
Electrical Engineering*

## **Title:**

# **Grid Tied Multilevel Inverter with Power Quality Monitoring**

**Advisor:** Dr. Syed Abdul Rahman Kashif

## **Abstract:**

The Project is based on Grid Tied Multilevel Inverter with power quality analysis and monitoring. A switch ladder multilevel inverter (SLMLI) topology is used to develop a 17-level inverter. Multilevel inverters can generate the output voltages with very low distortion. Power quality is the most important parameter that is measured and taken into account by utilities/supply companies to make a guess of the load demand of a customer. The power quality analyzer developed can measure voltage magnitude (RMS), current magnitude (RMS), real power, power factor, apparent power, reactive power, total harmonics distortion (current and voltage), voltage dips-swells and crest factor using NI LabVIEW. Hall Effect current sensors are used along with the current transformers (CTs) to measure the current of a particular load for its quality monitoring. For a high current measurement, CTs are used to measure the current whereas small current measurement can be taken using only current sensors without CTs. Potential transformers (PTs) are used to acquire the voltage data of the system to calculate the power quality parameters. Two methods are used to calculate the power quality parameters (voltage, current, THD, power factor, power, harmonics etc). In the first method, the instantaneous value of all the power quality parameters are calculated from the real time data that is acquired from a given electrical device. Those values show the manipulation of live data from an electrical device under test. In the second implementation method, a running average is computed for all the power quality parameters. That running average updates every 1.5 seconds on the GUI. Implemented 17-Level inverter for grid connectivity using LabVIEW and myRIO has THD as low as less than 5%. Its overall efficiency is high meeting the required international standards for grid connectivity. The 17-level inverter has 10 switches and 6 power supplies for single phase implementation. The output voltage cycle contains all the possible combinations of supplies which gives a very high value of output voltage as compared to applied dc voltage of supplies.

## **Group Members**

- Sajjad Ahmed (2013-EE-019)
- Muhammad Sohaib Shahid (2013-EE-121)
- Hamid Razzaq (2013-EE-041)
- Muhammad Umair Aslam (2013-EE-042)



## **Title:**

# Smart Grid Monitoring and Data Analysis using LabVIEW

**Advisor:** Dr. Syed Abdul Rahman Kashif

## **Abstract:**

Smart grids are becoming more and more common in our societies with the advancements in technology. With the advancements in smart grids, the methods to monitor these grids also needs to be improved. The proposed project is to develop an efficient power quality analyzer with remote access to data through Wi-Fi that could run efficiently in standalone conditions. The parts of the project include the data acquisition of our grid data, its accurate measurement, its analysis and control universally from everywhere. NI myRIO is used in this project due to its efficient high speed processing for data acquisition purpose and its advance approach towards energy measurements. NI LabVIEW is used for analyzing the power system parameters mathematically and graphically by its GUI. Moreover, we can generate automatic tripping of load locally and remotely if its power system parameters are not up to the mark. As the main advantage of a smart grid is its communication properties, we have worked on three to four different methods of communicating the state of the grid to the required personnel. These methods include transmission of data through SMS, WAN and Wi-Fi.

## **Group Members**

- |                                                |               |
|------------------------------------------------|---------------|
| <input type="checkbox"/> Talha Khalil          | (2013-EE-122) |
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| <input type="checkbox"/> Muhammad Farhan Ahmad | (2013-EE-129) |
| <input type="checkbox"/> Hafiz Awais Azkar     | (2013-EE-137) |



**Title:****Monitoring Energy Consumption Pattern In a University Hostel****Advisor:** Dr. Muhammad Asghar Saqib**Abstract:**

In University hostels the power consumption is irregular during winter season. Students use electric heaters, irons, electric kettles which is a burden for generators. This situation cause overloading of transformers which are designed for particular load and it does not include these high rated equipments. The main concept behind our project is the power regulation and continuous monitoring of the energy consumption curve. Our system is based on high computational power of STM32F429 controller. For the acquisition of the desired parameters we've got transducers; i.e. CT for current, PT for voltage. The parameters are kept for processing using a 12-bit inbuilt analog to digital converter. This data is moreover forward to a central database system on the internet using WIFI module. Most importantly all this monitoring is completing in a real time. This composed system will help authorities to make decisions concerning the installation of new distribution transformers, maintenance or up gradation of the existing ones. Installing this system aims to figure out these complexities in an economical and efficient manner.

**Group Members**

- Muhammad Nauman (2012-EE-155)
- Mudasser Rahim (2013-EE-036)
- Malik Muhammad Zaid (2013-EE-037)
- Muhammad Zeshan Joiya (2013-EE-093)

## **Title:**

# Tracking Learning Detection (TLD) based Semi-Autonomous Machine

**Advisor:** Dr. Muhammad Tahir

## **Abstract:**

Anti-intrusion Systems especially for border intrusion control primarily concern with the detection, tracking and neutralization of targets. Our project consists of the development of a prototype Sentry System designed specifically for detection, tracking and neutralization of human threats in real time. The required task involves acquiring an intruding human target from the field of view of a camera and moving a turret towards the target in real-time. The target is required to be locked-on, and when the target is confirmed as a viable threat, it is desired to effectively take out the confirmed target.

We propose a Tracking Learning Detection (TLD) based Semi-Autonomous machine which functionally implements the desired task of a sentry system in three logical units: Computer Vision Unit, Motion Control Unit and Control Unit. The Computer Vision Unit extracts the target coordinates from the camera frames with the help of TLD and other computer vision algorithms, and sends it to the Motion Controller. The Motion Control Unit produces an immediate response to the received target location, operating a turret to aim accurately at the target. The Control Unit gives remote access to a human being for the decision of target neutralization. Since the first two units operate autonomously to aim and lock-on at human targets and the neutralization is on the decision made by a remotely present human being, the overall system is Semiautonomous in nature.

The design of the sentry system's physical setup and organization consists of a camera fixed onto a firm tripod stand. A turret mounted on top of the tripod stand provides freedom of movement in x and y axes with the help of two motors, capable of providing high torque and quick response to aim the turret at any position desired in the camera feed. The sentry system's turret is armed with a projectile launcher for the neutralization of a confirmed human threat on command of an authorized person. The authorized person gives the command of neutralization while sitting remotely at a safe distance from the site of deployment of the sentry system, observing the confirmed threat in the live camera feed.

## **Group Members**

- Muhammad Ibrahim Qureshi (2013-EE-174)
- Hassaan Khalid (2013-EE-189)
- Zahra Zulfiqar (2013-EE-105)
- Taimur Bilal (2013-EE-161)



Department of Electrical Engineering  
University of Engineering and Technology, Lahore

## **Title:**

# **Electrical System Load Management and Automatic Billing**

**Advisor:** Dr. Khalid Mahmood ul Hasan

## **Abstract:**

This project is related to load management (Partial Load Shedding) for user benefits and automatic billing to alleviate sluggishness and problems to users. Partial Load Shedding includes the removal of loads on temporary basis which are using greatest of all the presently connected loads and this is what we have done in our project. we have connected loads of different watts and have managed to cut off the biggest load when the usage of power exceeds a set limit. Communication between the user and utility is also included in this project with the help of GSM which will be used to send warnings to user for over-usage and also the units that he has consumed in all the month. Arduino is being used in this project as the controller in which all the setting of maximum allowed power to be used is set and only the user who violates the limits is affected. Current Transformer sensors are being used to sense the current and to give output as voltage on Arduino pin. Tripping is done with the help of relays. Moreover, utility gets the data about the consumed power by user through GSM and utility makes a graph of this monthly use along-with a bill sheet that includes the penalty for over-use. Display is also attached with the meter of consumer so that he gets idea of the units consumed. In addition, a message at the end of the month and before the arrival of the conventional bill will be sent to user that will tell him about the monthly units used along-with the estimated bill.

