A

Project Report

on

LIFESAVER AT RAINY SEASON

Submitted in partial fulfillment for the requirements for the award of the degree of

BACHELOR OF ENGINEERING

in

INFORMATION TECHNOLOGY

By

G. SATYA SWAROOP	**(245119737014)**
M. SAI PRIYANKA	**(245119737016)**
T. RITHIKA	**(245119737019)**

Under the guidance of

Dr. Dumpala Shanthi

Associate Professor

Department of IT

MATURI VENKATA SUBBA RAO ENGINEERING COLLEGE

(An Autonomous Institution)

Department of Information Technology,
(Affiliated to Osmania University, Hyderabad)

Nadergul, Hyderabad, TELANGANA – 501510

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MATURI VENKATA SUBBA RAO(MVSR) ENGINEERING COLLEGE

(An Autonomous Institution)

(Affiliated to Osmania University, Hyderabad, Recognized by AICTE) Nadergul, Saroornagar Mandal, Hyderabad-501510

DEPARTMENT OF INFORMATION TECHNOLOGY

CERTIFICATE

*This is to certify that the project work entitled "**Life Saver at Rainy Seasons**" is a bonafide work carried out by **Mr. G Satya Swaroop (2451-19-737-014), Ms. M Sai Priyanka (2451-19-737-016), Ms. T Rithika(2451-19-737-019)** in fulfillment of the requirements for the award of degree of **Bachelor of Engineering** in **Information Technology** from **Maturi Venkata Subba Rao Engineering College,** affiliated to OSMANIA UNIVERSITY, Hyderabad, during the Academic Year 2021-22. under our guidance and supervision.*

The results embodied in this report have not been submitted to any other university or institute for the award of any degree or diploma.

Signature of Project Coordinator Signature of Guide

Signature of Head, ITD Signature of External Examiner

DECLARATION

This is to certify that the work reported in the present project entitled “Lifesaver At Rainy Season” is a record of bona fide work done by us in the Department of Information Technology, Maturi Venkata Subba Rao Engineering College, Osmania University. The reports are based on the project work done entirely by us and not copied from any other source.

The results embodied in this project report have not been submitted to any other University or Institute for the award of any degree or diploma to the best of our knowledge and belief.

Signature of the Student	Student Name:	Signature of the Student
(2451-19-737-014)	G Satya Swaroop	
(2451-19-737-016)	M Sai Priyanka	
(2451-19-737-019)	T Rithika	

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We would like to extend our gratitude to **Dr. D. Shanthi**, **Associate Professor, N.Hanumatha Rao, Assistant Professor, T Anjali Assistanr Professor** Department of Information Technology, Maturi Venkata Subba Rao Engineering College, for her valuable suggestions and timely help during the course of the project.

We are also thankful to **Dr K VenuGopal Rao,** Dean – Academics & Head, Department of Information Technology, Maturi Venkata Subba Rao Engineering College, Hyderabad for providing excellent infrastructure and a nice atmosphere for completing this project successfully as a part of our B.E. Degree (IT).

We convey our heartfelt thanks to the lab staff for allowing us to use the required equipment whenever needed.

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G. Satya Swaroop(2451-19-737-014)

M. Priyanka(2451-19-737-016)

T. Rithika (2451-19-737-019)

Maturi Venkata Subba Rao Engineering College

Department of Information Technology

COURSE NAME: Project Work II

COURSE CODE: PW861IT

VISION

To impart technical education to produce competent and socially responsible engineers in the field of Information Technology.

MISSION

To make teaching learning process effective and stimulating.

To provide adequate fundamental knowledge of sciences and Information Technology with positive attitude.

To create an environment that enhances skills and technologies required for industry.

To encourage creativity and innovation for solving real world problems.

To cultivate professional ethics in students and inculcate a sense of responsibility towards society.

PROGRAM EDUCATIONAL OBJECTIVES(PEOS)

The Program Educational Objectives of undergraduate program in Information Technology are to prepare graduates who will:

Apply knowledge of mathematics and Information Technology to analyze, design and implement solutions for real world problems in core or in multidisciplinary areas.

Communicate effectively, work in a team, practice professional ethics and apply knowledge of computing technologies for societal development.

Engage in Professional development or postgraduate education to be a life-long learner.

PROGRAM OUTCOMES(POs)

At the end of the program the students (Engineering Graduates) will be able to:

Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principle and apply 6 these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Lifelong learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

Hardware design: An ability to analyze, design, simulate and implement computer hardware / software and use basic analogue/digital circuits, VLSI design for various computing and communication system applications.

Software design: An ability to analyze a problem, design algorithm, identify and define the computing requirements appropriate to its solution and implement the same.

COURSE OBJECTIVES AND OUTCOMES

Course Objectives

To enhance practical & Professional skills.

To familiarize the tools and techniques of symmetric literature survey and documentation.

To expose students to industry practices and teamwork.

To encourage students to work with innovative and entrepreneurial ideas

Course Outcomes

On successful completion of this course student will be

Define a problem of the recent advancements with applications towards society.

Outline requirements and perform requirement analysis for solving the problem.

Design and develop a software and/or hardware, based solutions within the scope of project using contemporary technologies and tools.

Test and deploy the applications for use.

Develop the Project as a team and demonstrate the application, with effective written and oral communications

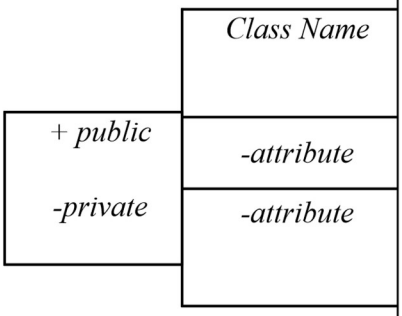
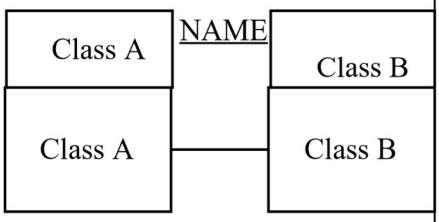
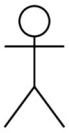
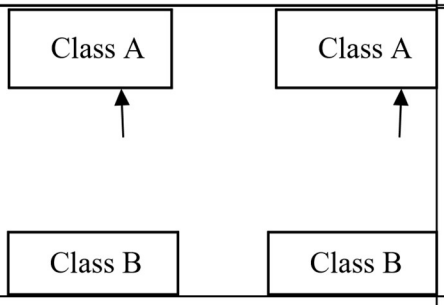
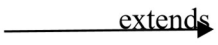
ABSTRACT

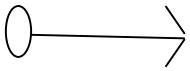
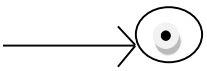
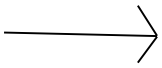
Nowadays, accidents due to broken, missing manhole covers and pits are high in Rainy seasons. Pits and Manholes are not monitored properly in developing countries, especially in rainy seasons. These accidents can lead to severe injuries and also death if there is heavy water flow. Hence, here we need to propose a system to overcome this problem. We need to include an array of sensors including a sonar concept where it can identify and also calculate the distance of the manhole or pits and the same will be alerted to the person who is in the driving seat, this problem generally raises with 2 wheelers

LIST OF FIGURES

LIST OF TABLES

LIST OF SYMBOLS

S.NO	NOTATION NAME	NOTATION	DESCRIPTION
1.	Class		Represents a collection of similar entities grouped together.
2.	Association		Association represents static relationships between classes. Role represents the way the two classes see each other.
3.	Actor		It aggregates several classes into a single class.
4.	Aggregation		Interaction between the system and external environment
6.	Relation (extends)		Extends relationship is used when one use case is similar to another use case but does a bit more.
7.	Communication		Communication between various use cases.

8.	State		State of the processes.
9.	Initial State		Initial state of the object
10.	Final state		Final state of the object
11.	Control flow		Represents various control flow between the states

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CHAPTER 1
INTRODUCTION

Road accidents are one of the most horrific unfortunate events we hear about on an almost daily basis. In developing countries like India where roads are filled with manholes and deep pits, it is very difficult for one to identify these manholes and pits on a rainy day which is a concerning issue leading to deadly accidents. Thus, this project uses sonar radiation and laser imaging to identify these pits and alert drivers about the nearby pits and manholes to prevent such accidents. Traffic congestion has been increasing in India due to economic growth, urbanization, and a rapid increase in vehicles. The number of reported accidents is exponentially increasing due to poor road conditions. The roads are deteriorating with more usage and lesser maintenance. Due to the poor road conditions, drivers find it difficult to ascertain the manholes, bumps, etc. which leads to major accidents. During the rainy season, potholes get filled with water and the driver is unable to distinguish their presence or depth which can lead to life-threatening calamities. Traveling by road without any warning signs is hazardous, especially at night. To avoid these accidents, a warning system is required which will detect and distinguish the potholes, manholes, bumps, etc. on the road surface before it is encountered so that the driver gets enough response time. For this, a system should be developed to detect the road's defects. The prime motivation behind making a pothole detection method is to aid drivers in various aspects and thus assist them in avoiding a possible accident. All these reasons urge the need to get information on such bad road conditions that can warn the driver. A system that warns the driver about potholes in its path, well in advance so that the driver gets a reasonable response time is being proposed here.

1.1 PROBLEM STATEMENT

Detect and identify the potholes by using the Sensors during rainy season. People during rainy seasons face a lot of problems in the visibility of the roads while driving during rainy seasons the pits, potholes are filled with water making the driver face problems while riding the vehicle So, the problem arises about the visibility of the road.

1.3 OBJECTIVES

The main objective of this project is to design a embedded system with ultrasonic sensors which could sense and detect the potholes in any condition that is dry potholes and water filled potholes and warn the rider. By this the driver can be cautious of the potholes while driving in such difficult conditions.

- Attach the sensor in the front part of the vehicle for easy detection and identification of the potholes and manholes in normal as well as rainy conditions.
- Using the Ultra Sonic Sensor for better output.
- Incorporate a program that records the potholes and uploads the geometric size and the GPS location of the potholes into the databases.

