Competency Demonstration Report

First Career Episode

CE 1.1: Introduction

Project Name **:** Crash avoidance system using automatic brakes

Geographical Location: University of Management and Technology (UMT), Lahore

Project Duration **:** June 2014

Organization **:** University of Management and Technology (UMT), Lahore

Title of Position **:** Electrical engineering student

CE 1.2: Background

CE 1.2.1: The project presented a new approach Automobiles coming in front of the car would be sensed by the Radar and ultrasonic sensor; there speed would be measured with Doppler radar. Moreover, the distance would be measured with the help of Ultrasonic Sensors. These Signals would be conditioned with the help of signal conditioning Elements. Further, the Signal would be given to the microcontroller that would take the required action. The nature of the project was to understand the automatic vehicle working principle along with designing automatic brake systems. The brake systems would be elementary to control the automatic vehicle from sudden collision along with alerting systems installed.

CE 1.2.2: During the implementation of the project, I identified that the PIC 16f877A microcontroller and corresponding echo will determine the nearby obstacles. I demonstrated the use of sensor to detect the obstacles to automatic detection of further pit stops. Therefore, the

main objective of this project was to design the automatic brake system in vehicles that will help in detecting obstacles with accuracy. Following were the key objectives for this project:

- To send suitable alert to the driver for showing obstacles from blind spot regions, during the lane changing

- To provide periodic distance change index to the driver for showing the obstacles or nearby vehicles and apply automatic brakes as well when the certain distance limit is reached

CE 1.2.3: I have successfully completed the Bachelor degree in the field of Electrical Engineering from the University of Management and Technology (UMT), Lahore in the year of 2014. However, this was my final project in during the academic year. This was a group project where we designed the automatic vehicle brake that is working with all materials and helps in preventing vehicles from sudden accidents with maximum accuracy. Therefore, in this particular project, I was assigned as Electrical Engineering student with management role for other team members. Apart from that, as I have effective communication and writing skill, I had to take the responsibility of preparing the documentation of the project including presentation at the end of the project. I used my theoretical skills and knowledge of Mechanical Engineering into practical approach in order to bring success for this project. I have collected all the theoretical resource from open sources. I was also played the role of communicating with the supervisor for this project including the HOD of mechanical department. In order to make the brake system, I played important role of designing the technology for automation system of speed breaker for automatic vehicle.

CE 1.2.4: As this was a group project, there were five students including me who played several important roles within the project. Apart from that, one supervisor was included within the project along with the senior supervisor (HOD).

CE 1.2.5: Through the entire project, I was involved with the integral part of the project. I was firmly involved with the designing process of PIC 16f877A microcontroller circuit that was used to ultrasonic sound sensing mechanism. Apart from that, I developed a good understanding for working and constructing the project. I used the components of automatic vehicles in order to design the entire vehicle with braking systems. It allowed me in making the Machine with all materials with high accuracy regarding automatic brake system.

CE 1.3: Personal Engineering Activity

CE 1.3.1: Ultrasonic Transducers produce ultrasonic Signals which are in the form of sound waves. These signals are being converted from electrical signals to Sound waves of very high frequency, frequency much higher the frequency that can be heard by humans. These reflected sound waves from the obstacle will be reaching the transducer, which is the same in most cases, and will be converted back to electrical signals. Ultrasonic signals are like audible sound waves, except the frequencies are much higher. An output signal is produced to perform some kind of indicating or control function. A minimum distance from the sensor is required to provide a time delay so that the "echoes" can be interpreted. Variables which can affect the operation of ultrasonic sensing include, target surface angle, reflective surface roughness or changes in temperature or humidity.

CE 1.3.2: Ultrasonic waves are produced from the transmitter end and after being reflected from the obstacle will reach the receiver portion. The distance between the obstacle and the transducer can be calculated by determining the time taken by wave to being reflected back to the receiver.

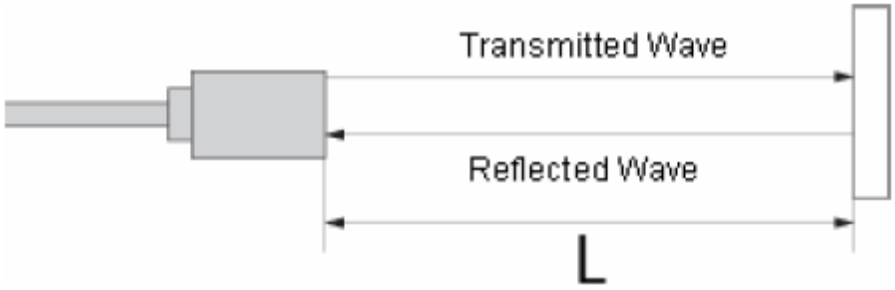


Figure: Effective use of Ultrasonic Sonsor

CE 1.3.3: As it is apparent from the below figure, the sensor has a beam pattern that is approximately 50 degrees wide and cone shaped. Also, the range varies with the angle. The beam pattern for the sensor as given in the data sheet is provided below:

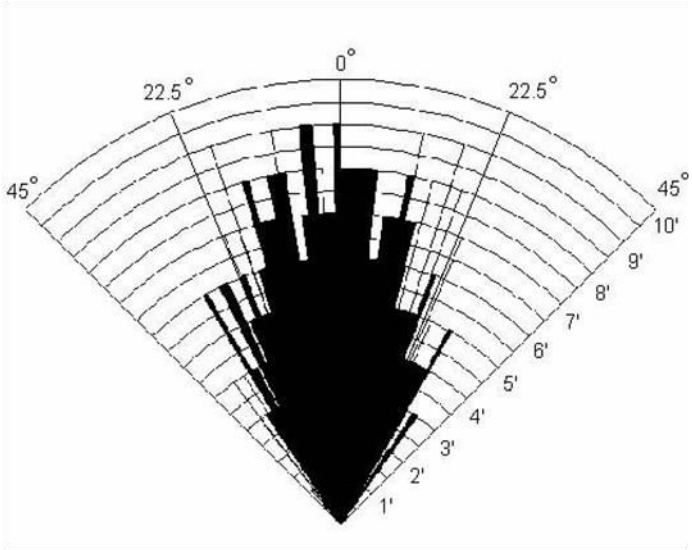
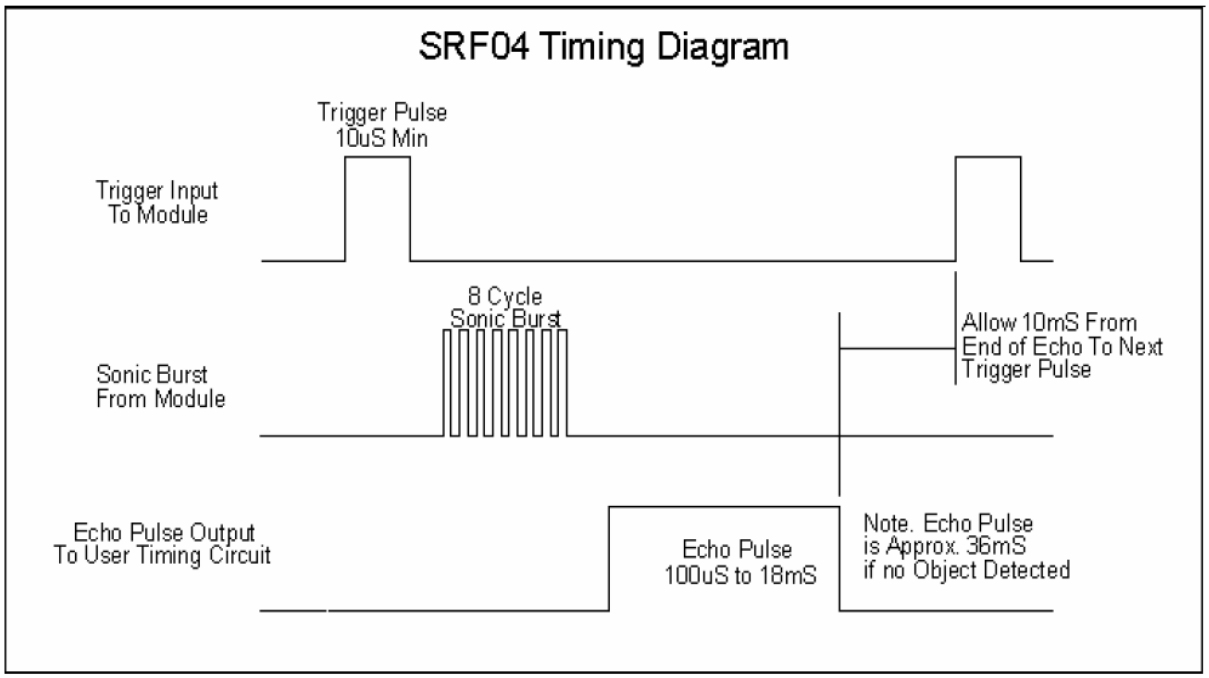


Figure: Beam Pattern for the Sensor

CE 1.3.4: To produce the strongest echoes, the sensor's beam should be pointed toward the target. If a smooth, flat target is inclined off perpendicular, some of the echo is deflected away from the sensor and the strength of the echo is reduced. Targets that are smaller than the spot diameter of the transducer beam can usually be inclined more than larger targets. Sensors with larger beam angles will generally produce stronger echoes from flat targets that are not perpendicular to the axis of the sound beam. Sound waves striking a target with a coarse, irregular surface will diffuse and reflect in many directions. Some of the reflected energy may return to the sensor as a weak but measurable echo. As always, target suitability must be evaluated for each application.

Below is the timing diagram of the sensor that helps us understand how the sensor actually works. Distance (cm) = (t us / 1000000 us/s) * (347m/s) * (100 cm/m)



CE 1.3.5: There are three memory blocks in each of the PIC16F87X MCUs. The Program Memory and Data Memory have separate buses so that concurrent access can occur.

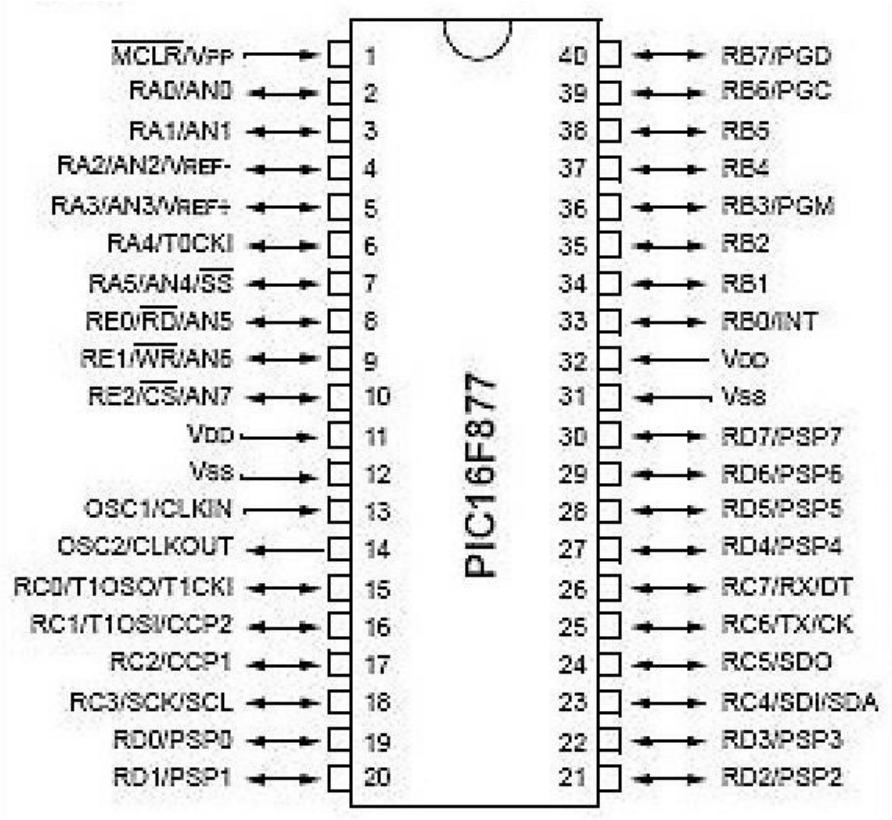


Figure: PIC16F877 Microcontroller Pin Configuration

A relay is an electrically operated switch. Many relays use an electromagnet to operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

CE 1.3.6: I was very frank in nature and worked friendly with my other team members. I was very much cooperative with my senior members. I was always a good learner and share my knowledge among others. This nature helped me in creating an eco-friendly environment in this project. Moreover, as I have good communication and written skills, I made the final documentation of this project.