## **Group Members**

- M. Ayyaz Tariq (2013-EE-086)
- Badar Shahar Yar (2013-EE-084)
- Umar Farooq (2013-EE-071)
- Saqib Razzaaq (2013-EE-066)



## **Title:**

# **Closed Loop Speed Control of 2.0 kW Induction Motor Using NI myRIO and LabView**

**Advisor:** Mr. Salman Fakhar

## **Abstract:**

In Pakistan, energy saving is of great importance. In order to overcome energy crisis the only possible solution with minimum cost is to save energy. Optimizing motor control systems by installing to variable frequency drives (VFDs) can reduce energy consumption in our facility by as much as 70%. No work has ever been done previously on this much high power rating VFDs in the education and research sector of Pakistan. Variable speed drives are not manufactured at local level owing to the lack of stability of design and therefore industrialists bear the brunt of high costs in importing the speed drives (or VFDs). The first approach to this project will be to design a gate driver circuit, driving high power IGBT stacks and this constitutes a three phase inverter. It will operate a high wattage induction motor. The efficient control of this inverter will be done by space vector modulation technique using NI myRIO FPGA. Space vector pulse width modulation (SVPWM) could not have been implemented efficiently using other micro-controllers and DSP boards. So we will prefer NI myRIO. The next major steps will include the control of starting current of the induction motor and its speed. The speed control of the motor will be done by controlling the operating frequency and voltage of the induction motor in a closed loop commonly known as V/f speed control of the induction motor. As we are dealing with high power ratings, in order to eliminate stray capacitance and inductance, we shall be using snubber circuits to protect IGBT stacks that has also not been done earlier in Pakistan. The final outlook of the project will be an efficiently running myRIO FPGA based Variable Frequency Drive (VFD) for high power induction motor that will serve as a basis to provide the local industrialists with the economical solution of motor speed control. For marketing purposes we are developing a website encompassing all the features of our product to gravitate the buyers as well as investors towards our product. Once we succeed in setting up the local VFD manufacturing unit, it will be the inception of a new era of industrial revolution in Pakistan that will benefit local industrialists and country's economy will experience a boom.

## **Group Members**

- |                                                  |               |
|--------------------------------------------------|---------------|
| <input type="checkbox"/> Anas Tariq              | (2013-EE-112) |
| <input type="checkbox"/> Moaz Ahmad              | (2013-EE-130) |
| <input type="checkbox"/> Nouman Khan             | (2013-EE-134) |
| <input type="checkbox"/> Muhammad Husnain Shaikh | (2013-EE-143) |



## **Title:**

# **3D Mapping Autonomous Flight Quadcopter with Inductive Charging**

**Advisor:** Dr. Khalid Mahmood-Ul-Hasan

## **Abstract:**

This project is based on implementation of SLAM during flight of quadcopter, along with generation of three dimensional map and wireless charging of LiPo battery while it lands on its base station. SLAM (Simultaneous Localization & Mapping) estimates the structure of the surrounding world (the map), while simultaneously getting localized in it, which will ultimately lead to cost map of surrounding environment. Readings obtained from RP Lidar sensor provides the data which creates a map immediately, also indicating position of quadcopter and obstacles near it. Manual mode is provided through which, control of throttle, yaw, roll and pitch of quadcopter is made possible. The most innovative feature of our project is 3-D mapping, which makes it possible to generate three dimensional layout of any place. It is implemented through SFM (Structure from Motion) which reconstructs 3-D geometry from multiple 2-D images by estimating camera positions. Live video stream is obtained from Raspberry Pi camera, mounted on quad-copter. This video stream is then transferred to base station which is converted into frames. These frames on processing generates a complete 3-D point clouds in base station. We have designed and implemented a wireless charging system through contact free power transfer mechanism called resonance inductive coupling, which enhance the efficiency of power transfer and is robust to imperfect alignment of coils. Wireless charging of the system is also controlled at base station by making use of load shifting topology

## **Group Members**

- Muhammad Ayaz Qureshi (2013-EE-27)
- Muhammad Ismail Saleem (2013-EE-29)
- Wajid Ali (2013-EE-35)
- Hummad Ahmad Usmani (2013-EE-46)



## **Title:**

### **AUTOMATIC SECURITY SYSTEM THROUGH BODY ACTIONS AND FACIAL EXPRESSIONS VIA REAL TIME IMAGE PROCESSING**

**Advisor:** Dr. Kashif Javed

## **Abstract:**

Terrorism has become an International problem from the past 6 years. Almost every country is affected by it in some way or another. With the increased crime rate the need of security has become more imminent than ever before. Conventional security systems of camera networks based on CCTV technology or even IP cameras are not capable to provide response of an activity of interest in real-time systems. A software level solution was required to assist the security personnel in their task of narrowing down the suspicious person from different screens in front of him. To enhance the precision and focus point of the security personnel we have developed our system.

Our proposed solution consists of two major parts. The facial expressions and body gestures. In the facial expression part, we will be utilizing the facial gestures of the person to identify if he is exhibiting suspicious behavior in the facial expressions e.g. either he is sad or confused or frightened. Our system also tracks the body posture if that person is suspicious i.e. one of the gestures that has been identified as suspicious is detected, then this person will be marked and security personnel will be informed about him and he will check that person carefully so that he is caught before performing any dangerous activity. In this way the scope of view of the security personnel has been narrowed down from multiple screen to one screen and then from multiple people in the scene to one single person.

## **Group Members**

- Ali Hassan (2012-EE-68)
- Ghulam Murtaza (2012-EE-74)
- Hadi Mustafa (2012-EE-81)



## **Title:**

**Wheelief: An Automated Guided Wheelchair**

**Advisor:** Dr. Ubaid Ullah Fayyaz

## **Abstract:**

Wheelief is a smart intelligent wheelchair that traverses through a guided path and acts as a personal assistant for physically challenged ones by enhancing their mobility and degree of control. It has various control features which include voice command-ability, joystick and eye blinks directed control. An Android app is developed for speech to text conversion and the textual string is transmitted to controller via blue-tooth. A Filter circuit is designed that takes raw signal from forehead through electroencephalogram(EEG) electrodes to removes unwanted components and amplify the signal for its further processing. This analog signal is then converted into a digital signal. Based on the detection of the pattern, micro-controller governs the 2-D movement. Stair climbing feature is also added in this wheelchair through a mature structural and mechanical design. It uses track mechanism and has automatic seat adjustment feature for climbing the stairs. Ultrasonic sensors are used to detect the presence of any nearby obstacles for collision avoidance.

## **Group Members**

- Muhammad Umer Noor (2013-EE-16)
- Usman Akram (2013-EE-40)
- Muhammad Danish Qureshi (2013-EE-178)



Department of Electrical Engineering  
**University of Engineering and Technology, Lahore**

## **Title:**

Auto Geared Smart Bike

**Advisor:** Arsalan A Rahim

## **Abstract:**

Motorcycles are in need of today's cheap and flexible transportation. Manual gear shifting has become a thing of the past since the inception of more smart and intelligent transmission systems but sadly for the motor bike industry this technology has not yet become cheap and easy to install. The gear shifting system of the motorcycle is conventionally manual. Auto Geared Smart Bike is a nonintrusive system of transmission that is easily installed on the exterior of the bike to robotically control the transmission in a smart and real time manner switching gears automatically just like an automatic car.