1.3.1 Problem Specification

In India cause of the heavy rainfalls the water gets accumulated in the potholes and pits, when the water gets accumulated then it is hard for the rider to identify whether there is a pothole on the road or not. The purpose of choosing this problem statement is to eliminate the problem faced by drivers during the rainy season and prevents occurring of accident.

1.4 Existing System

In the existing system, the identification of potholes and calculation of their height, depth, size, and distance between potholes and the driver is achieved by using an ultrasonic sensor, which will assist or alert drivers to take evasive action with the aid of giving earlier warnings. The sensor is arranged beneath the vehicle to sense the presence of potholes using sonic waves, where sonic waves penetrate through water and hit the bottom of the potholes and indicate, alert the presence of potholes.

Drawbacks:

In the existing system, the application mainly focuses on the array of sensors placed under the vehicle by which the output result time is delayed due to an inappropriate time for applying the brakes.

1.5 PROPOSED SYSTEM

The main application of the projects is to detect the potholes and pits during rainy seasons, by this the rider can know that there is a pothole on the road which he couldn't see during the rainy seasons. This gives an advantage to the rider and he could apply brakes at the right time to avoid any kind of accidents or unfortunate events. Not only potholes and pits, we can also detect any kind of obstruction on the path of the road.

We would like to propose a system in which the sensors are placed at the front part of the vehicle which would ease the identification of potholes and helps us to detect the potholes quickly and alerts the driver by providing a buzzer alert. In the proposed system we have two Ultra Sonic sensors which uses sound rays for detecting dry potholes and pits. When the ignition is turned on, the microcontroller takes the power from the battery of the vehicle and powers up all the units connected to the board. The sensors work constantly sensing, ranging and detecting for the potholes and pits on the roads.

1.6 SCOPE OF THE PROJECT

- One can safely ride the vehicle during rainy seasons and avoid the potholes filled with water.
- We can ensure that the driver gets the prior notice alarm to apply brakes at the appropriate time.

CHAPTER 2
LITERATURE SURVEY

1. Pothole detection system design with proximity sensor to provide motorcycles with a warning system and increase road safety driving.

AUTHORS: Hadistian Muhammad Hanif, Zener Sukra Lie, Winda Astuti and Sofyan Tan

Technology in transportation becomes important nowadays and must be developed over time. In the era of development, there are so many road extensions to balance the significant additions of motorized vehicles. The increasing number of vehicles caused problems such as damaged roads and lack of maintenance to the road itself. Lack of awareness to repair the damaged roads, especially potholes, make it more dangerous for riders to drive safely. These issues are more concerning right now because of the increasing number of accidents and mortality. To prevent accidents to happen, the pothole detection sensor can be used on the car system.

The development of a pothole detection sensor in this research is adopted from the proximity sensor system where in that system they use a camera and digital imaging process. The advantages of our system that we research and develop are more user-friendly from the feasibility and the financial aspect. A low-cost sensor with the same quality as the existing system is developed in this work. Despite the use of low-cost sensors, maintenance is also at a lower cost and is easier to do. As the result of this research and study, an error was obtained between the distance that detected the pothole should be in less than 4% distance range from the sensor.

2. Pothole Detection Using Arduino and Ultrasonic Sensors

AUTHORS: Arulananth, T.S., Baskar, M., Thrishma, K., Srilekha, N., supraja, S., Ravalika, C. (2022).

This work projected an automated Pothole identification and detection system which helps the motive force in fending off route holes on the roads, with the aid of giving earlier warnings. Warnings given by like buzzer, if the driving vehicle is coming near a pothole or driving vehicle are getting the warning about superior to what street has how

many potholes. Hazardous road surroundings due to the result of natural activities, which include tropical rains and flooding, make driving hazardous.

Risky situations can also stand up from the negative bodily condition of a road and its environment. It may additionally cause a road accident. While driving at night times simply the headlights may not be enough help for the driver.

Unpredicted sprints on street may additionally purpose greater injuries. Also due to horrific road conditions, the fuel consumption of the vehicle increases widely, thus inflicting waste of fuel. Increasing traffic on the road is another undesirable result of potholes. While proposed this system 'Pothole and hump Detection and vehicle speed control System tells the driver about the pothole or hump and alerts the driver to control the speed of the vehicle. This system uses an ultrasonic sensor to sense the potholes and humps and which quantity the height and deepness of the potholes based on the acknowledged signals. The projected system can classify the road surfaces with potholes and no potholes. Hence, this work can make accidents or mishaps reduction and traffic control.

3. Role of Ultrasonic Sensor in Automatic Potholes and Hump Detection System AUTHORS: Stepheena Joseph, K. Edison Prabhu

In this paper, we have proposed a system that will detect the potholes on the road and save the information in the server and reduce the vehicle speed if needed. Due to the rains and oil spills, potholes are generated which will cause accidents. The potholes are detected, and their height, depth, and size are measured using an ultrasonic sensor. The GPS is used to find the location of the pothole. All the information is saved in the database. This timely information can help to recover the road as fast as possible. By controlling the rate of fuel injection, we can control the rotation of the drive shaft using an IR Non-contact tachometer. This helps to reduce the vehicle speed when a pothole or hump is detected. Hence the system will help to avoid road accidents.

4. IOT-based Manhole Detection and Monitoring System

AUTHORS: S. Himanshu, J. Bharani Kumar, K. Shashank, Dr. T. Rama Swamy

Nowadays, underground observation is tough. This idea suggests a completely new approach to managing the subsurface system. This system offers a clever solution. Clog, foul gas, and temperature can all be detected with this device.

This may be the case. Smart cities have been introduced, and they are simple to operate. anybody. It is a low-cost, time-saving, and human-friendly option. system of intervention the system that has been presented identifies the sewer water level and thus detects the obstruction quickly present on the inside It also identifies the foul gas produced because of sewage contaminated water The temperature inside the manhole was also rather high. Temperature sensors can also be used to detect it.

S.no	Name	Authors	Description	Limitations
1	Image Processing, Proximity sensors	Hadistian Muhammad Hanif, Zener Sukra Lie, Winda Astuti, Sofyan Tan	Pothole detection system design with proximity sensor to provide motorcycles with a warning system and increase road safety driving.	An error was obtained while measuring the distance.
2	Arduino and ultrasonic sensors	T S Arunlananth, M. Baskar, K.Thrishma	Pothole Detection Using Arduino and Ultrasonic Sensors.	The sensor is placed right under the vehicle so there is a small delay faced by the driver.
3	Ultrasonic sensor, ARM7, GPS, GSM, IR speed sensor	Stepheena Joseph, K.Edison Prabhu	Role of the ultrasonic sensor in automatic pothole and hump detection system.	The hump only detects if the hump is above a certain height
4	IOT	Himanshu Shriwas	IOT-based Manhole Detection and Monitoring System.	Only detection of manholes.
5	I0T	AarthiM, Bhuvaneshwaran A	To detect the volume and depth and delivers information via alerts.	Highly non-scalable

CHAPTER 3

SYSTEM REQUIREMENT SPECIFICATION

3.1 Software Requirements

OS: Windows 10 or above/ MacOS/ Linux

Application : Aurdino IDE

Processor: Minimum 1.7 GHz; recommended 2GHz (or more)

3.2 Hardware Requirements Ultra Sonic Sensors

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

- **Switch**

A switch is utilized to determine whether the rider is wearing the helmet or not. This switch has two modes, ON and OFF. It activates when the rider puts on the helmet and weight is detected on the switch and remains OFF otherwise.

- **Arduino UNO**

Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digitals input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button.

CHAPTER 4
SYSTEM DESIGN

4.1SYSTEM ARCHITECTURE

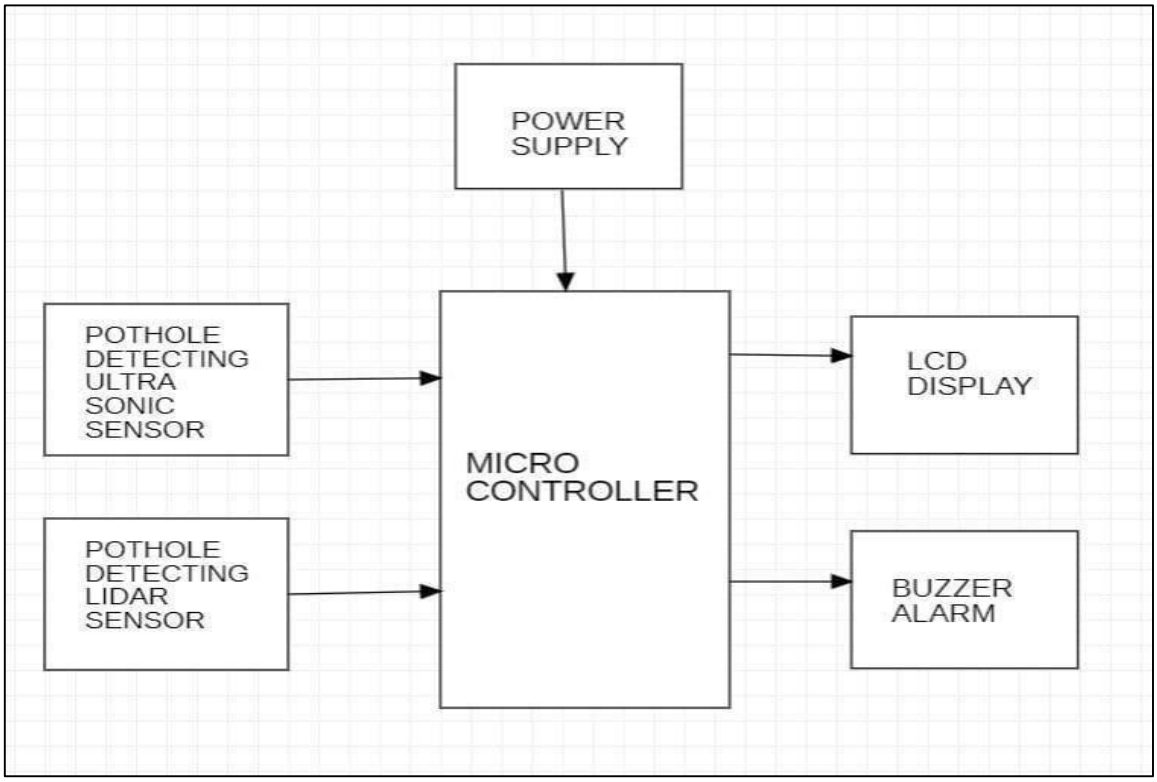


Fig.4.1. System architecture.