CE 1.4: Summary

CE 1.4.1: The project was really a novel experience for us. It will not be without some pride when we think that we have accomplished the programming, circuit testing, assembling, soldering, final product testing, all within a short span of time. The experience that we got during this tenure will help us to handle similar projects with ease in future.

The new Crash Preventing system presented in this project combines several techniques that use wireless technology in order to implement a reliable braking control system. This proposed system can be easily implemented in Densely Populated areas. The project holds flexibility and capability of development with little hardware changes such as changing the speed and performing various speed control methods to prevent Crashes on the road.

CE 1.4.2: The proposed system is based on microcontroller technology for collecting data related to distance and transmitting waves through a transceiver to a base station that analyzes the transmitted data and takes appropriate decisions related to distance and control requirements. This experience has encouraged us to learn more about upcoming trends and technologies and thereby adding our bumble knowledge and experience about the vast ocean of electronics.

CE 1.4.3: Apart from that, I developed a good understanding for working and constructing the project. I used the components of automatic vehicles in order to design the entire vehicle with braking systems. It allowed me in making the Machine with all materials with high accuracy regarding automatic brake system. We used relay in our project so that we can switch between the two automatic applications of the car, that is, to cut off the power supply to the gear motors if any object came in front of the car and to provide the supply to the motor if no object is detected. A microcontroller is being used to control the relay switch.

Competency Demonstration Report

Second Career Episode

CE 2.1: Introduction

Project Name **:** Scada based monitoring of Distribution Transformer (through Lab View)

Geographical Location: University of Management and Technology (UMT), Lahore

Project Duration **:** June 2014

Organization **:** University of Management and Technology (UMT), Lahore

Title of Position **:** Electrical Engineering student

CE 2.2: Background

CE 2.2.1: The objective of this project is to develop a prototype model for continuous and real time monitoring of distribution transformer and in case of fault alarms or some kind of signal is send to avoid the flash out of transformer. First, CT's and PT's are used as current and voltage sensors to step down current and voltage. After that sound card is used as data acquisition device to send these signals to computer software. Software selection for hardware is LABVIEW and since because of unavailability of three phase transformer for prototype model we have selected single phase transformer for hardware prototype and for three phase same procedure is used with three CT's and three PT's. For three phase actual transformer we have used MATLAB to show proper connections for both sides of transformer in a way we can make every type of transformer protection including differential protection.

CE 2.2.2: We are developing such a system that can handle all the situations described previously and can send data to remote locations. This project will be able to monitor real timely our primary distribution transformer and also send data to remote locations. The key features of our project are as following:

1. Continuous and real time monitoring of Primary distribution transformer
2. The system measures harmonic contents in voltage and current waveforms. Able to measure energy going out of transformer
3. The system will be able to monitor every type of fault including differential protection. Upload all data to World Wide Web for remote locations
4. Generate alarms for the following kind of faults Overload(over current fault)
5. Over voltage fault Under voltage fault
6. Over and under frequency fault Differential fault on transformer

CE 2.2.3: If we compare our project with other SCADA systems then first key advantage is elimination the complex GPRS module. In addition, these systems are very costly so it cannot be installed on every transformer in our country. These systems require expensive protection in case of fault and if SCADA device burns out then it causes a lot of expenditure while our data acquisition device is very cheap. No measurements that we have discussed above are possible with these SCADA devices. Therefore, for primary distribution transformer this is the best cost effective solution.

CE 2.2.4: Continuous and real time monitoring of distribution transformer is essential for the purpose of not only protection but also for measurement of load. If we talk about primary distribution transformer then some monitoring system is always there for the purpose of

protection. But for the secondary distribution transformer no monitoring system is there because of the expensive price of SCADA based monitoring systems. So amount of load in this type of transformer is never checked.

Furthermore, the monitoring of primary distribution transformer via SCADA devices is very expensive. However, at the same time it is needed also and need for sending information like fault on one transformer to remotely cannot be neglected. Therefore, there must be some sensible device, which monitors the whole system, and in case of fault, it will be able to send the signal to any remote desired location. Now, many power instrument-manufacturing companies make SCADA devices that handle all these tasks but due to the price factor some time it is not installed on transformers and this type of negligence results in hilarious conditions.

CE 2.3: Personal Engineering Activity

CE 2.3.1: SCADA systems play important role in modern world but any failure to these systems may result in severe hazards and explosions. Therefore proper protection for these systems must be adopted to avoid these kinds of situations. SCADA systems are usually consist of master SCADA unit, remote SCADA units, some communication media and software. Software is for operator to control the process. Remote SCADA unit is installed at the place of plant where process is measured. Communication media is any wire of wireless system which sends of receives signals to master SCADA system. Master SCADA system controls many of these kinds of processes and sends appropriate signals to remote units. These systems are everywhere now days in world.