By this system no change / alteration will be made in the motorcycle engine because an additional smart system will be retrofitted in place on the vehicle to shift the gear and for automatic controlling the clutch. The system is also provided with a GUI and a smart heads up display. This system uses low-cost microcontrollers to make responsible accurate decisions for shifting the gear up and down by observing the speed, and it controls the clutch transmission where necessary. The complete hardware and software has been tested on road as well as on different conditions. This system is flexible and can be used with any user motorcycle.

## **Group Members**

- Aurangzaib Jahangir (2013-EE-17)
- M Nouman Nasir (2013-EE-18)
- Adeel M Khan (2013-EE-20)
- Ali Hassan (2013-EE-45)



## **Title:**

# **Variable Frequency Drive with Real Time Power Quality Monitoring.**

**Advisor:** Dr. Syed Abdul Rahman Kashif

## **Abstract:**

The efficient speed control of three phase induction motor is one of the important constraints of the modern world. Induction machines are being used in most of the industries and are considered as the back bone of any industry. The efficient and precise control of induction motor is the most desired element in implementation of process control in any industry. The motor working mechanism should be made capable of bearing the unfavorable power system situations. Unfortunately, the gains made with Variable Frequency Drives are often at the expense of power quality. So controlling and doing real time monitoring can serve the best solution in this regard. So we are making an energy saving variable frequency drive along with the monitoring of different electrical parameters. Additionally, using World Wide Web any one can access power quality monitoring data of the motor via the Internet. A three phase inverter is made which is capable of running on conventional energy sources as well as on renewable resources. We are controlling the output of three phase inverter by implementing one of the best Pulse Width Modulation algorithm known as Space Vector Pulse Width Modulation by using myRIO FGPA along with graphical interface of the LabVIEW for motor control process. We have implemented the closed loop motor control of induction motor by adjusting the motor operating voltages and frequency according to the given reference speed. This is basically a V/f speed control of motor. The real time power quality monitoring enables us to continuously observe different parameters such as voltage and current waveforms, torque, speed, harmonics etc. On the basis of these factors we can improve the response of the induction motor. The real time monitoring and accessing via internet helps to operate Variable Frequency Drives efficiently.

## **Group Members**

- Ibrar Ahmad (2013-EE-127)
- Muhammad Irfan (2013-EE-132)
- Muhammad Haris Khan (2013-EE-140)
- N K T Katuwawala (2013-EE-149)



## **Title:**

# Home Automation and Power Monitoring System

**Advisor:** Prof. Dr. Muhammad Asghar Saqib

## **Abstract:**

Home automation is concerned with the wireless control of different types of load remotely. The main control system implements wireless technology to provide remote access from smart phone using an android application with user friendly GUI. Host of communication method between the user and main control system is Wi-Fi. Power monitoring of different types of load is also performed which allow the user to calculate power consumption of each load and this is the key parameter which differentiate this project from other home automation projects.

Thus, the system intended to control and provide power monitoring for electrical appliances and devices in house with relatively low cost design, user-friendly interface, high efficiency and ease of installation.

## **Group Members**

- Kanwal Saif (2013-EE-057)
- Abdul Ahad (2013-EE-061)
- Wajeeha Sadaf (2013-EE-155)
- Saad Aleem (2013-EE-186)



## **Title:**

# **Android Control of Induction Motor Using SVPWM Technique On STM32F4**

**Advisor:** Prof. Dr. Sohail Aftab Quraishi

## **Abstract:**

Among the electrical machines induction motor is the widely used machine in the industry and commercial purposes. When we connect IM with supply it runs at rated speed

but we need variable speed in many applications along with rated torque..To achieve this we implement v/f control which enables us to improve dynamic control of IM with rated torque and varying speed. We have employed advanced PWM technique known as

SVPWM in which a reference voltage vector having desired frequency and magnitude is sampled at high frequency.

Our goal is to approximate reference vector trajectory circular as much as we can. Closer

the circular trajectory, lower will be the harmonics in phase current and output will approach to sinusoidal. The running (present) speed of IM is compared to input speed and error is fed to PI controller which assures the precise control independent of slip of the motor. Keeping in mind the diverse use of mobiles, instead of manually controlling the drive we are controlling it with android app. Android app is connected with blue-tooth module which further communicates with STM controller.

## **Group Members**

- |                                           |              |
|-------------------------------------------|--------------|
| <input type="checkbox"/> Muhammad Ashfaq  | (2013-EE-73) |
| <input type="checkbox"/> Hasan Qureshi    | (2013-EE-67) |
| <input type="checkbox"/> Amir Nazar Malik | (2013-EE-77) |
| <input type="checkbox"/> Umer Nazir       | (2013-EE-91) |



## **Title:**

Solar Auto-Drive Car

**Advisor:** Dr. Syed Abdul Rahman Kashif

## **Abstract:**

The world today is designing solutions for sustainable energy and increasing number of accidents on the roads. Our project "Solar Auto-Drive Car" is a step towards this solution. This dissertation details the energy provision to the electric car via solar panel and charge controller as it deals with buck boosting and stopping the overcharging of the power supplied to the battery. Autonomous driving is the solution for decreasing or eliminating the road accidents. In this approach, we will concentrate on the obstacle detection by sensors for the movement of car on the road by comparing the distances from objects with the set thresholds. Moreover, image processing TSDR technique will be used for detecting the road signs. All of this will be achieved by programming myRIO through LabVIEW software.

## **Group Members**

- Imrana Jabeen (2013-EE-052)
- Shehzeen Malik (2013-EE-053)
- Noor Fatima (2013-EE-056)
- Khush Bakht (2013-EE-153)



## **Title:**

### **PLC Based Smart Restaurant**

**Advisor:** Professor Khalid Mahmood Ul Hasan

**Co-Advisor:** Mr. Habib Wajid

## **Abstract:**

This era is termed as the world on innovation. From advanced automobiles to industrial automation, we have it all. Such a large endeavors have been taken place by restaurants owners also to adopt latest data communication technologies in the likes of PDA, wireless LAN, expensive multi touch screens etc to improve dining experience. However, there are some restrictions of the regular paper based and PDA based food ordering framework like the necessity of human labor and solid administrative model. Rather than this what we propose is a cheap touch screen based restaurant management system utilizing PLC (Programmable Logic Design) and multi touch LCD Module (HMI). The system comprises of a multi touch LCD module at the client table containing all the menu subtle elements. Orders made by the clients will be shown on the chefs HMI. Hell place the order at a defined spot which will be provided to the customer through the channel of a robotic arm and a conveyer belt. Not only this, even the return of the dishes is automated. This application is easy to use, enhances proficiency and precision for customers by saving time and lessens human errors. This framework effectively beats the disadvantages in prior mechanized food ordering systems and is more affordable as it requires a one-time venture for contraptions and furthermore avoids salaries of servers and staff. Man labor is only needed for preparing food.

## **Group Members**

- M. Hamza Riaz (2013-EE-168)
- Talha Zia M. Ali (2013-EE-175)
- M. Muneeb (2013-EE-024)
- Abdus Salam Mahmood (2013-EE-026)



Department of Electrical Engineering  
University of Engineering and Technology, Lahore

## **Title:**

# **Power Generation Using Stand Alone Wind Energy System**

**Advisor:** Prof. Dr. Suhail Aftab Qureshi

## **Abstract:**

The shortage of Energy is the biggest problem faced by our nation. The growing deficit between generation and demand for electricity has resulted in prolonged power outages. Stand Alone Wind Energy Systems are a proposed solution to mitigate this growing difference by providing energy to urban areas, rural areas and remote locations where no source of energy is present. Stand Alone Wind Energy System can also be termed as an Off-Grid Power System. It harnesses the energy in the wind and provides electricity for the general use. A HAWT has been used to harness the energy in the wind which is used to drive a DC Generator. The DC voltage is regulated and maintained at 12V with the help of a Boost Converter which converts the fluctuating output voltage of the DC Generator into a fixed 12V DC output to charge a Deep Cell Battery. The Charging is supervised by the help of a Charge Controller to prevent over charge. DC Voltage from the battery is inverted into AC voltage with the help of an inverter. The obtained waveform is passed through a filter to remove low order harmonics. A Transformer is used to step up the voltage to the standard 230V Ac at 50 Hz for general use. Wind being a renewable source of energy provides a cost effective and eco-friendly solution to the power shortage dilemma.