Architecture of this project consists of Micro Controller, Sensors, Buzzer and Alarm. All the components are connected to the Micro Controller. The Ultra Sonic Sensor are used to project the rays and obtain the reflected rays back, by which the micro controller takes in the input and provides appropriate output to the Alarm and Buzzer.

4.2 UML DIAGRAMS

UML stands for Unified Modeling Language. UML is a standardized general-purpose modeling language in the field of object-oriented software engineering. The standard is managed, and was created by, the Object Management Group.

The goal is for UML to become a common language for creating models of object-oriented computer software. In its current form UML is comprised of two major components: A Meta-model and a notation. In the future, some form of method or process may also be added to; or associated with, UML.

The Unified Modeling Language is a standard language for specifying, Visualization, Constructing and documenting the artifacts of software system, as well as for business modeling and other non- software systems.

The UML represents a collection of best engineering practices that have proven successful in the modeling of large and complex systems.

The UML is a very important part of developing objects-oriented software and the software development process. The UML uses mostly graphical notations to express the design of software projects.

4.2.1 USE CASE DIAGRAM:

Use Case: Use case describes the behavior of a system. It is used to structure things in a model. It contains multiple scenarios, each of which describes a sequence of actions that is clear enough for outsiders to understand.

Actor: An actor represents a coherent set of roles that users of a system play when interacting with the use cases of the system. An actor participates in use cases to accomplish an overall purpose. An actor can represent the role of a human, a device, or any other systems.

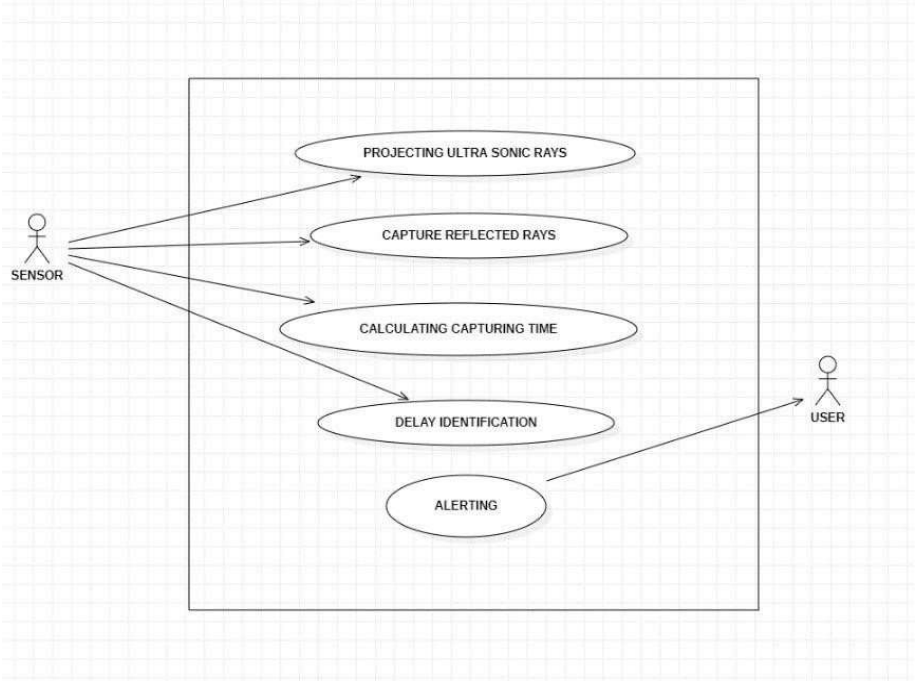


Fig.4.2.Use case diagram.

The above use case diagram, here there are two actors used: one is sensor and the other one is User. Sensor projects the ultra-sonic rays, captures them, calculates the time constraints and by the result of the calculation the delay is identified. Then the User is alerted based upon the presence of pothole.

4.2.2 ACTIVITY DIAGRAM:

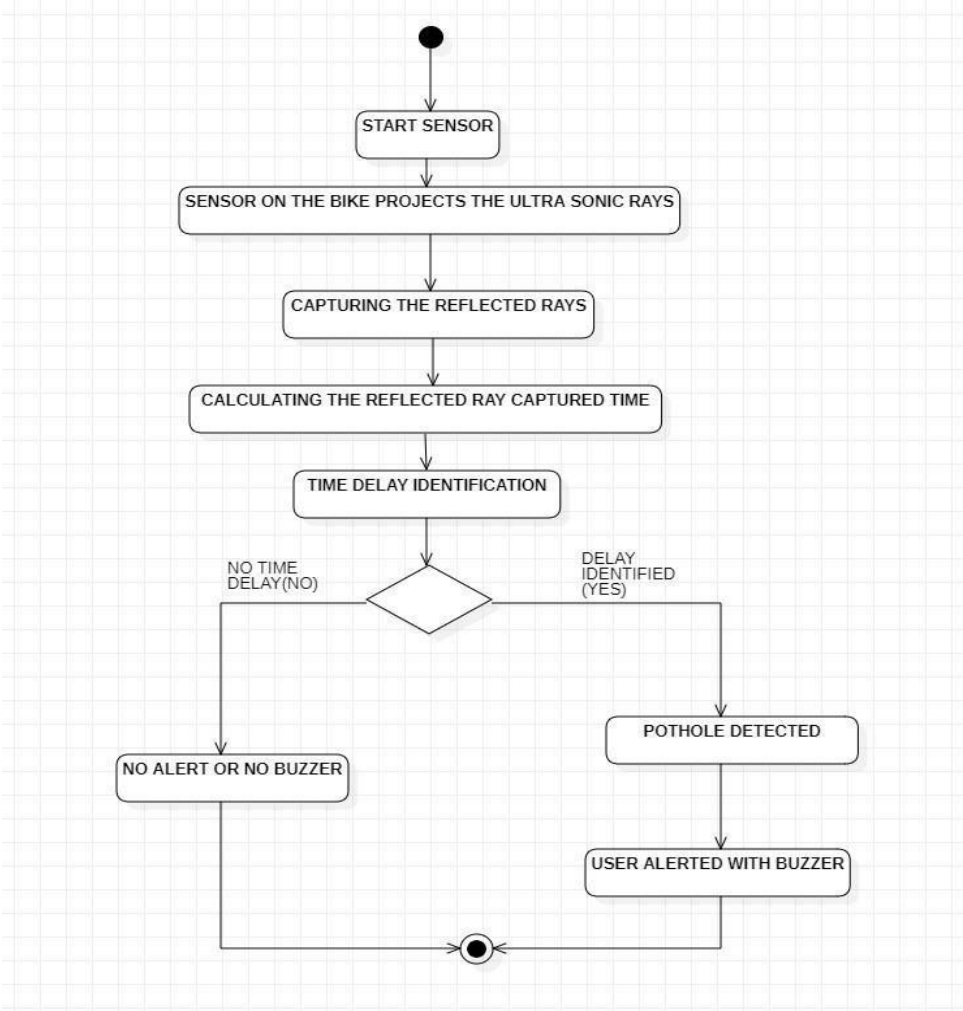


Fig.4.3.Activity diagram.

Firstly, after starting the micro controller, the sensors get started. While riding the bike the sensors constantly project the rays upon the road for detecting the potholes and pits. Upon the capturing the rays back, micro controller does the calculation for finding the time delay. IF the time delay is found then the system identifies it as a pothole and alerts the rider by using the buzzer and ELSE IF the time delay isn't there then it identifies that there is not pot hole and no alert is given to the rider.

4.2.3 CLASS DIAGRAM:

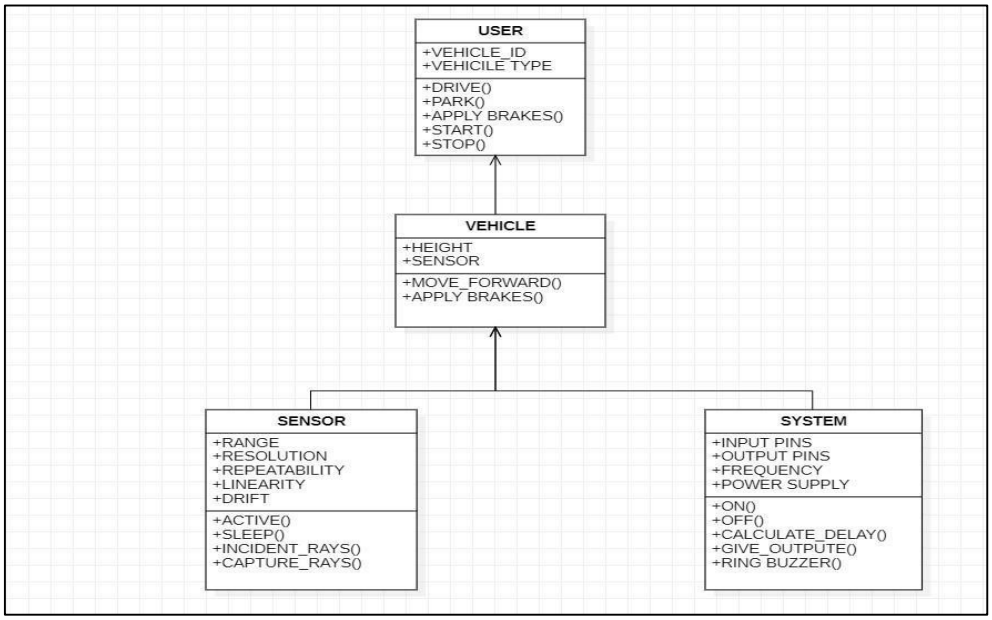
Class: A Class is a description of a set of objects that shares the same attributes, and has similar operations, relationships, behaviours, and semantics.

Generalization: Generalization is a relationship between a general element and a more specific kind of that element. It means that the more specific element can be used whenever the general element appears. This relation is also known as specialization or inheritance link.