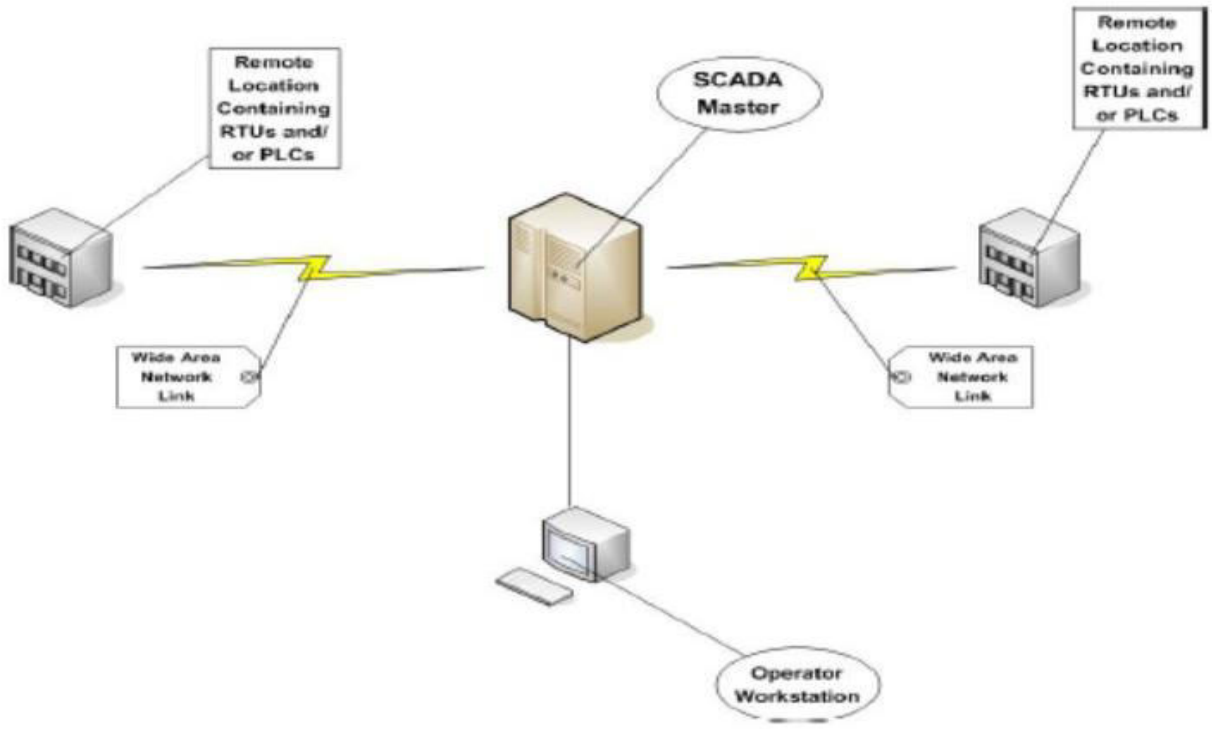


Figure: SCADA system with master SCADA terminal Unit

CE 2.3.2: Data acquisition we have used is sound card of PC. Because of its low price and minimum error we preferred this one over microcontroller which can also be connected here. The pink port of sound card is microphone port that we have used for data sending. Since sound card has built in ADC and DCA so whole complexity of these things is omitted. Sampling rate and number of samples can be varied. We have used four USB sound cards with one channel. After connecting these sound cards to signals via TRS connector next task is to read it in LabVIEW.

CE 2.3.3: We have selected CT of rating 60/5 Ampere for both sides of transformer. Since our data acquisition device reads only voltage signals so we have to convert our current

signals into voltage equivalent form. This is done by burden resistance of both CT's and with proper adjustment of number of turns of CT's. Burden resistance = .1 Ω

On primary side:

5 turns into CT for step downing voltage to one volt range. After that Voltage on CT burden resistance = .15 V (peak)

On secondary side:

10 turns into CT for step downing voltage to one volt range. After that Voltage on CT burden resistance = .2 V. After sending these signals to Lab VIEW, we multiply with proper factor to convert back to original values.

Voltage transformer

PT rating on both sides of transformer = 220/12V

On primary side: Voltage = 220 V, Voltage at PT secondary = 12V, Resistances of Voltage divider circuit = 221.8 KΩ After Voltage divider Circuit = .9 V (peak)

CE 2.3.4: The software serves the final and the most vital purpose of the SCADA based remote monitoring system that involves acquiring the data and presenting it to the operator in viewable format with control applications. The software we are using for the project is LABVIEW by National Instruments. The main purposes it serves are interpreting the input data, performing a detailed analysis on it and finally presenting it in form of front panels. For Data acquisition, we have used sequence structure frame for connecting 4 USB sound cards to PC. In

sequence structure, we have added four frames and device ID is connected with numeric control block. The diagram of sequence structure is:

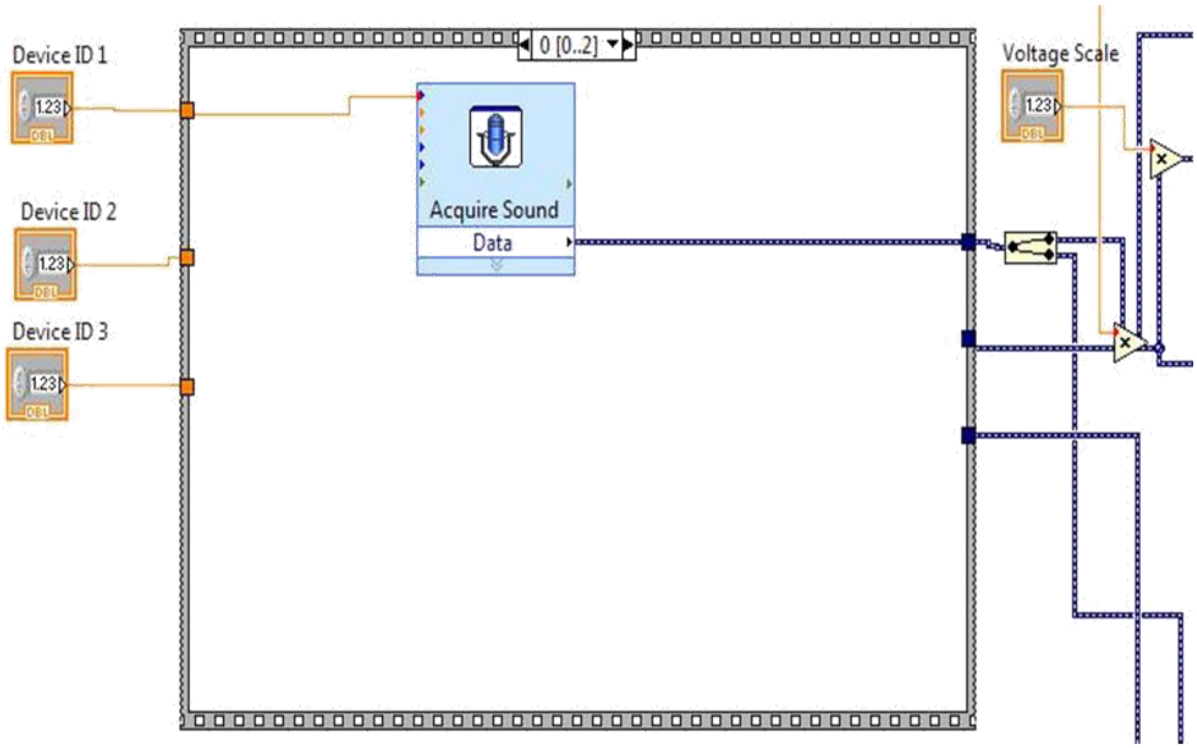


Figure: Diagram of Sequence Structure

CE 2.3.5: In this block diagram, we have found the peak values for both current and voltage signals then by converting them to rms value and after that by multiplying with power factor we have calculated active power and by trigonometric functions we have measured sin (angle b/t voltage and current) then reactive power is also computed.