## **Group Members**

- Ahmed Mujtaba (2013-EE-116)
- Zainab Butt (2012-EE-03)
- Iqra Safdar (2012-EE-05)
- Asif Rahim (2012-EE-145)



## **Title:**

Design And Implementation of Robotic ARM That Copies Human Arm

**Advisor:** Mr. Umer Shahid

## **Abstract:**

The aim of this project is to make a robotic arm that copies the human. The user will get a wearable sleeve and glove that will act as the input device and copy the motion of arm and fingers. This data will be stored in a controller, processed in LabVIEW and sent to the other side where a robotic arm will mimic the motion. In this way, a person can complete a task from a remote location, just by using this device. NI LabVIEW will be used, combined with Raspberry pi 3 using DILIGENT LINX. The application consists of two parts, the controller arm that acts as the input, and the power arm that acts as the output. The controller arm will be a wearable sleeve and glove, and will sense the motion of joints of the arm. The sensors used are mostly potentiometers, because they are cheap and no complex algorithm is needed to process the data. For complex joints, we will use gyroscope. For the power arm, we will use DC geared motors. The geared motors are controlled using a PID control loop inside LabVIEW. Both arms, controller and power arm, will have a controller attached and will communicate using a wired or wireless protocol. The project is aimed to be cost effective.

## **Group Members**

|                   |              |
|-------------------|--------------|
| Arslan Ahmad      | (2013-EE-72) |
| Muhammad Ibraheem | (2013-EE-79) |
| Khawar Nabi Shah  | (2013-EE-99) |
| Mohsin Ahsan      | (2013-EE-92) |



## **Title:**

### **Bidirectional Energy Meter with Data Acquisition**

**Advisor:** Dr. Suhail Aftab Qureshi

## **Abstract:**

The conventional ways of electricity production are casting an adverse effect on environment. Hence, their usage for electricity generation needs to be minimized in order to maintain a healthy ecosystem. In this aspect, the renewable energy resources like solar, hydal, wind energy etc. ought to be promoted. These unconventional but clean sources of electricity are catching hype across the whole world but in developing countries, like Pakistan, these renewable energy sources seem to be expensive at user end. That is the main reason of resistance in usage and implementation of such green energy sources.

The main reason of these sources being expensive is that the whole generated electricity is not utilized efficiently and about 40 percent of solar generated electricity in Pakistan is wasted. Now, if this wasted energy is brought into an effective use then expense of green energy can be minimized by optimizing its usage. Our project model deals with the development of a bidirectional energy meter that will be capable of transporting the surplus renewable energy back to the national grid or to the neighboring electricity consumers. In this model, no green energy will be lost. The bidirectional meter will measure the units of electricity that are being imported from national grid and also the units that are being transported back to the national grid. This will be in compliance with application of net metering. The consumer tariff load will be reduced and he will have to pay price just for net amount of units used by him. In this way, Bidirectional Energy Meter promotes the generation and utilization of green energy at consumer end.

## **Group Members**

- |                                            |              |
|--------------------------------------------|--------------|
| <input type="checkbox"/> Muhammad Shahid   | (2013-EE-11) |
| <input type="checkbox"/> Safyan Amin       | (2013-EE-28) |
| <input type="checkbox"/> Muhammad Huzaifah | (2013-EE-30) |
| <input type="checkbox"/> Saad Tahir        | (2013-EE-69) |



## **Title:**

### **Maximum Power Point Tracking with Buck-Boost Converter**

**Advisor:** Mr. Salman Fakhar

## **Abstract:**

Extracting power from renewable energy sources is a need of the hour and our project focuses on extracting maximum power out of solar module. We are producing a prototype which when implemented on commercial basis will not only improve the efficiency of existing system but also will produce good profit margins. Maximum power point tracker is primarily defined as power electronics DC to DC converter that traces the maximum operating power point of the solar panel and supplies it to the load. This DC to DC converter is designed to reduce the input voltage from the PV module to a reasonable voltage level that is necessary to charge the batteries according to their rating. Dual axis solar tracking has been achieved by using LDR's and two hydraulic DC motors assembled to control solar panel movement in particular direction to a point where solar insolation is maximum. Particle swarm optimization method is used for maximum power point tracking to enhance the power output of solar panel and to regulate output of solar panel. Using buck converter output voltage of PV is reduced to 24 volts to charge the 24 volt DC batteries using stm microcontroller. The output of 24 volt DC batteries is boosted to 220 volt using ferrite core chopper transformer working as a boost converter then, output of Boost converter is converted to 220 Vrms via single phase inverter at 50 Hz. Enhanced efficiency and improved power are the most significant aspects of maximum power point tracking.

## **Group Members**

- Muhammad Salman Razzaq (2013-EE-164)
- Junaid Ali (2013-EE-166)
- Uzair Khan (2013-EE-179)
- Muhammad Athar Shah (2013-EE-192)



**Title:**

Home automation using Mesh Topology

**Advisor:** Dr. Khalid Mehmood Hassan/ Sir Ali Shafique

**Abstract:**

Home automation requires appliances to be connected to the cloud. A local network is created to ensure the communication among all the devices. The most popular protocol to develop a local network is ZigBee. An improved version of ZigBee protocol i.e. DigiMesh is implemented to improve the drawbacks associated with ZigBee protocol. DigiMesh protocol provides desirable qualities such as ad-hoc network creation, self-healing of nodes and low power consumption for battery powered nodes due to sleeping nodes. A local mesh network using DigiMesh protocol is created that connects to the cloud through a gateway. Two way communication of data between the cloud and the smart devices is done via MQTT protocol.

**Group Members:**

- Iqra Javed 2013-EE-001
- Waneeza Zaheer 2013-EE-004
- Ateequa Yaqoob 2013-EE-051
- Farwa Abbas 2013-EE-054



Department of Electrical Engineering.  
**University of Engineering and Technology, Lahore.**

## **Title:**

# **GPS Based Public Transport Arrival Time Prediction**

**Advisor:** Dr. Ubaid Ullah Fayyaz

## **Abstract:**

Users of public transport face a lot of problems such as long irritating wait on bus stops and often no bus arrival after a long wait. An innovative solution is to display the expected bus arrival time on bus stops. Many systems have been developed based on different techniques. In this paper, we will present real time bus arrival information rather than using participatory or supposed constant travel times. Global Positioning System (GPS) has been used to obtain real time location information of a vehicle in order to predict its arrival time on a particular position.

The communication between each node (such as in-vehicle device and bus stop device) has been established using Global System for Mobile Communications (GSM) network based Short Messaging Service (SMS) service. On server side, we have developed an efficient algorithm to predict the arrival times accurately. An optimized algorithm has been developed in terms of processing time and memory requirements.

In the last section, we have also presented results of our system under various test conditions. Many test drives have been done on a selected route and resulting predicted times and their deviation from Final Travelling Time (FTT) at each bus stop have been shown in graphs. Accuracy of our algorithm with several modifications have been compared and finally algorithm with an average error of less than a minute has been implemented.