Realization: Realization is the relationship between a specialization and its implementation. It is an indication of the inheritance of behaviour without the inheritance of structure.

Association: Association is represented by drawing a line between classes. Associations represent structural relationships between classes and can be named to facilitate model understanding. If two classes are associated, you can navigate from an object of one class to an object of the class.

Aggregation: Aggregation is a special kind of association in which one class represents the larger class that consists of a smaller class. It has the meaning of a "has-a" relationship.



CHAPTER 5
IMPLEMENTATION

5.1 ENVIRONMENTAL SETUP

Installing Arduino IDE 2.1.0

- Go to the official Arduino website at www.arduino.cc and download the latest version of the Arduino IDE for Windows.
- Once the download is complete, open the installer file and click "Run" if prompted by your computer's security settings.
- Follow the prompts in the installer window to complete the installation process. You can choose where to install the IDE on your computer and create desktop shortcuts for easy access.
- After installation, connect your Arduino board to your computer using a USB cable.
- Open the Arduino IDE and select the correct board type and serial port from the "Tools" menu.
- You can now write, compile, and upload code to your Arduino board using the IDE.

Installing CH340 Windows 10 driver

Driver details

CH340, CH340G & CH341 (USB-SERIAL chip) V3.5

Driver Version = 2019-01-30, 3.5.2019.1

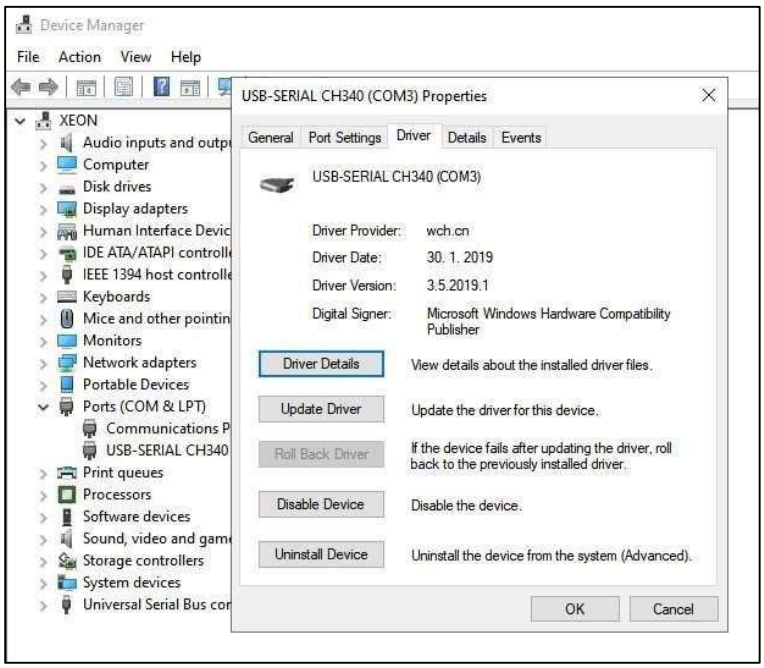


Figure 8 Properties

CH340 Windows 10 driver installation

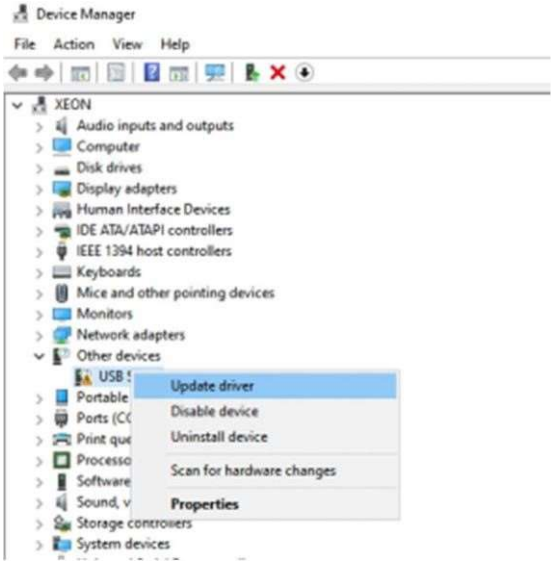


Figure 9 Open Device Manager-
right mouse clicks on USB Serial, then left click Update Driver.

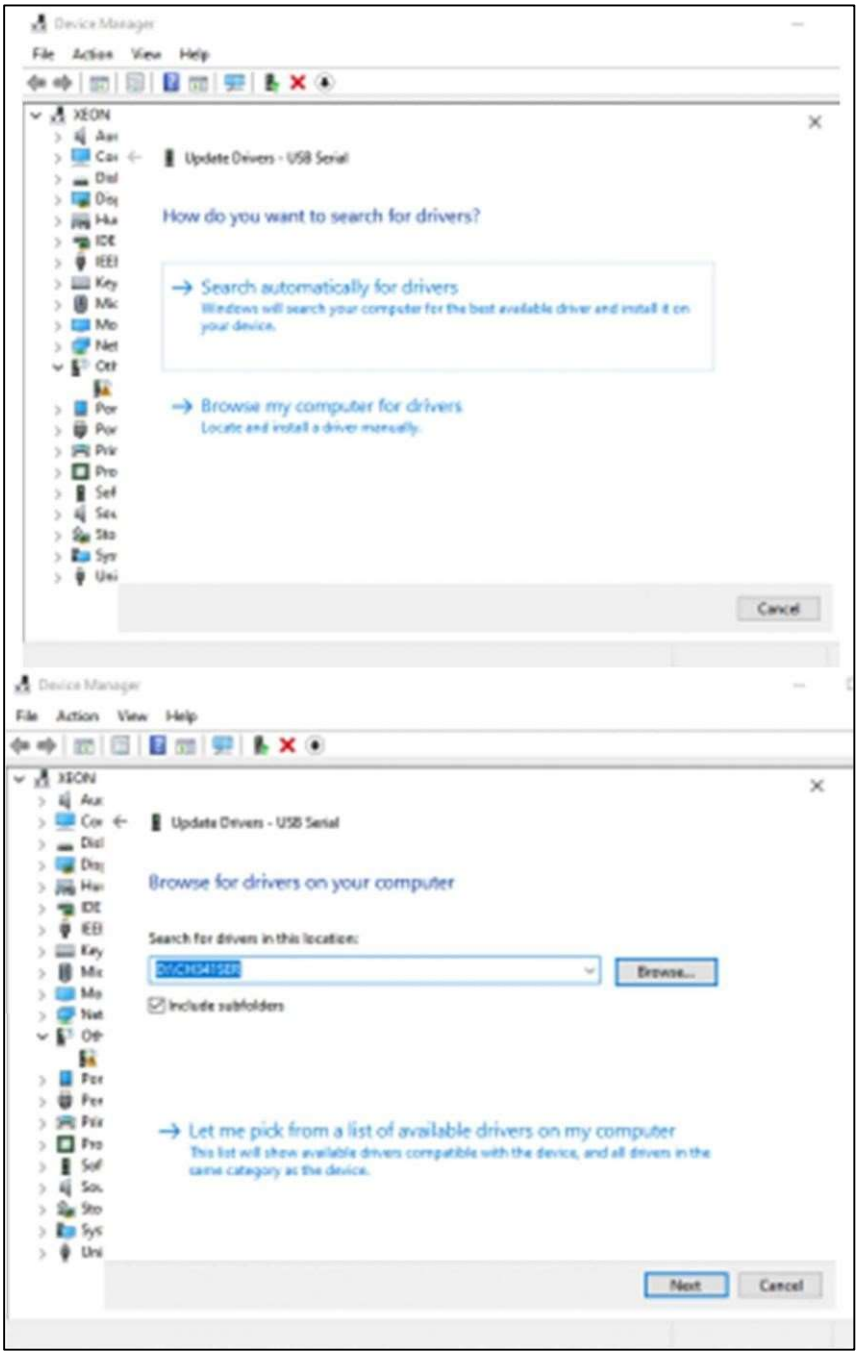


Figure 10 open the directory with downloaded & extracted CH341SER.zip driver.

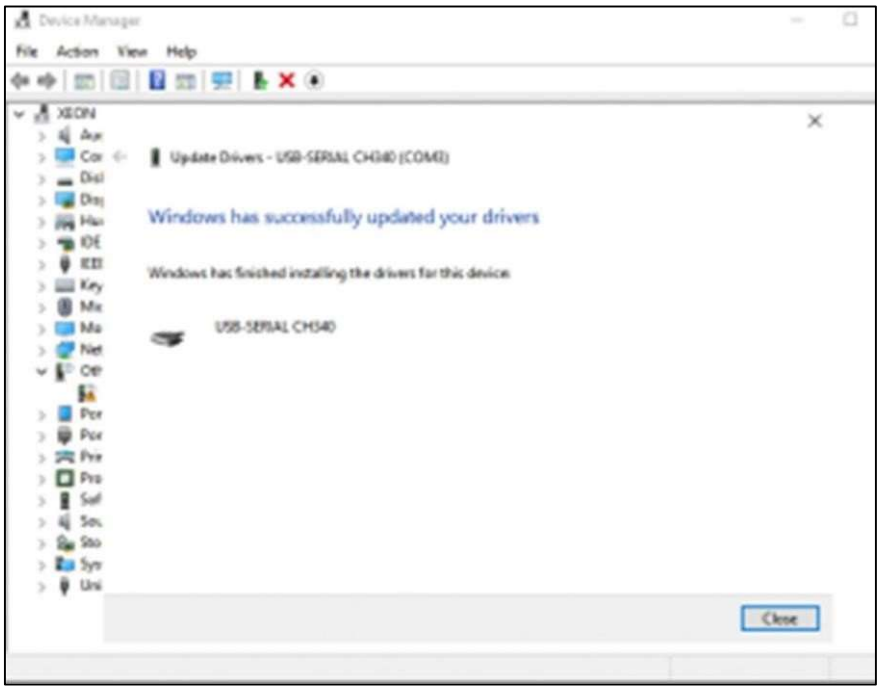


Figure 11 Finished, Close.