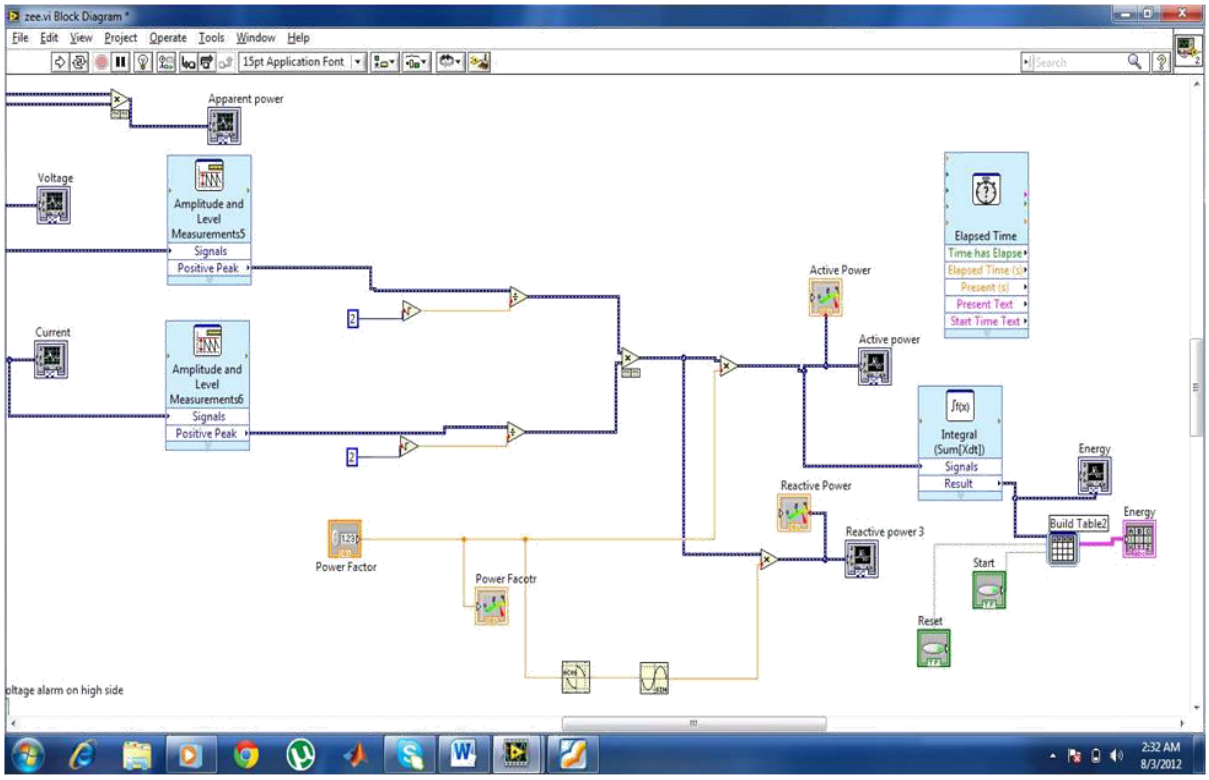


Figure: Lab VIEW Interface Working on Transformer

In the front panel control, total energy that is going out of transformer is shown in the form of graph and also table. We have placed the control for recording energy values in table. From the energy calculation we can find out the electricity theft by calculating the difference in the outgoing energy and sum of energy coming from consumer meters. This is just one application of SCADA monitoring system.

CE 2.3.6: Here we measure different parameters of distribution transformer to extract the results. The results are given below:

a) Results show the Amplitude, Sine wave and Power spectrum of Voltage and Current on high and low sides.

b) Give the THD, 3rd Harmonics, Cycle Average, Mean Level and Cycle RMS. Give the alarms when value increase or decrease from the limits.

c) Calculate and show the graphs of Active, Reactive and apparent power on output side.

d) Show the power factor.

e) Calculate and record the energy in the form of graphical description.

f) We can monitor transformers that are located far away by the **World Wide Web**

Therefore, these results are good for us because we measure any parameter. When any value increase or decrease from its set point then system will alarm and the plant automatically tripped. This project can be used on any turbine, plant, or transformer for protection. This Lab View based system is used to monitor and record key operation of a distribution transformer like overvoltage, over current, temperatures, certain gas evolved and rise or fall of oil level. Also it is important to keep an eye on transformer health when operator is not present actually at transformer site so we are introducing system named as two way communication systems between transformer and operator through GSM modem where person can ask any related parameter value of transformer health by sending massage to the system. This system can be designed to send the whole status of the results whenever the circuit tips or related parameter value exceeds the predefined limits.

CE 2.4: Summary

CE 2.4.1: For further improvement, one can use some module to transmit signals wirelessly. If this can be done then we can connect this project to monitor transformers that are located far away. The Distribution Transformers failures are effectively protected against

overload, over temperature and over voltage. The parameters of the transformer are continuously monitored and transmitted to the nearest electrical office for the necessary actions. Wireless communication systems are used for transmitting and receiving the data from the transformer and the nearest electrical office by using RF communication. In this project the over voltage, temperature and over load are monitored in signal system. The projects is fully automated and require no manual interface.

CE 2.4.2: We have designed a protection of single phase transformer which is very less in error due to the implementation of Lab View software. More efficient working can be done by using GPS but it is very complex and costly. Due to the flexibility of lab view which is used in our project. This project is very portable also and one can just go to the transformer with a laptop and all data of that transformer can be read and upload with very ease.