## **Group Members**

- Muhammad Umar Farooq (2013-EE-090)
- Fahad Imran Khattak (2012-EE-095)
- Aamna Shakoor (2012-EE-157)



## **Title:**

Design and Development of Data Handling Unit of a Microsatellite

**Advisor:** Dr. Muhammad Tahir

## **Abstract:**

SUPARCO, the space agency of Pakistan started student satellite project PNSPP-1 (Pakistan national student satellite phase 1) for which we have designed Command and Data Handling Subsystem. We must continue with design provided by our seniors. It has only one unit that is known as Data handling unit. It is the brain of satellite. It is responsible for on board communication management. It manages space craft power on and power shut down sequence. It acquires telemetries from all the subsystems, processes it for detection of faults and executes tele-commands based on its analysis. It also sends data to ground station through RF communication chain

## **Group Members**

- Syed Mustafa Arshad (2013-EE-116)
- Hassan Sarfraz (2013-EE-115)
- Amna (2013-EE-101)
- Hajra Bint-e-Naeem (2013-EE-108)



## **Title:**

# **INDUCTION HEATER USING RESONANT INVERTER WITH FEEDBACK USING PLL**

**Advisor:** Mr. Habib Wajid

## **Abstract:**

This projects aims to implement Induction heating for metals, employing Single Phase Full H-bridge voltage fed square wave inverter to power series resonant tank used along with coupling transformer. IGBTs are used because of their high current capability with high frequency operation. Driving signals and feedback is implemented via controller. Electrical Model is simulated on MATLAB Simulink and observed output is a pure sinusoidal waveform across tank circuit. The resonant frequency of LC tank is tracked using PLL which is implemented via PID controller. A constant phase difference of  $90^\circ$  between voltage of inverter and tank capacitor voltage ensures the condition of resonance and the process is achieved in real time. When work piece is introduced inside the work coil, the inductance of the coil changes thus resonance frequency also changes. The PID controller taking the feedback signals allows us to reach the resonance frequency as quickly as possible after the insertion of work piece. Moreover, same metal piece offer different inductance at different temperatures, this problem is also solved by PLL. The performance parameters: Resonance frequency, Phase difference and temperature are displayed on LCD. High temperature sensing is required, for that we have employed non-contact IR Temperature sensor.

## **Group Members**

- Fawad Rauf (2013-EE-162)
- Sohaib Ahmad (2013-EE-167)
- Fakhar Asif Bajwa (2013-EE-170)
- Faizan Javed (2013-EE-196)



## Title:

### Personal Assistant Robot

**Advisor:** Dr. Kashif Javed

## Abstract:

In this busy world, everyone wishes to have a personal robot to help them, especially bedridden patients who need a helper all the time to take care of their necessities. Society seems to see them as a burden. Therefore, we built a project, a *Personal Assistant Robot* for such bedridden people that fulfills their very basic needs. Hence, there won't be any need of a human caretaker. The main modules of this robot are: *Speech Recognition*, *Object Identification* and *Vehicle Movement* via Raspberry Pi 3. For Speech Recognition, Dynamic Time Warping and for Object Identification, Nearest Neighbor Algorithm is used. Our dataset includes 50 audio and 50 image samples for each of the four words i.e. Water, Apple, Medicine and First-aid. *Raspberry Pi 3* is used to make it a standalone four-wheel assembly.

Personal assistant robot listens the voice commands via Bluetooth mic. The commands include the names of the things to be fetched e.g. medicine, water etc. Speech Recognition System running on Raspberry Pi 3 will be able to recognize the spoken word. The whole room will be scanned via camera, rotated by stepper motor, to locate the demanded object. Once identified, the robot will move towards the required object by sensing the distance via Ultrasonic sensor and return to the patient with the object.

## Group Members

- Rabia Saleem (2013-EE-151)
- Mahnoor Abbasi (2013-EE-152)
- Anam Dar (2013-EE-154)



## **Title:**

WIRELESS ECG

**Advisor:** Mr. TAHIR IZHAR

## **Abstract:**

Proper monitoring of heart is very important for the people suffering from cardiac diseases. The electrical activity produce by the heart can be monitored through cardiac monitoring. This document represents the development of wireless and low cost ECG monitoring system. Number of electrodes are connected to the body and the ECG is wirelessly transmitted through Bluetooth technology and observe on an Android app. This device is able to display ECG signal and measures any abnormality if present in ECG and inform to the patient's doctor. The ECG monitoring used in hospitals is high cost and high power consuming devices. The scope of this project is to produce a low cost, low power ECG monitoring system. Such portable device can be used without going to hospital.

## **Group Members**

- Samia Zafar (2013-EE-007)
- Amna Javed (2013-EE-009)
- Nayyara Nasir (2013-EE-010)
- Summayya Shabbir (2013-EE-158)



# Title:

A Software Defined Rapid Prototyping Platform

**Advisor:** Dr. Ubaid Ullah Fiaz

## Abstract:

The field of wireless communication has become the hottest area and Software Defined Radio (SDR) is revolutionizing it. By bringing much functionality as software, SDR reduces the cost of hardware maintenance and up-gradation. Open source hardware such as USRP (Universal Software Radio Peripheral) and software called GNU Radio-Companion are commonly used to do experiments in SDR. Since the cost of USRP is high, a low cost set up is needed which is affordable by the student community. The aim of our project is to provide an alternative platform using RTL-SDR (Realtek Software Defined Radio) which is only used for reception. Reception of a signal can be followed by different operations with the help of an embedded system. It will allow the re-configuration of the operating parameters; center frequency, bandwidth, power level, output rate and sampling rate by software which is one of the most important features in the SDR. We provide a GUI in order to receive, process and dump the signal. The basic framework of our platform constitute of a dongle, Raspberry pi and a transmission module. We provide a GUI that sets center frequency and sampling rate according to requirements. The dongle will receive the signal, digitalize it and then send it to the USB port of Raspberry pi. Our GUI provides multiple options for the processed signal. We can either listen to it in real time or can dump the data into a file. We can dump the raw data as well. This rapid prototyping SDR will serve as a platform to understand the basic realization of signals in real time. It is a low cost alternative, 10 times cheaper than the existing one. It is a complete programmable receiver platform. It allows a user to exploit the signals in different ways using GUI functionalities. The students will perform their lab sessions in a better way. This will help the students to build their lab projects related to communication systems by writing a simple C code. It is an affordable teaching and research solution.

## Group Members

- Maheen Zulfiqar (2013-EE-103)
- Fatima Farooq (2013-EE-106)
- Muhammad Arslan (2013-EE-118)
- Muhammad Bilal Aslam (2013-EE-135)



## **Title:**

Classification of upper limb gestures using Surface electromyography (SEMG) for amputees, paralyzed and multipurpose applications Using NI myRIO

**Advisor:** Dr. Ubaid Ullah Fayyaz

## **Abstract:**

Many amputees and paralyzed are among us who are not able to compete with others only because they are held back by the fact that some part of their body is not fully functional. WHO estimates that there are 40 million amputees throughout the world, 30 percent of which are upper limb amputees. While there is no commercially available solution for the paralyzed, the prosthetic limbs available for the amputees in the market are too expensive and only available in developed countries. The success of this project lies in providing robust gesture classification using myoelectric signals acquired using surface electrodes which will then be used to drive a complete low cost human arm having 4 DOF. The gesture classification will also be used for other applications such as driving a wheel chair for amputees and using a mounted robotic arm on the wheel chair for performing basic tasks. This project also aims to explore the control of the limb for paralyzed using externally applied myoelectric signals by TENS Pads. Cost is one of the most important aspects of this project, and the target is to create a product that is affordable for most amputees and paralyzed.