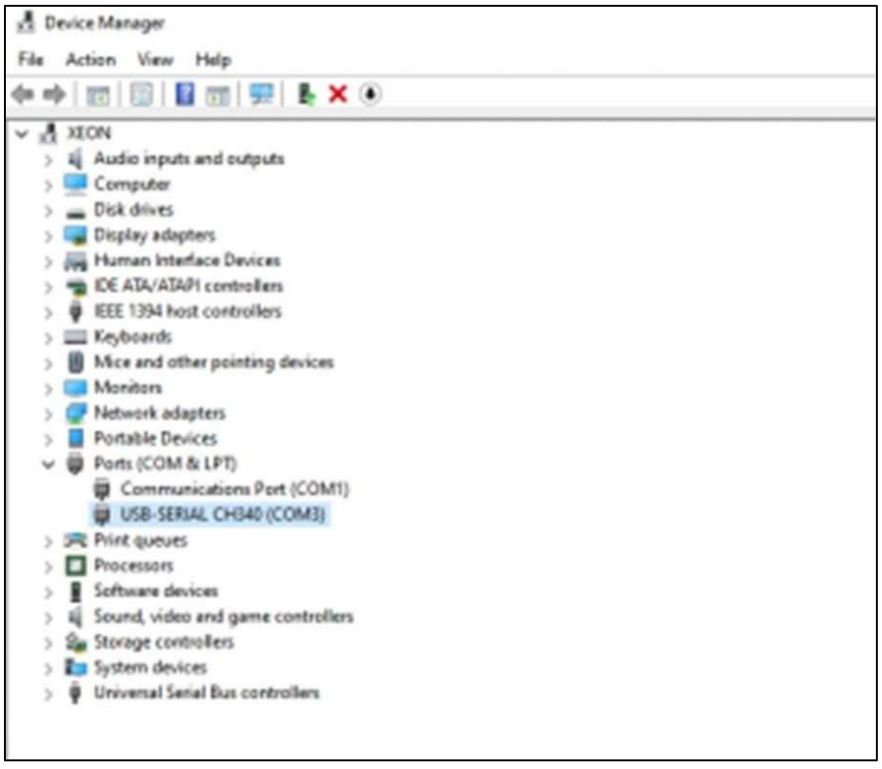


Figure 12 CH340 driver installed and working.

To install Arduino Windows 10 drivers there are several steps that are to be followed:

- Connect your Arduino board to your Windows 10 computer using a USB cable. Windows 10 should automatically recognize the Arduino board and install the necessary drivers. However, if Windows does not automatically install the drivers, you can follow the next steps.
- Open the Arduino IDE and select the correct board type and port from the "Tools" menu.
- Click on "Device Manager" in the Windows search bar.
- In the "Device Manager" window, look for "Other devices" or "Ports (COM & LPT)" and find your Arduino board.
- Right-click on your Arduino board and select "Update driver".
- Select "Browse my computer for driver software".
- Browse to the folder where you installed the Arduino IDE and select the "drivers" folder.
- Click "Next" and Windows should install the necessary drivers.

• Once the installation is complete, the Arduino board should be recognized by Windows 10 and the Arduino IDE.

5.2 MODULE DESCRIPTION

Arduino uno

Arduino UNO is based on an ATmega328P microcontroller. It is easy to use compared to other boards, such as the Arduino Mega board, etc. The board consists of digital and analog Input/Output pins (I/O), shields, and other circuits.

The Arduino UNO includes 6 analog pin inputs, 14 digital pins, a USB connector, a power jack, and an ICSP (In-Circuit Serial Programming) header. It is programmed based on IDE, which stands for Integrated Development Environment. It can run on both online and offline platforms. The IDE is common to all available boards of Arduino.

- **ATmega328 Microcontroller**- It is a single chip Microcontroller of the Atmel family. The processor code inside it is 8-bit. It combines Memory (SRAM, EEPROM, and Flash), Analog to Digital Converter, SPI serial ports, I/O lines, registers, timer, external and internal interrupts, and oscillator.
- **ICSP pin** - The In-Circuit Serial Programming pin allows the user to program using the firmware of the Arduino board.
- **Power LED Indicator**- The ON status of LED shows the power is activated. When the power is OFF, the LED will not light up.
- **Digital I/O pins**- The digital pins have the value HIGH or LOW. The pins numbered from D0 to D13 are digital pins.
- **TX and RX LED's**- The successful flow of data is represented by the lighting of these LED's.
- **AREF-** The Analog Reference (AREF) pin is used to feed a reference voltage to the Arduino UNO board from the external power supply.

Reset button- It is used to add a Reset button to the connection.

- **USB**- It allows the board to connect to the computer. It is essential for the programming of the Arduino UNO board.

- **Crystal Oscillator**- The Crystal oscillator has a frequency of 16MHz, which makes the Arduino UNO a powerful board.
- **Voltage Regulator**- The voltage regulator converts the input voltage to 5V.
- **GND**- Ground pins. The ground pin acts as a pin with zero voltage.
- **Vin**- It is the input voltage.

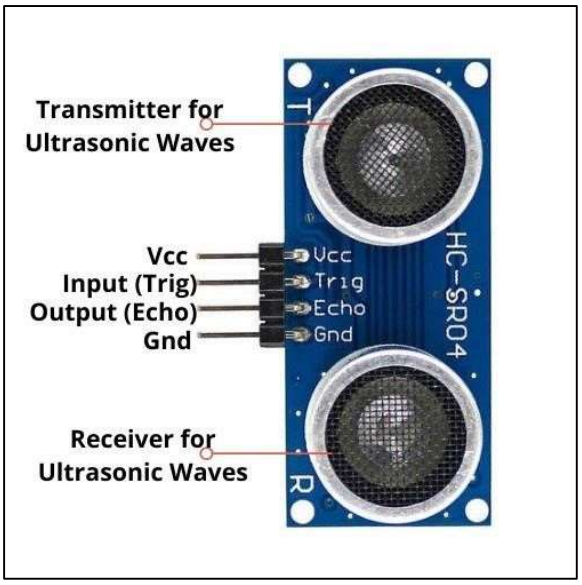
  Analog Pins- The pins numbered from A0 to A5 are analog pins. The function of Analog pins is to read the analog sensor used in the connection. It can also act as GPIO (General Purpose Input Output) pins

Switch

A switch is an electric mechanism for ON/OFF the device, it is used to regulate the flow of electricity by interrupting or diverting the current from one conductor to another. This switch is placed inside on top of the helmet, and it is pressed when the rider wears the helmet, and it is released when helmet takes off. Based on the switch condition the bike ignition key will be ON/OFF.

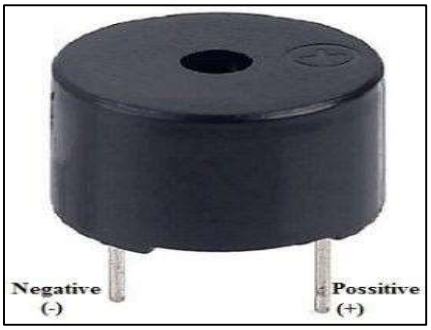
Sensor

An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity.

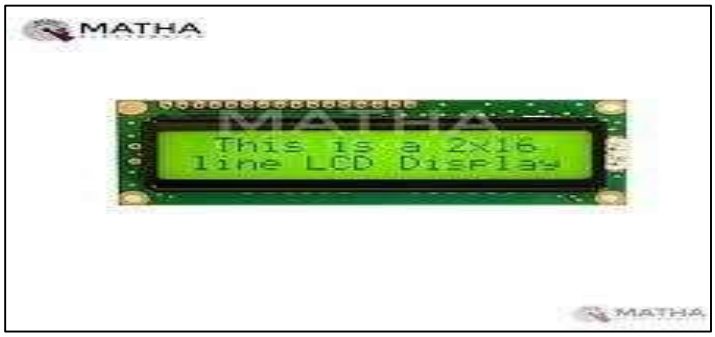


Buzzer

An audio signaling device like a beeper or buzzer may be electromechanical or piezoelectric or mechanical type. The main function of this is to convert the signal from audio to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. Based on the various designs, it can generate different sounds like alarm, music, bell & siren



LCD Display



LCD (Liquid Crystal Display) is a type of flat panel display which uses liquid crystals in its primary form of operation. LEDs have a large and varying set of use cases for consumers and businesses, as they can be commonly found in smartphones, televisions, computer monitors and instrument panels.

5.3 MODULE SPLIT UP

□ VEHICLE

In the primary module to which the sensor is attached, the user drives the vehicle and gets feedback upon detection of potholes.

Receiver Module, Battery, Ignition Key, Switch, Motor Unit.

□ SENSOR AND SYSTEM

The Sensor projects the rays on the road and calculates the time delay for the pothole identification.

Ultra Sonic sensors, Arduino UNO, Buzzer, Battery, Switch, LCD Display.

□ USER

Based upon the result of the pothole identification, the user receives feedback in form of an Alarm on the presence of a pothole on the road.