Competency Demonstration Report

Third Career Episode

CE 3.1: Introduction

Project Name **:** Line Following Robot Design

Geographical Location: Please Fill

Project Duration **:** Please Fill

Organization **:** Please Fill

Title of Position **:** Electrical engineering student

CE 3.2: Background

3.2.1: In this particular assignment, it mainly explains about the line follower nature of robot. Moreover, the line follower robot is one of the robots that mainly used in order to follow the specific path that is mainly indicated with the help of the line. Therefore, in doing the circuit diagram it mainly consists of the Motor Driver IC, motors, two IR sensors and ATmega8 microcontrollers.

In this particular assignment, it mainly discusses about the robot direction that is mainly dependent on the sensors outputs. Moreover, based on the output of the IP sensor microcontroller it mainly point to changes of the directions of the motors.

3.2.2: This project was designed in order to introduce a new mechanism that totally transform this world along with the automation as almost all the organizations are in need of robotics and suitable automatic devices. Therefore, the main objective of this project was to

design line follower robot with automation technology that achieve maximum accuracy including minimum effort for random-fashion routes. In order to complete this project, some of the objectives are given below:

1. To design the line follower robot circuit based on the microcontroller and the IR sensors
2. To draw out the circuit operations of the line follower robotics vehicles

3.2.3: According to the project requirements, I served the purpose of team leading with following processes to implement the project. The purpose of my work was to collect data and information from various sources to accomplish the entire project work within time. Moreover, I had applied the theoretical and hypothetical aspects of electrical engineering to design the line follower circuit. However, I also applied the knowledge of the robotic science by doing the proper use of microcontroller. As an electronic engineer, I also worked in doing the designing of the circuit that mainly transmit the IR rays in the continuous manner.

3.2.4: Total seven people involved in this project where I was included as Electrical Engineer with project managing purpose and there were one head of the project and one project manager. Apart from that, there were two other mechanical experts. Two members were working as technical experts from the field of electronics engineering. I served the team leading purpose and role to support my subordinates. The project was segmented based on our skills and capabilities in particular design process. I was designer of the Microcontroller circuit and supervisor helped me to understand the project approach in this study. I managed project works as well with timeline consideration in the study.

3.2.5: My duties in the project are listed along with specified roles are determined within the project design aspects.

A. I collected random information and relevant data from online or other sources to accumulate the design of the study. My role was to research thoroughly about the design process.

B. I consulted the project design approach along the team members to complete it within timeline and described the status as well

C. I designed robot block diagram the circuit and the movement of the sensors that can automatically adjust the robot

D. I prepared the final documentation for the project submission

E. I moreover determined thee benchmarking activities to include them to maintain a suitable standard in project design and implementation

CE 3.3: Personal Engineering Activity

3.3.1: In this particular project, the design of the circuit mainly consists of IR transistors, IR receivers, Motors, Motor driver and Atmega8 microcontroller. However, this particular microcontroller is from the AVR family of the microcontroller. The DC motor techniques of this robot are mainly connected with the controller by doing the use of motor driver IC. Moreover, in this particular assignment, the two IR sensors are mainly connected with the PB0 and the PB1

pins based on the microcontroller. Furthermore, this study is mainly conducted in order to investigate the feasibility analysis of the circuit design of IR sensor.

3.3.2: This project was mainly dependent on the circuit diagrams of the IR sensor that mainly consists of IR receiver and IR transmitter. In this project, it mainly uses the resistors type of R1 to R4. The diagram of the microcontroller mainly consists of 23 programmable pins. Moreover, the DC motors of the robot are mainly connected with the controller by doing the use of the proper motor driver IC. Therefore, in order to amplify the voltage motor driver, the different types of IC is used. This is mainly used in the operation techniques of IC.

3.3.3: As the efficient team member, I also have the ability in order to administer various programs as well as in order to cooperate the project with team members. I was shown proper guidance from my supervisor and mentor, I was thankful to them for their support. I shared my daily views to the members to make them understand about the project approach and design techniques. I served the purpose of assigning proper resources in order to complete the project within deadline. I was responsible for designing the circuit with microcontroller setup.

3.3.4: Some of the problems that are identified in doing the implementation of the circuit are that IR sensor can absorb the IR rays that may causes the improper movement of the robot. Moreover, it also requires the 2-3 inches nature of the broad line. Apart from this, the problems of the project also include various communication errors as well as resources errors that cause disruption in doing the development of the project. Moreover, due to the lack of money as well as time I along with all my teammates was get unable to do the use of circuit in the practical approach. Therefore, I also get unable in order to make effective communication regarding the project.

In order to mitigate all the faced problems at the time of implementation of the project I learnt about various mechanisms that mainly used in the system of the driver less car by adding some new features that mainly include obstacle detection system. Moreover, this technique is mainly used in doing both the defense and industrial applications. The required skills and competencies determined from my side, I served the allocation of the resources in the project for later design of the robot. I applied robotics concepts and ideas to support the same part of the solution. I selected the approach of including relevant details of electrical engineering knowledge to design the circuits.

3.3.5: To complete the designing of the project, I chosen particular project samples and documents for further knowledge. I included the appropriate solutions in designing the project to achieve higher quality project delivery with suitable aspects of outcomes. Therefore, I also reached various conclusions that helped me in doing various final decisions in order to follow the path by doing the detection of the line. Apart from this, I also reached the conclusion that also helped me to make the final decisions regarding the circuit diagrams as well as the various sensors. The DC motors that are mainly used in the robot are mainly connected to the controller by doing the proper use of the motor driver type IC.

3.3.6: I made an effective communication with all the team members throughout various messaging and phone calls with all the team members. It also helped me in order to provide various detailed technical information that mainly includes various guidelines and standards. I took the responsibility of conducting free flow of information along with the team members for identifying issues in the project. Furthermore, I managed the resources and timeline scheduling

for assessment of risks and resolve the risks as well. The circuit making approach was suitable for conducting successful project within relevant deadline.