## **Group Members**

- Maham Nasir Khan (2013-EE-06)
- Zohaib Salahuddin (2013-EE-12)
- Mamoon Masud (2013-EE-15)
- Ali Yousaf (2013-EE-39)



## **Title:**

# **Power Factor Improvement Using Static VAR Compensator**

**Advisor:** Dr. Umer Tebrez Shami

## **Abstract:**

Normally power systems are subjected to small disturbances resulting from minor load changes to change in mechanical inputs to a power system. After an abnormal condition, when a system converges to some new values it is said to be dynamically stable system. Many techniques are utilized nowadays to rectify these contingencies. Restrictions on the construction of new system have forced the design engineers to look for some unconventional solutions to increase the power system stability and efficiency. Since the construction of new power system are both expensive and time-consuming, solution to the problem has been found in Flexible AC Transmission System (FACTS) devices. This project describes the implementation of SVC on Single Phase to provide improved Voltage stability, controlled power factor, and efficient Reactive Power feeding. Main purpose of the project is to provide reactive power to the system to improve power factor and time for which capacitor and inductor are added in the system has to be made Variable. This has been achieved by using TRIAC and Relays. We monitor the power factor through Microcontroller and when it is below certain limits than capacitor (inductor) is added for lagging load (leading load) by switching the TRIAC through relay.

## **Group Members**

- Muhammad Arshed (2013-EE-138)
- Sadia Naseer (2013-EE-058)
- Sohail Ahmad (2013-EE-096)
- Faheem Zafar (2013-EE-188)



## **Title:**

IOT Based Home Automation

**Advisor:** Salman Fakhar

## **Abstract:**

In the vast wilderness of technology, control systems have taken a preeminent position. From simple kitchen wares to rocket sciences and space shuttles, everything is surrounded with automated marvels of technology. There are home automation systems (HAS), heating, ventilation and air-conditioning system (HVAC), responsive surveillance systems etc. which lie under the domain of control systems. Porting anything on the internet means that it's being made available on the global network of computers. Twenty first century has seen a tremendous breakthrough in the field of networking. Internet has made almost everything connected and made the utopian concept of global village, an amazing reality. This project basically deals with the concept of 'internetworking' of physical resource collectors and control units or otherwise known as Internet of Things (IoT).

We have made a mesh network of sensors and connected it to an embedded TCP/IP server to demonstrate the idea. We connected some control appliances and sensors to the server and forwarded the port of the server on the internet. User interface was provided in an android app to connect to the server in both LAN and WAN mode. Security procedures have also been deployed to eradicate any possibility of breach.

## **Group Members**

- Junaid Anwar (2013-EE-181)
- Rao Arslan Ahmed (2013-EE-180)
- M Hammad Hafeez (2013-EE-190)
- Ahsan Riaz (2013-EE-183)



## **Title:**

### **Micro Hydro Power Plant Dummy Load Controller**

**Advisor:** Dr. Tahir Izhar

## **Abstract:**

Due to the variation of the load on the consumer end, the speed of the generator varies which causes the frequency to change. It is a problem for the consumer as all the electrical appliances are designed for specific frequency allowing a variation of usually 1% above and below 50 Hz. A control unit is designed which will be connected between generator and the load. A constant load will be maintained at the generator using a dummy load controlled by Thyristors. Control Unit will check the line frequency and depending upon the value produce specific pulses of required firing angle. These pulses will control the gate of Thyristors to which our dummy load is connected.

## **Group Members**

- Abdullah Khalid (2013-EE-063)
- Muhammad Khalil Yousaf (2013-EE-065)
- Noman Masood Awan (2013-EE-078)
- Nadeem Nawaz (2013-EE-128)



## **Title:**

Robot Learning From Demonstration.

**Advisor:** Dr. Kashif Javed

## **Abstract:**

Learning from Demonstration is a technique which enables robots to autonomously accomplish and successfully perform new tasks and therefore it is not required of users to manually program the robot to execute the desired response. Robots are trained for a specific task through demonstration i.e. user performs a demonstration of the required task and the data is collected from that demonstration. Algorithms and techniques are employed on that data and as a result the robot is given a generalized model that helps accomplish the task at hand. This technique is particularly powerful because now one only needs one robot to get various things done. The only requirement is to train it through demonstration. Therefore any user who is not familiar with the ins and outs of robotics and programming, he may use the robot in the best possible way because giving demonstration does not require any knowledge of programming or robotics. So this idea improves the way we use robots and is very efficient.

## **Group Members**

- Maria Ishtiaq Ahmed (2013-EE-55)
- Hafiz Muhammad Zunair (2012-EE-70)
- Muhammad Bilal Yousaf (2012-EE-82)
- Muhammad Shahzaib Aslam (2012-EE-88)



Department of Electrical Engineering  
University of Engineering and Technology, Lahore

## **Title:**

### **Buried Life Detection under Earth Quake Rubble**

**Advisor:** Dr. Inam Elahi and Dr. Muhammad Tahir

## **Abstract:**

Buried life detector (BLD) is a device that is made to detect human life under the Earthquake rubble. Pakistan is one of the countries that is prone to natural disasters that cause collapse of buildings and infrastructure where it is highly probable that human life be trapped in the gaps and voids inside the debris. Such a situation requires timely and targeted rescue operation to extract the human life. Buried life detector operates at 1GHz L band frequency to target the victim trapped inside the rubble. Penetrating through 20-30ft rubble the directed signal becomes frequency modulated due to the breathing and heart beat of the human body as it gets reflected from the victim. This frequency modulation governs the phenomena of doppler frequency shift and returns back as frequency shifted doppler signal. All the multipath and surrounding reflected signal acts as unwanted signal to the system and needs to be cancelled. Clutter cancellation techniques are implemented to cancel the clutter signal for the extraction of the doppler signal. The algorithm involves the adjustment of the phase and attenuation of the reference signal so that the reflected signal cancels to its maximum. Proper demodulation techniques are executed through robust hardware modules to demodulate the captured signal and extract the doppler life signal to be processed further. The demodulation involves the use of 30MHz IF (intermediate frequency) to increase the sensitivity of the system. Once the demodulation is achieved the low frequency human signal is filtered. The filtered signal is processed to distinguish life from non life. Signal processing techniques involve the calculation of the depth of human life inside the debris. A Microcontroller board is used to implement the clutter cancellation algorithm and for the signal processing. The low SNR signal extraction involves designing of filters to extract the human life signal from the noise signal.

## **Group Members**

- Sohaib Imran Bhatti (2012-EE-23)
- Moosa Sultan (2012-EE-21)
- Ameer Muavia (2012-EE-22)
- Muhammad Saad (2012-EE-34)



## **Title:**

Design, Implementation and Comparative analysis of six different AC regulation techniques.

**Advisor:** Dr. Tahir Izhar

## **Abstract:**

The large variations in the ac voltage greatly affects the working of electrical equipment and can cause severe damage to them and sometimes complete failure. To overcome this problem, voltage regulators are used that maintain the voltage within desired range. This project examines the design procedure to implement six different automatic ac voltage regulation techniques. Micro-controller based designs are implemented for the increase in efficiency and better response. The proposed techniques include online tap changing using electromagnetic relays, dc motor stabilizers, tap changing using solid state triacs, phase control method, PWM based solid state regulators and three-phase inverter. Complete design description and working is provided separately for each technique. Hardware is developed for each technique and tested in different voltage conditions. Power quality analysis of each technique is done that differentiate them, based on their employment in industrial and domestic use. Important comparison points include speed of response, sag and swell level, total harmonic distortion, types of power faults handled, ruggedness, cost and efficiency.