CHAPTER 6

RESULTS (SCREENSHOTS)

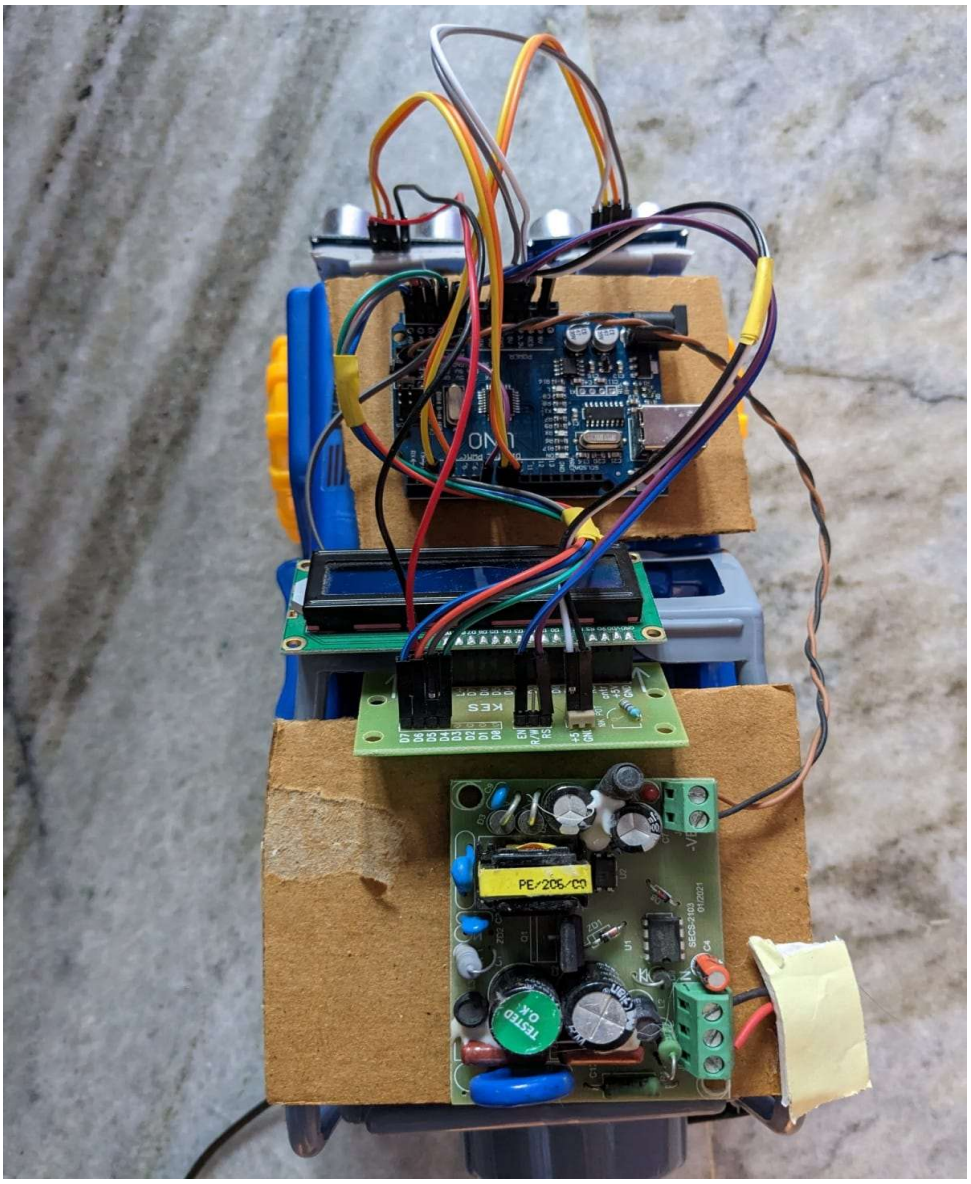


Figure 6.1 Device Setup

Shows the setup of hardware model of the Life Saver at Rainy Season. It shows the connection between all the components.

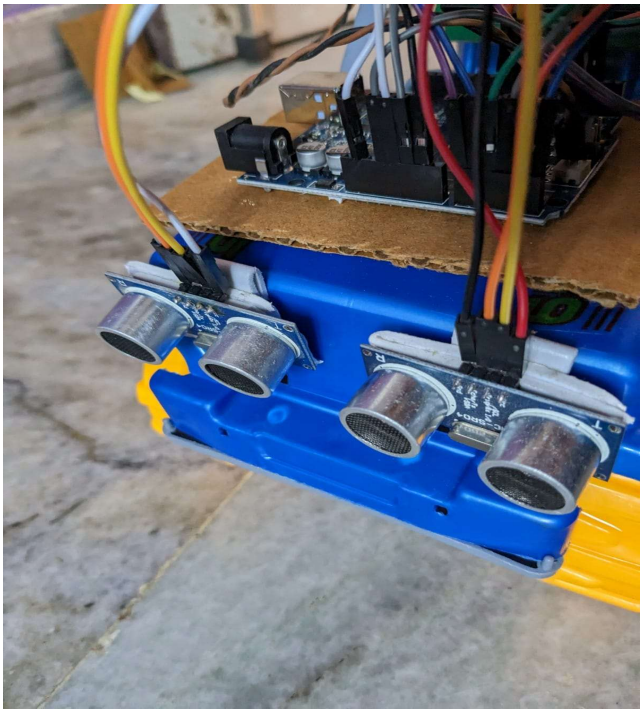


Figure 6.2 Shows the setup of array of ultra sonic sensors.

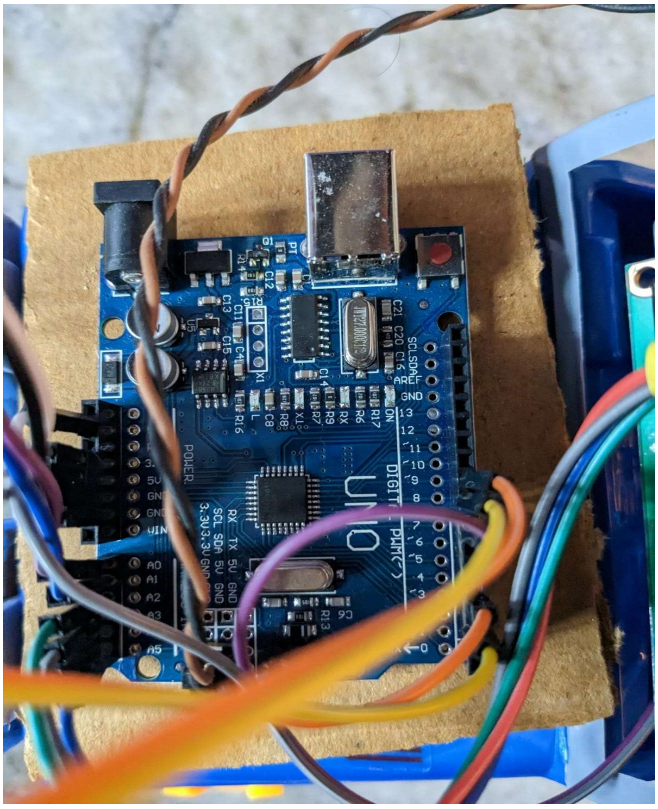


Figure 6.3 Arduino UNO

Array of Ultra Sonic sensors at a declination are connected to the Arduino

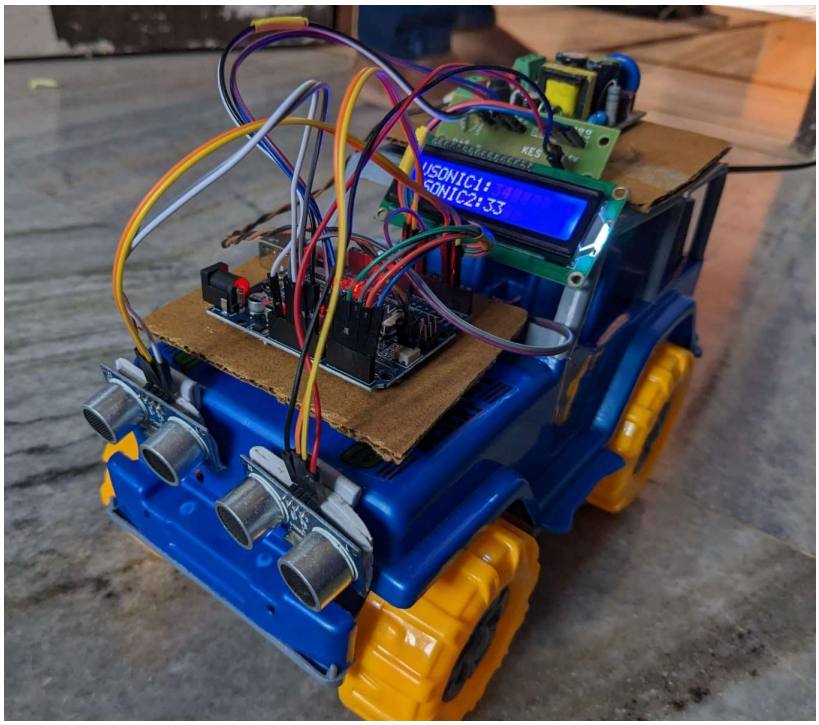
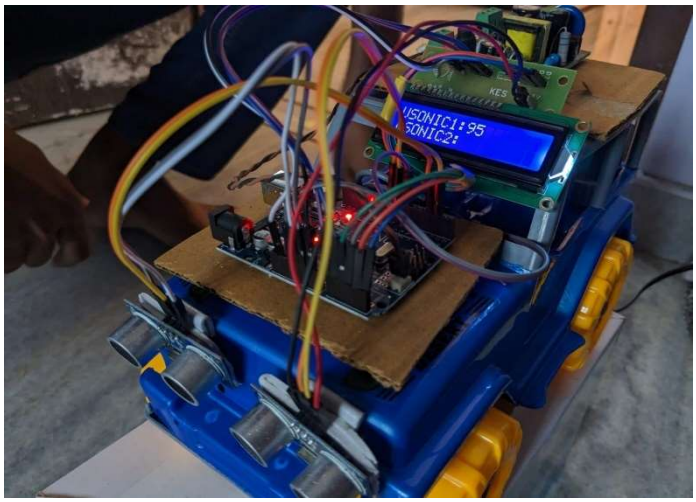


Figure 6.4 Showing the values in Ultrasonic 2

Figure 6.5 Showing the values in ultrasonic 1



When the pothole distance is greater than 50cm that is threshold value then buzzer alerts the driver,Below 50cm then buzzer doesn't ring.