CE 3.4: Summary

3.4.1: This particular study mainly focuses on the circuit diagrams of the line follower robot that mainly follows the specific path specified by the line that having width. However, various components that are needed to be there in doing the circuit diagram of the robot are ATmega8 Microcontroller, Motors, and Resistors, IR receivers, IR transistors and Motor driver IC. Apart from this, it also helped in order to improve the communication of the network. On an overall, the project was a success to realize all our efforts are in good practices and effective application of engineering knowledge.

3.4.2: I collected random information and relevant data from online or other sources to accumulate the design of the study. My role was to research thoroughly about the design process. In addition to mentioned role, I coordinated with other team members that helped me to facilitate the development of the project. Therefore, I also participated in collaborative approach of doing the completion of all the tasks segmented in the project. I consulted the project design approach along the team members to complete it within timeline and described the status as well. I designed robot block diagram the circuit and the movement of the sensors that can automatically adjust the robot.

Competency Demonstration Report

Continuing Professional Development

Continuing Professional Development

Primary objectives of my career are to seek new responsibilities irrespective of reward and recognition, maintaining calm and positive temperament, along with good communication and interpersonal skills. I seek and find solutions to challenges keeping exceptionally positive attitude at any situation. My first project was “Crash avoidance system using automatic brakes”. The project presented a new approach Automobiles coming in front of the car would be sensed by the Radar and ultrasonic sensor; there speed would be measured with Doppler radar. Moreover, the distance would be measured with the help of Ultrasonic Sensors. These Signals would be conditioned with the help of signal conditioning Elements. Further, the Signal would be given to the microcontroller that would take the required action. I have conducted this project as Electrical Engineer Final Project in Bachelors. My second project was “Scada-based Monitoring of Distribution Transformer (through Lab View)”. I completed this project when I was a student in Electrical Engineering discipline. Moreover, I participated in several different types of projects namely as Line Following Robot, Temperature Sensor, Water Level Detector, Network Layers Security and Testing, Web Services Security, Java based Home automation system, Penetration testing and exploitation of IP Cameras.

I have diverse software skills in programming, networking, and electrical engineering domain. I acquired interests in embedded system, Java programming, operating system architecture, and ethical hacking as well. I hereby declare that all the information that is served along with the competency demonstration report is genuine. I take complete responsibility in case any inconsistencies found in demonstration of my capabilities and skills. I am completely aware about moral and ethical aspects in terms of academic and professional platform. I fulfilled

professional working role in certain organization, therefore, I can assure the concerned authority that I am acquired with profound knowledge and practical experiences.

Therefore, I want to apply to Professional Engineer (Engineer Australia) in terms of increasing my knowledge and skills.

Academic Background

Duration	***Course***	***Institution***
Since September 2015 to Current	Masters degree on Computer Science	University Of Hertfordshire, Hertfordshire, UK
June 2014	Bachelor degree in Electrical Engineering	University of Management and Technology (UMT), Lahore
July 2012	CCNA training certification being a network associate	Cisco Learning Institution
2009	Appeared in A-level evaluation tests	Lahore Learning Center
2006	Appeared in O-level evaluation tests	Lahore Learning Center

Work and Practical Experience

Duration	***Position***	***Organization***
June to September 2012	Experience of Internship	PTCL (Pakistan Telecommunication Company Limited)
Internship helped me to gather knowledge about network configuration at practical level along with different topologies consideration as well. I spend time learning Networking principles and the main sources to do switching and transmission. PTA played understanding of roles when allocating frequencies in Pakistan. I went to different base stations and worked under supervisors. I served the purpose of routing and switching with different servers to work on. I carried out the understanding the different topologies that are applied in the transmission department.		

Name: Bilal Abdullah

Date: PLEASE FILL

Place: PLEASE FILL

Competency Demonstration Report

Summary Statement

Professional Engineer: Summary Statement

Competency Element	A brief summary of how you have applied the element	Paragraph number in the career episode(s) where the element is addressed
PE 1 KNOWLEDGE AND SKILL BASE		
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.	I) According to the project requirements, I served the purpose of team leading with following processes to implement the project. II) The purpose of my work was to collect data and information from various sources to accomplish the entire project work within time. III) Moreover, I had applied the theoretical and hypothetical	Career Episode 1: CE 1.2.3, CE 1.3.1 and CE 1.3.2 Career Episode 2: CE 2.3.1 and CE 2.3.3 Career Episode 3: CE 3.2.1, CE 3.3.1 and CE 3.3.2

	aspects of electrical engineering to design the line follower circuit.	
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.	I) However, I also applied the knowledge of the robotic science by doing the proper use of microcontroller. II) As an electronic engineer, I also worked in doing the designing of the circuit that mainly transmit the IR rays in the continuous manner. III) I served the team leading purpose and role to support my subordinates. IV) I was designer of the Microcontroller circuit and supervisor helped me to understand the project approach in this study.	Career Episode 1: CE 1.3.1 Career Episode 2: CE 2.3.2, CE 2.3.3 and CE 2.3.4 Career Episode 3: CE 3.3.1

PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline.	I) I managed project works as well with timeline consideration in the study. II) I collected random information and relevant data from online or other sources to accumulate the design of the study. III) My role was to research thoroughly about the design process.	Career Episode 1: CE 1.3.1 Career Episode 2: CE 2.3.1, CE 2.3.4, CE 2.2.5 and CE 2.4.2 Career Episode 3: CE 3.3.1, CE 3.3.3
PE1.4 Discernment of knowledge development and research directions within the engineering discipline.	I) I consulted the project design approach along the team members to complete it within timeline and described the status as well. II) I designed robot block diagram the circuit and the movement of the sensors that can automatically adjust the	Career Episode 1: CE 1.2.5, CE 1.3.1 and CE 1.4.2 Career Episode 2: CE 2.3.2, CE 2.3.4 and CE 2.4.1

	robot. III) I prepared the final documentation for the project submission.	Career Episode 3: CE 3.3.2, CE 3.3.3 and CE 3.4.1
PE1.5 Knowledge of contextual factors impacting the engineering discipline.	I) I moreover determined thee benchmarking activities to include them to maintain a suitable standard in project design and implementation II) As the efficient team member, I also have the ability in order to administer various programs as well as in order to cooperate the project with team members. III) I was shown proper guidance from my supervisor and mentor, I was thankful to them for their support.	Career Episode 1: CE 1.2.1, CE 1.2.2, Career Episode 2: CE 2.2.1, CE 2.2.2 Career Episode 3: CE 3.2.1, CE 3.2.2

PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.	I) I shared my daily views to the members to make them understand about the project approach and design techniques. II) I served the purpose of assigning proper resources in order to complete the project within deadline. III) I was responsible for designing the circuit with microcontroller setup.	Career Episode 1: CE 1.2.3, CE 1.3.1, CE 1.3.4 and CE 1.3.2 Career Episode 2: CE 2.2.3, CE 2.3.1 and CE 2.3.2 Career Episode 3: CE 3.2.3, CE 3.3.1 and CE 3.3.2
PE 2 ENGINEERING APPLICATION ABILITY		
PE2.1 Application of established engineering methods to complex engineering problem solving.	I) In order to mitigate all the faced problems at the time of implementation of the project I learnt about various mechanisms that mainly used in the system of the driver less car by adding some new features	Career Episode 1: CE 1.2.4, CE 1.3.1 and CE 1.4.2

	that mainly include obstacle detection system II) Moreover, I used the components of automatic vehicles in order to design the entire vehicle with braking systems. III) The required skills and competencies determined from my side, I served the allocation of the resources in the project for later design of the robot.	Career Episode 2: CE 2.3.3, CE 2.3.4 and CE 2.4.1, CE 2.4.2 Career Episode 3: CE 3.3.1, CE 3.3.2 and CE 3.4.2
PE2.2 Fluent application of engineering techniques, tools and resources.	I) It allowed me in making the Machine with all materials with high accuracy regarding automatic brake system. II) I used relay in our project so that we can switch between the two automatic applications of the car, that is, to cut off the power supply to the gear	Career Episode 1: CE 1.3.3, CE 1.3.2 and CE 1.3.1 Career Episode 2: CE 2.3.1, CE 2.3.2 and CE 2.3.3

	motors if any object came in front of the car and to provide the supply to the motor if no object is detected. III) I provided analytical solution with the problems, process control validation during cutting, simulation about the designing of the cutting machine.	Career Episode 3: CE 3.3.1, CE 3.3.2 and CE 3.3.3
PE2.3 Application of systematic engineering synthesis and design processes.	I) I placed each components in correct sequence II) Firmly focus on identifying the entire problems of designing Power Cutting machine that undergoing the testing phases	Career Episode 1: CE 1.2.3, CE 1.3.1 and CE 1.3.2 Career Episode 2: CE 2.3.3 and CE 2.3.4; Career Episode 3: CE 3.2.2
PE2.4 Application of systematic approaches to the conduct and management of	I) I designed the Automatic vehicles with brake systems II) I have completed the	Career Episode 1: CE 1.3.1 and CE 1.3.2 Career Episode 3: CE 2.2.3, CE

engineering projects	connection between the line follower circuit and automation III) I completed the evaluation of the machine through testing by suitable process.	2.3.1, CE 2.3.2 and CE 2.3.3 Career Episode 3: CE 3.3.1 and CE 3.3.2
PE 3 PROFESSIONAL AND PERSONAL ATTRIBUTES		
PE3.1 Ethical conduct and professional Accountability.	I) I performed in-depth analysis of automatic vehicle and brakes. I built the Machine with high quality value in fewer costs. II) I conducted in-depth search on line follower robot. III) I provided maximum accuracy based on automatic alert systems.	Career Episode 1: CE 1.2.3, CE 1.3.3 and CE 1.4.1 Career Episode 2: CE 2.2.3, CE 2.3.5 and CE 2.4.2 Career Episode 3: CE 3.3.3, CE 3.4
PE3.2 Effective oral and written communication in professional and lay domains.	I) I consulted with my project supervisor about the mechanism and designing	Career Episode 1: CE 1.2.3, CE 1.3.3 and CE 1.4.1

	process of automatic vehicle brakes. II) Proficiently, I implemented different suggestions within the project. III) I delegated specific task based on skills and knowledge.	Career Episode 2: CE 2.2.3, CE 2.3.5 and CE 2.4.2 Career Episode 3: CE 3.3.3, CE 3.4
PE3.3 Creative, innovative and pro-active demeanor.	I) I designated of working principle of automatic brakes. II) I applied robotics concepts and ideas to support the same part of the solution. III) I selected the approach of including relevant details of electrical engineering knowledge to design the circuits.	Career Episode 1: CE 1.3, CE 1.4 and CE 1.4.2 Career Episode 2: CE 2.3, CE 2.4, CE 2.2.5 and CE 2.4.2 Career Episode 3: CE 3.2, CE 3.3
PE3.4 Professional use and management of information.	I) To complete the designing of the project, I chosen particular	Career Episode 1: CE 1.2.3, CE 1.2.5, CE 1.4.2

	project samples and documents for further knowledge II) I have written the entire project report documentation. III) I supported the team members in integration and designing	Career Episode 2: CE 2.2.3, CE 2.2.5, CE 2.4.2 Career Episode 3: CE 3.2.3, CE 3.2.5, CE 3.4.2
PE3.5 Orderly management of self and professional conduct.	I) It allowed me in making the Machine with all materials with high accuracy regarding automatic brake system. II) I used the components of automatic vehicles in order to design the entire vehicle with braking systems. III) Through the entire project, I was involved with the integral part of the project. I was firmly involved with the designing process of PIC 16f877A	Career Episode 1: CE 1.4.2, CE 1.3.1 and CE 1.3.2 Career Episode 2: CE 2.4.2, CE 2.3.2, CE 2.3.3 and CE 2.3.4 Career Episode 3: CE 3.4.2, CE 3.3.1 and CE 3.3.2

	microcontroller circuit that was used to ultrasonic sound sensing mechanism.	
PE3.6 Effective team membership and team leadership.	I) Apart from that, I developed a good understanding for working and constructing the project. II) I demonstrated the use of sensor to detect the obstacles to automatic detection of further pit stops. III) During the implementation of the project, I identified that the PIC 16f877A microcontroller and corresponding echo will determine the nearby obstacles.	Career Episode 1: CE 1.4.1, CE 1.4.2, Career Episode 2: CE 2.4.1 and CE 2.4.2 Career Episode 3: CE 3.4.1 and CE 3.4.2