## **Group Members**

- Waleed Tariq (2013-EE-114)
- Ahmed Hasan Hameed (2013-EE-120)
- Muhammad Hamza Qayyum (2013-EE-124)
- Muhammad Ejaz Arif (2013-EE-142)



## **Title:**

Intelligent Soft Starter Inverter for Conventional Air Conditioner

**Advisor:** Arsalan A. Rahim

## **Abstract:**

Conventional Air Conditioners although cheap, but with an inherent drawback of high starting current, on-off cycles that are responsible for huge energy wastage and high billing cost. Inverter Based Air Conditioners are already prevailing in the market. But, no attempts have been made to incorporate conventional non-inverter based ACs into the domain of Inverter technology and money is spent over such technology which is much costlier than a method which could be easily integrated into the conventional system which can give similar performance with low cost.

An Energy Saving Soft Starter Inverter kit is going to be designed in this project, that will intelligently control our conventional Air Conditioner to make it operate on low electricity consumption and low cost.

## **Group Members**

- M. Noman Almani (2013-EE-171)
- Mehtab Hussain (2013-EE-173)
- Shahroz Irshad (2013-EE-182)
- Zeewaqaar Ali (2013-EE-013)



Department of Electrical Engineering  
University of Engineering and Technology, Lahore

## **Title:**

High Voltage DC Supply

**Advisor:** Dr. Muhammad Asghar Saqib

## **Abstract:**

High voltage DC power supply is fundamental device in power engineering. High voltage lab is incomplete without HVDC power supply. The objectives of this project are to explore and develop a device that will produce a HVDC low power supply. The project is based upon Flyback transformer and Cock-Craft voltage multiplier circuit. The switching pulses have been generated by NAND gate logic and fed to one terminal of flyback transformer while other is fed DC source rectified using full wave rectifier. Flyback transformer is high frequency operated transformer which provides high voltage pulses in KVs with input extending to few volts. Output pulses of flyback have been fed to 6-stage Cock-Craft voltage multiplier. The output specifications are 60 KV no load and 40 KV while in loading condition. Proteus and Matlab Simulink have been used for simulation purposes. The supply has been equipped with measuring circuit employing potential divider technique. The application circle of HVDC low power supply is extended to many fields of science for testing and research purposes. Dealing with high voltage DC is a matter of precaution, so a great deal of that is required. To accomplish these results was a tough though a feasible job. Our project mainly deals with the two fields of Electrical Engineering namely Power and Electronics.

## **Group Members**

- Sajid Raheem (2013-EE-064)
- Kashif Zahoor (2013-EE-075)
- Abdussalam (2013-EE-195)
- Muhammad Asim (2013-EE-098)



## **Title:**

Design of an Air Conditioner Compressor Drive to control speed of induction motor

**Advisor:** Dr. Tahir Izhar

## **Abstract:**

This projects deals with the control of the speed of the compressor of air conditioner by controlling the speed of the induction motor on the basis of the temperature input. The energy consumption is optimized by improvement dynamic response of induction motor and we can be obtained desired torque speed curve. The method called V/f is one of famous method which enables to run motor at its rated torque and vary its speed simultaneously. The increment in frequency causes increment in applied voltage to keep v/f constant otherwise it will saturate core of induction motor. Space vector modulation technique assisted us in order to control the motor since we can change the frequency of the output by changing the frequency using SVPWM. The temperature sensor senses the temperature of environment and air conditioner compressor moves to its full speed to attain the set temperature and after attaining the set temperature it moves at slow speed and this overall process leads to less consumption of energy as compared to the conventional air conditioner, leading to more efficient and reliable system.

## **Group Members**

- Muhammad Bilal Aslam (2013-EE-136)
- Arslan Aslam (2013-EE-123)
- Muhammad Hassan Asghar (2013-EE-131)
- Fatima Farhana (2013-EE-104)



## **Title:**

### **Surveillance and Security Robot**

**Advisor:** Dr. Khalid Mehmood-ul-Hasan

## **Abstract:**

The project aims for surveillance and security purpose in indoor and also outdoor environments with the feature of automatic stair climbing. Visual information is constantly gained with high-resolution cameras, bolstered by different sensors and dynamic brightening. The whole information handling is performed straightforwardly on the portable robot stage continuously. Surveillance system and robots are two unique system that complete their claim undertaking individually. The fundamental motivation for this venture is to join these two frameworks to create a versatile robot furnished with a camera as an insight observation framework. This robot can be utilized as a medium for a checking framework remotely by remotely-controlled by human through PC. For the cause of surveillance, the live video will be streamed through Raspberry Pi (No IR, V2) with the help of Wi-Fi router. For manual controlling of the robot, 4 channel RC controller is used having a carrier frequency of 35 Mhz. The other part of the project is security. Moving item identification gives a grouping of the pixels in the video succession into either frontal area (moving items) or background. A typical approach used to accomplish movement recognition is foundation subtraction, some of the time alluded to as background removal, where every video casing is looked at against a reference or background demonstrate, pixels that veer off essentially from the background are thought to move objects. In security mode, motion detection is done using GMG filter of the Open CV. When motion is detected an alert is send to the administrator by message/call. Along with the alert, images of detected person are also uploaded on the dropbox folder for the sake of future record. To assist the camera for night vision IR illuminators are used in front along with the camera. In add-ons section, we are doing object targeting with the help of a laser which is achieved by taking the difference of detected object position and laser position and trying to make that error equal to zero.

## **Group Members**

- Abdul Rehman Laraib (2013-EE-32)
- M. Wajahat Hussain (2013-EE-31)
- M. Aquib Aslam (2013-EE-33)
- Rabi-ul-Islam (2013-EE-38)



## **Title:**

# **Design and development of On Board Computer of micro LEO Satellite**

**Advisor:** M. Tahir

## **Abstract:**

Design and implementation of the onboard computer (OBC) of a Micro LEO satellite is to be installed as part of the Attitude Control Subsystem (ACS) of PNSS-1 (Pakistan National Student Satellite). PNSS-1 is a joint collaboration of SUPARCO with academia, initiated in 2014 to design and fabricate the first ever student made satellite of Pakistan and is envisioned to be launched in Space in 2018. The satellite falls into the category of Micro Low Earth Orbit Satellites weighing a total of 50 Kg and carrying an experimental payload into the space. Our project deals only with the onboard computer of the satellite which is considered to be the brain of the Satellite. The OBC units primary function is the attitude control, fault detection isolation and recovery (FDIR) and health telemetry of the Attitude Control Subsystem (ACS). In this document, we discuss the complete hardware design of the OBC, selection of components keeping in view the compatibility with the stringent space conditions such as extended temperature range, redundancy and power budget minimization. We also propose the schematic design of the various sub-modules of the OBC and their interconnections. Furthermore, the budget analysis of the selected components is performed and their conformity with the design requirements of SUPARCO is verified. In the end we also provide the details of the hardware and software testbed designed to simulate the behavior of onboard computer as installed in the satellite. The designed hardware for the onboard computer has been fabricated after detailed verifications from SUPARCO officials. Our project is the first of its kind promising a linkage between the industry and academia of Pakistan from which the future generation of engineers can seek inspiration.