TESTING

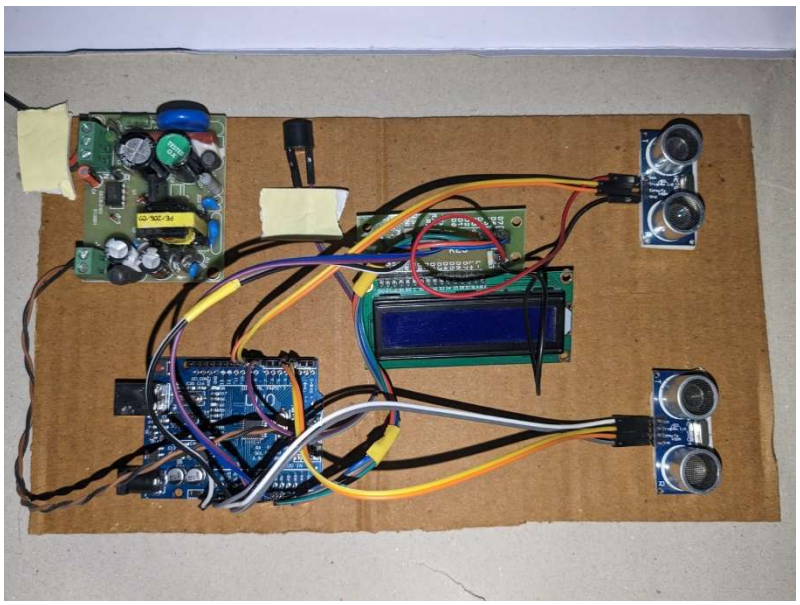


Figure 6.6 Inaccurate detection of potholes

Ultra Sonic sensors detect the potholes which are less than 50cm close.

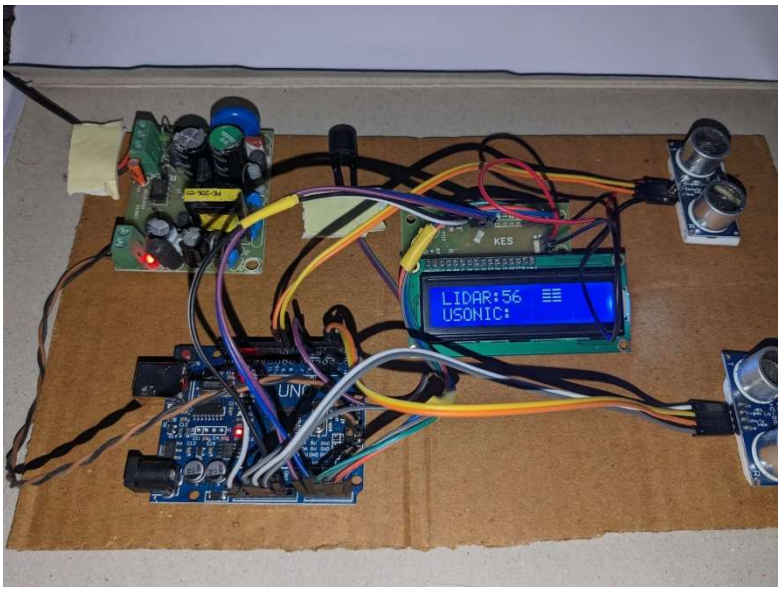


Figure 6.7 Display Error

Naming Convention on the display Is wrong, display shows LiDAR and Ultra Sonic as naming.

CHAPTER 7
CONCLUSION

The thesis presented two models for the detection of dry and water-filled potholes. The two model works well for detecting pothole and giving warning. The circuit for the functioning of the ultrasonic sensor is fabricated and by using a microcontroller the sensor calculates the distance and depth of the pothole. It gives a warning to the driver in the presence of a pothole. The experimental results show that the algorithm works to detect and warn the driver regarding potholes. By using an array of detectors, we can get more information about the pothole i.e., we will get the profile of the pothole along with the range and depth. So, by using an array we can acquire the 3D image of the pothole. The array means multiple detectors receiving pulses and by adding up these outputs, we can obtain the profile of the pothole. The reflected signals from the different regions can be added up thus obtaining the exact information about the pothole. So, to detect the pothole and to image it, an array of detectors needs to be used. It has been shown that the proposed feature extraction algorithm works for the laser module for the detection of water-filled potholes. The experimental results show that the algorithm is highly reliable and accurate in detecting the potholes, obtaining the maximum depth, and generating the depth profile of the pothole.

CHAPTER 8
REFERENCES

- Stephena Joseph, "ROLE OF ULTRASONIC SENSOR IN AUTOMATIC POTHOLE AND HUMP DETECTION SYSTEM '‘, International Journal of Scientific & Engineering Research Volume 8, Issue 7, July 2017.
- P. More, S. Surendran, S. Mahajan, and S. K. Dubey, “Potholes and pitfalls spotter,” IMPACT, Int. J. Res. Eng. Technol., vol. 2, no. 4, pp. 69–74, Apr. 2014.
- T S Arulanath, "Pothole Detection Using Arduino and Ultrasonic Sensor" in, LNNS, volume 292.
- Hadistian Muhammad Hanif, Zener Sukra Lie, Winda Astuti, Sofyan Tan, “Pothole detection system design with proximity sensor”, Published under license by IOP, 13– 14 November 2019, Solo, Indonesia.

  Himanshu Shriwas,” IOT-based Manhole Detection and Monitoring System”, International Journal for Research in Applied Science & Engineering Technology, Volume 10 Issue VI June 2022.

APPENDIX

CODE:

```
#include <LiquidCrystal.h>
#include <SoftwareSerial.h>

LiquidCrystal lcd(A0, A1, A2, A3, A4, A5);//rs, en, d4, d5, d6, d7



const int trigPin = 8; const int echoPin = 9;

const int trigPin2 = 2;
const int echoPin2 = 3;

const int BUZZER = 7;

long duration; int distance;

long duration2;
int distance2;

void setup()  {
pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output pinMode(echoPin, INPUT);
// Sets the echoPin as an Input

pinMode(trigPin2, OUTPUT); // Sets the trigPin as an Output
pinMode(echoPin2, INPUT); // Sets the echoPin as an Input


pinMode(BUZZER, OUTPUT);

digitalWrite(BUZZER, HIGH);

Serial.begin(9600); // Starts the serial communication



lcd.begin(16, 2); lcd.print("LIFE SAVER BY ");
lcd.setCursor(0, 1); lcd.print("LIDAR & USONIC");
delay(3000);
lcd.clear();


lcd.setCursor(0, 0); lcd.print("LIDAR:"); lcd.setCursor(0, 1); lcd.print("USONIC:");
```

```
}

void loop()
{
Serial.print("Distance: "); Serial.println(Check_Distance()); lcd.setCursor(7, 1);
lcd.print(distance); delay(500); lcd.setCursor(7, 1); lcd.print("    ");



Serial.println(Check_Distance2()); lcd.setCursor(6, 0); lcd.print(distance2); delay(500);
lcd.setCursor(6, 0); lcd.print("    ");
}


int Check_Distance() { digitalWrite(trigPin, LOW); delayMicroseconds(2);

digitalWrite(trigPin, HIGH); delayMicroseconds(10); digitalWrite(trigPin, LOW);

duration = pulseIn(echoPin, HIGH);

distance= duration*0.034/2;

if(distance<50)
{
digitalWrite(BUZZER, LOW); delay(300);
digitalWrite(BUZZER, HIGH);
} return distance;
}

int Check_Distance2() { digitalWrite(trigPin2, LOW); delayMicroseconds(2);
digitalWrite(trigPin2, HIGH); delayMicroseconds(10); digitalWrite(trigPin2, LOW);

duration2 = pulseIn(echoPin2, HIGH);

distance2= duration2*0.034/2;

if(distance2<50)
{
digitalWrite(BUZZER, LOW); delay(100); digitalWrite(BUZZER, HIGH); delay(100);
digitalWrite(BUZZER, LOW); delay(100);
digitalWrite(BUZZER, HIGH);

} return distance2;
}
```

MVSR Engineering College, Dept. of IT

COURSE NAME: PROJECTWORK II
COURSE CODE: PW861IT

Course Objectives:

1. To enhance practical & Professional skills.
2. To familiarize the tools and techniques of symmetric literature survey and documentation.
3. To expose students to industry practices and teamwork.
4. To encourage students to work with innovative and entrepreneurial ideas.

Table 1: Course Outcomes - Cognitive levels
Cognitive Levels: R-Remember; U-Understand; Ap-Apply; An=Analyze; E-Evluate; C-Create

Course code	**Statement** Student will be able to	**Cognitive Level**	**PO / PSO addressed**
PW861.1	Define a problem of the recent advancements with applications towards society.	An	PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8,PSO1,PSO2
PW861.2	Outline requirements and perform requirement analysis for solving the problem.	An	PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8,PSO1,PSO2
PW861.3	Design and develop a software and/or hardware based solution within the scope of project using contemporary technologies and tools.	AP, E, An	PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8,PSO1,PSO2
PW861.4	Test and deploy the applications for use.	AP ,E, An	PO8,PO9,PO10,PO11,PO12,PSO1,PSO2
PW861.5	Develop the Project as a team and Demonstrate the application, with effective written and oral communications.	C	PO8,PO9,PO10,PO11,PO12,PSO1,PSO2

Table:2 CO's

Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
No. of PIs addressed by course for a given PO	**4**	4	**4**	**4**	**4**	**4**	**4**	**5**	**5**	**7**	**4**	**6**	**5**	**6**
CO1	2	2	2	1	3	1	1	1	3	3	1	2	1	3
CO2	3	2	3	2	3	1	1	1	3	3	3	2	2	3
CO3	3	3	3	2	3	1	1	3	3	3	3	2	2	3
CO4								3	3	3	3	2	2	2
CO5								1	3	3	3	2	2	3

Table 3: Justification for CO-PO/PSO Level – through number of sessions

	PO1		PO2		PO3		PO4		PO5		PO6		PO7		PO8		PO9		PO10		PO11	
PW861IT	**%**	**Level**	**%**	**Level**	**%**	**Level**	**%**	**Level**	**%**	**Level**	**%**	**Level**	**%**	**Level**	**%**	**Level**	**%**	**Level**	**%**	**Level**	**%**	**Level**
CO1	50	3	50	2	50	2	25	1	50	3	25	1	25	1	20	1	50	3	50	3	25	1
CO2	75	3	50	2	75	3	50	2	50	3	25	1	25	1	20	1	50	3	50	3	75	3
CO3	75	3	75	3	75	3	50	2	50	3	25	1	25	1	50	3	50	3	75	3	75	3
CO4	50														50	3	50	3	75	3	75	3
CO5	50														20	1	50	3	50	3	75	3
No of Cos mapped & total	3	9	3	7	3	11	3	8	3	9	3	3	3	3	5	9	5	15	5	15	5	13
Average of Level	9/3=3		7/3=2.3		8/3=2.6		8/3=2.6		9/3=3		3/3=1		3/3=1		**9/5=1.8**		15/5=3		15/5=3		**13/5=2.6**	
Rounded average level	**3**		**2**		**3**		**3**		**3**		**1**		**1**		**2**		**3**		**3**		**3**	