## **Group Members**

- Azeem Awan (2013-EE-111)
- Umair Riaz (2013-EE-113)
- M. Huzaifa Bashir (2013-EE-125)
- M. Nabeel Tahir (2013-EE-139)



## **Title:**

# **Implementation of Short-Term Load Forecasting Using Artificial Neural Network**

**Advisor:** Prof. Dr. Suhail Aftab Qureshi

## **Abstract:**

In a deregulated, competitive power market, utilities tend to maintain their generation reserve close to the minimum required by an independent system operator. This makes a need for an accurate instantaneous-load forecast for the coming several dozen minutes. This work is related to the Short-Term Load Forecasting (STLF) in power system operations. A three layered Feed-Forward Neural Network (FFN), trained by Resilient Back-Propagation (RBP), is used. This algorithm considered more powerful as compared to the other traditional approach when the actual loads are forecasted and used as input variables. It provides more reliable forecasts, especially when the weather conditions are different from those represented in the training data. The proposed model can provide 24 hour ahead load forecasts. Separate ANNs are utilized for load forecasting of one hour to twenty-four hours ahead. The inputs to the ANN are previous day load with other factors related to it, and the output of the ANN is the predicted load for the next day for a given hour. Artificial Neural Network (ANN) in MATLAB software was used in solving the forecasting problem. The average error percentage was determined by using the Mean Absolute Percentage Error (MAPE). The result of Multi-Layer Perceptron (MLP) network model, used for one day ahead short term load forecast, shows that MLP network has a good performance and accurate prediction was achieved for this model. Its forecasting reliabilities were evaluated by computing the mean absolute error between the actual and predicted values. We were able to obtain Mean Absolute Percentage Error (MAPE) of 1.9214% which represents a high degree of accuracy.

## **Group Members**

- Ammar Saeed (2013-EE-159)
- Mohammad Moaid (2013-EE-147)
- Mohamed Elhindi (2013-EE-148)
- Wael Sraj (2013-EE-146)



## Title:

TISON-Theatre for *In Silico* Oncology: A Next-Generation Modelling and Simulation Platform for Predicting Cancer Growth, Development and Metastasis

**Advisor:** Dr. Khalid Mahmood-ul-Hasan

## Abstract:

Cancer is a multi-factorial pathology arising from a combination of anomalies at genetic, proteomics and metabolomics levels. Modern dietary and life-style preferences have led to a rapid increase in the risk of developing cancer. Clinical data shows that cancer incidence has risen manifolds over the past few decades across the globe, and an ever-increasing number of cases are being reported every day. Cancer care, in general, is an extremely costly proposition. Moreover, the treatable patients are met by an astronomical financial burden without any guarantees for an assured cure even after affording the treatment. This dire situation calls for out-of-box approaches towards developing affordable and patient-specific cancer therapeutic paradigms. For that, an integrative computational systems biology approach with a capacity to capture the spatiotemporal subtleties of cancer is quintessential. Till date several salient biological modelling and simulation tools have been developed including CHASTE, CompuCell, ELECANs, Repast, BioFVM, etc. Although, these platforms offer varying degrees of modelling coverage, and next-generation oncology data integration, however, their resulting models lack conformation and standardization. Also, the front-end user-interfaces offered by these platforms are unintuitive and not conducive to use by a layman researcher. Last but not the least, the simulation runtime performances of these platforms are not at pace for modelling biological entities in real time. Towards addressing these issues, we propose *TISON-Theatre for in silico Oncology*; a platform to equip clinicians with a multi-scale cancer modelling platform for disease prognosis and therapeutic evaluation. The envisaged platform not only improves upon the pre-existing modelling features present in the platforms, but also introduces several novel modelling and simulation strategies. TISON is a web application which includes (i) an integrating gene and protein networking editor, (ii) a cell circuit designer, (iii) a cell modelling editor, (iv) a tissue designer and assembler (v) a GPU-based high performance core (vi) a comprehensive 'What You See Is What You Get' (WYSIWYG) graphical user interface, (vii) a wet-lab data integration framework and many more, all designed towards evaluating patient-specific drug synergies.

## Group Members

- Muhammad Faizyab Ali Ch. (2013-EE-119)
- Hira Anees Awan (2013-EE-102)
- Zainab Arshad (2013-EE-109)
- Hadia Hameed (2013-EE-002)



## **Title:**

### **Computer Controlled Multi-Level Inverter**

**Advisor:** Dr. Umer Tabrez Shami

## **Abstract:**

This Project aims at the control of Multi-Level inverter using Arduino UNO microcontroller. The power electronics device which converts DC power to AC power at required output voltage and frequency level is known as inverter. Inverters can be broadly classified into single level inverter and multilevel inverter. Multilevel inverter as compared to single level inverters have advantages like minimum harmonic distortion, reduced EMI/RFI generation and can operate on several voltage levels.

A multi-stage inverter is being utilized for multipurpose applications, such as active power filters, static var compensators and machine drives for sinusoidal and trapezoidal current applications. The drawbacks are the isolated power supplies required for each one of the stages of the multi-converter and it's also lot harder to build, more expensive, harder to control in software.

Recently, inverters are considered an integral part in renewable energy systems which are used to convert DC input voltage to AC output voltage. This is because most of RE power outputs such a solar, wind, tidal and biomass are in DC while the electrical transmission system is based on AC. However, presence of Harmonics on its output, leads to severe effect on the performance of the systems connected to them. As compared to two-level inverters, multilevel voltage source inverters (MVSIs) have better harmonics profile which they will be able to reduce the harmonics distortion without decreasing the power output.

## **Group Members**

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|------------------|-------------|
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| ▪ Tabish Aftab   | 2013-EE-187 |



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# ABSTRACT BOOK

Grid Tied Multilevel Inverter with Power Quality Monitoring. Smart Grid Metering and Data Analysis Using LabVIEW. Monitoring Energy Consumption Pattern In University Hostels. Tracking, Learning and Detection (TLD) Based Semi-Autonomous Machine. Electrical System Load Management and Automatic Billing. Closed Loop Speed Control Of 2.0 Kw Induction Motor. 3-D Mapping Autonomous Flight Quadcopter with Inductive Charging. Automatic Security System Through Body Actions and Facial Expressions Via Real Time Image Processing. Wheelchair: An Automated Guided Wheel-Chair. Auto Geared Smart Bike. Power Quality Analyzer. Home Automation and Control of Induction Machine from Main Block. Induction Motor Drive. Solar Auto Drive Car. Plc Based Smart Restaurant. Industrial Energy Management System. Power Generation Using Standalone Wind Energy System. Design and Implementation of Robotic Arm That Copies Human Arm. Bi-Directional Energy Meter with Data Acquisition. Communication Between Dumb and Normal Persons. Maximum Power Point Tracking with Buck Boost Converter. Wi-Fi Based Smart Home Using Mesh Topology. GPS Based Public Transport Arrival Time Prediction. Design and Development of DHU Of Microsatellite. Induction Heater Using Resonant Inverter with Feedback Using PLL. Personal Assistant Robot. Wireless Electrocardiography. A Software Defined Rapid Prototyping Platform. EMG Controlled Robotic Arm. Power Factor Improvement Using Static Var Compensator. Home Automation. Micro Hydro Power Plant Dummy Load Controller. Robot Learning from Demonstration. Buried Body Detection Under Earthquake Rubble. Design, Implementation and Power Quality Analysis of Six Different Ac Regulation Control Techniques. Intelligent Soft Starter Inverter for Conventional Air Conditioner. Air Conditioner Inverter and Frequency Control Through Closed Loop System Surveillance and Security Robot. Design and Implementation of On Board Computer of Micro Leo Satellite. Implementation of Short-Term Load Forecasting Using Ann. Next Generation Cancer Modelling Platform. Computer Controlled Three Phase Ac Multi-Level Inverter Drive.



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