Table 4: Calculation of CO-PO/PSO correlation levels

PW861IT	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2	1	3	1	1	1	3	3	1	1	1	3
CO2	3	2	3	2	3	1	1	1	3	3	3	1	3	3
CO3	3	3	3	2	3	1	1	3	3	3	3	1	3	3
CO4								3	3	3	3	1	1	3
CO5								1	3	3	3	1	2	3
PW861IT	**3**	**2**	**3**	**3**	**3**	**1**	**1**	**2**	**3**	**3**	**3**	**1**	**2**	**3**

Table 5: PO/PSO addressed by the Project

Project Name	Domain	In-house/ Industry	PO/PSO addressed	Internal Guide
LIFE SAVER AT RAINY SEASON	IOT	In House		DR. D. Shanthi ,Associate professor ,ITD

Table 6: Rubrics Evaluation

PO/PSO	PO1,PO2,PO6,PO7				PO3	PO4,PO5, PSO1	PO4,PO5, PSO2	PO8	PO9				PO10			PO11	PO12
Rubrics	R1				R2	R3	R4	R5	R6				R7			R8	R9
Roll. No.	CI	CII	CIII	Total	CIV	CV	CVI	CVII	CVIII	CIX	CX	Total	CXI	CXII	Total	CXIII	CIV
	4	4	4	12	4	4	4	4	4	4	4	12	4	4	8	4	4

Rubrics for project

Focus Areas:

1. **Problem Formulation (PO1,PO2, PO6, PO7)**
2. **Project Design (PO3)**
3. **Build (PO4,PO5, PSO1)**
4. **Test & Deploy (PO4, PO5, PSO2)**
5. **Ethical responsibility (PO8)**
6. **Team Skills (PO9)**
7. **Project Presentation (P10)**
8. **Project management (PO11)**
9. **Lifelong Learning (PO12)**

Focus Areas	Criterion [c]	Exemplary 4	Satisfactory 3	Developing 2	Unsatisfactory 1
Problem Formulation (PO1,PO2, PO6, PO7)	**I - Identify/Define Problem** Ability to identify a suitable problem and define the project objectives.	Demonstrates a skillful ability to identify / articulate a problem and the objectives are well defined and prioritized.	Demonstrates ability to Identify / articulate a problem and All major objectives are identified.	Demonstrates some ability to identify / articulate a problem that is partially connected to the issues and most major objectives are identified but one or two minor ones are missing or priorities are not established.	Demonstrates minimal or no ability to identify / articulate a problem and many major objectives are not identified.
	II - Collection of Background Information: Ability to gather background Information (existing knowledge, research, and/or indications of the problem)	Collects sufficient relevant background information from appropriate sources, and is able to identify pertinant/critical information;	Collects sufficient relevant background information from appropriate sources;	Collects some relevant background information from appropriate Sources.	Minimal or no ability to collect relevant background information
	III- Define scope of the problem Ability to identify problem scope suitable to the degree considering the impact on society and environment	Demonstrates a skillful ability to define the scope of problem accurately mentioning the relevant fields of engineering precisely. Considers, explains and evaluates the impact of engineering interventions on society and environment.	Demonstrates ability to define problem scope mentioning the relevant fields of engineering broadly. Considers and explains the impact of engineering interventions on society and environment	Demonstrates some ability to define problem scope mentioning some of the relevant fields. Some consideration of the impact of engineering interventions on society and environment.	Demonstrates minimal or no ability to define problem scope and fails to mention relevant fields of engineering. Minimal or no consideration of the impact of engineering interventions on society and environment
Project Design (PO3)	**IV- Understanding the Design Process and Problem Solving:** Ability to explain the design process including the importance of needs, specifications, concept generation and to develop an approach to solve a problem.	Demonstrates a comprehensive ability to understand and explain a design process. Considers multiple approaches to solving a problem, and can articulate reason for choosing solution	Demonstrates an ability to understand and explain a design process. Considers multiple approaches to solving a problem, which is justified and considers consequences.	Demonstrates some ability to understand and explain a design process. Considers a few approaches to solving a problem; doesn't always consider consequences.	Demonstrates minimal or no ability to understand and explain a design process. Considers a single approach to solving a problem. Does not consider consequences.

Focus Areas	Criterion [c]	Exemplary 4	Satisfactory 3	Developing 2	Unsatisfactory 1
Build (PO4,PO5, PSO1)	**V- Implementing Design Strategy:** Ability to execute a solution taking into consideration design requirements using appropriate tool (software/hardware);	Demonstrates a skillful ability to execute a solution taking into consideration all design requirements using the most relevant tool.	Demonstrates an ability to execute a solution taking into consideration design requirements using relevant tool.	Demonstrates some ability to execute a solution but not using most relevant tool.	Demonstrates minimal or no ability to execute a solution. Solution does not directly attend to the problem.
Test & Deploy (PO4, PO5, PSO2)	**VI- Evaluating Final Design:** To evaluate/confirm the functioning of the final design. To deploy the project on the target environment	Demonstrates a skillful ability to evaluate/confirm the functioning of the final design skillfully, with deliberation for further Improvement after deployment.	Demonstrates an ability to evaluate/confirm the functioning of the final design. The evaluation is complete and has sufficient depth.	Ability to evaluate/confirm the functioning of the final design, but the evaluation lacks depth and/or is incomplete.	Demonstrates minimal or no ability to evaluate/confirm the functioning of the final design.
Ethical responsibility (PO8)	**VII - Proper Use of Others' Work:** Ability to recognize, understand and apply proper ethical use of intellectual property, copyrighted materials, and research.	Always recognizes and applies proper ethical use of intellectual property, copyrighted materials, and others' research.	Recognizes and applies proper ethical use of intellectual property, copyrighted materials, and others' research.	Some recognition and application of proper ethical use of intellectual property, copyrighted materials, and others' research.	Minimal or no recognition and/or application of proper ethical use of intellectual property, Copyrighted materials, or others' research.
Team Skills (PO9)	**VIII - Individual Work Contributions and Time Management:** Ability to carry out individual Responsibilities and manage time (estimate, prioritize, establish deadlines/ milestones, follow timeline, plan for contingencies, adapt to change).	Designated jobs are accomplished by deadline; completed work is carefully and meticulously prepared and meets all requirements.	Designated jobs are accomplished by deadline; completed work meets requirements.	Designated jobs are accomplished by deadline; completed work meets most requirements.	Some Designated jobs are accomplished by deadline; completed work meets some requirements.
	IX - Leadership Skills: Ability to lead a team. (i) Mentors and accepts mentoring from others. (ii) Demonstrates capacity for initiative while respecting others' roles. (iii) Facilitates others' involvment. (iv) Evaluates team Effectiveness and plans for improvements	Exemplifies leadership skills.	Demonstrates leadership skills.	Demonstrates some leadership skills at times.	Demonstrates minimal or no Leadership skills.
	X - Working with Others: Ability to listen to, collaborate with, and champion the efforts of others.	Skillfully listens to, collaborates with, and champions the efforts of others.	Listens to, collaborates with, and champions the efforts of others.	Sometimes listens to, collaborates with, and champions others' efforts.	Rarely listens to, collaborates with, or champions others' efforts.

Project Presentation (P10)	**XI - Technical Writing Skills** Ability to communicate the main idea with clarity. Ability to use illustrations properly to support ideas (citations, position on page etc)	Main idea is clearly and precisely stated. Materials are seamlessly arranged in a logical sequence Illustrations are skillfully used to support ideas	Main idea is understandable. Material moves logically forward, Illustrations are properly used to support ideas	Main idea is somewhat Understandable. Material has some logical order and is somewhat coherent or easy to follow. Illustrations are for the most part properly used to support ideas	Main idea is difficult to understand. Material has little logical order, and is often unclear, incoherent. Illustrations are used, but minimally support ideas. (not properly cited etc)
	XII - Communication Skills for Oral Reports Ability to present strong key ideas and supporting details with clarity and concision. Maintain contact with audience, and ability to complete in the allotted time	Presentation logically and skillfully structured. Key ideas are compelling, and articulated with exceptional clarity and concision. Introduction, supporting details and summary are clearly evident and memorable, and ascertain the credibility of the speaker Presentation fits perfectly within time constraint.	Presentation has clear structure and is easy to follow. Key ideas are clearly and concisely articulated, and are interesting. There is sufficient detail to ascertain speaker's authority, and presentation includes an introduction and summary. Presentation fits within time constraint, though presenter might have to subtly rush or slow down.	Presentation has some structure. Key ideas generally identifiable, although not very remarkable. Introduction, supporting details and/or summary may be too broad, too detailed or missing. Credibility of the speaker may be questionable at times. Presentation does not quite fit within time constraint; presenter has to rush or slow down at end	Presentation rambles. Not organized; key ideas are difficult to identify, and are unremarkable. No clear introduction, supporting details and summary. Speaker has no credibility. Presentation is unsuitablably short or unreasonably long.
Project management (PO11)	**XIII - Monitoring and Controlling the Project**	Monitors timelines and progress toward project goals on a daily basis. Provides accurate, complete reports of project progress.	Monitors timelines and progress toward project goals most of the time. Provides relatively accurate, complete reports of project progress with only minor errors or omissions	Seldom monitors timelines and progress toward project goals. Provides relatively accurate, yet clearly incomplete, reports of project progress	Does not monitor timelines and progress toward project goals. Provides inaccurate, incomplete reports of project progress
Lifelong Learning (PO12)	**XI V - Extend Scope of Work:** Ability to extend the project through implementation in other study areas	Demonstrates a skillful ability to explore a subject/topic thoroughly, discusses the road map to extend the project in other areas.	Demonstrates an ability to explore a subject/topic, and shows possible areas in which project can be extended	Demonstrates some ability to explore a subject/topic, providing some knowledge of areas in which project can be extended	Demonstrates minimal or no ability to explore a subject/topic, and does not discuss future work clearly mentioning other areas