GPS Controlled Robotic Vehicle for Environmental Impact Analysis

ABSTRACT

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Environmental monitoring is indeed a review of the processes and activities required to track the environmental baseline. IoT sensors are able to offer correct real-time information on the surrounding to assist us to understand how we tend to have an effect on the environment and take actions to enhance quality of life. We proposed an automated vehicle that used for monitoring temperature, humidity, pressure, light luminescence and concentration of gases. System is designed in a way to provide autonomous movement which is controlled by an individual via android application. Two way audio communication and Visualization of environment can be obtained by camera through IoT gateway. The robotic system is accomplished using a cost-efficient Arduino that communicates through a wireless network to the Internet of things platform, where data are stored, processed and can be accessed using a smart device. Data stored can be used to further explore pollution reduction, energy savings and improve the overall living environment.

In existing robotic system consist of limited sensing capabilities. System does not obtain the environmental visuals through camera. The system updates sensor data to IoT server in every 15 seconds. The cost for implementation of the vehicle is high.

The proposed robotic is designed in a way to provide autonomous movement and is controlled by an individual via android application. Latitude and longitude coordinates are obtained by Global Position System mounted on the robotic vehicle. The system can update the data to the application for every 6 seconds. It focuses primarily on Internet connected monitoring system that streams live camera imagery, two way audio communication and other environmental information through Internet of things.

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ABBREVIATION	EXPANSION
IoT	INTERNET OF THINGS
GPS	GLOBAL POSITIONING SYSTEM
UAV	UNMANNED AERIAL VEHICLE
ARM	ADVANCED RISC MACHINE
V	VOLTAGE
HC-05	BLUETOOTH MODULE
NODE MCU	NODE MICROCONTROLLER UNIT
DC	DIRECT CURRENT
PWM	PULSE WIDTH MODULATION
LDR	LIGHT DEPENDENT RESISTOR

INTRODUCTION

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Environmental monitoring involves assessing environmental quality to controlling risk. It is developed as the basis for environmental impact assessment production. This knowledge is used to research natural changes and measure current environmental condition and used in the preparation of environmental impact assessments, as well as in various circumstances in which human activities threaten the natural environment with harmful effects. The main aim of this system is to track the Environmental Parameters without any human intervention. Readings from environmental observation stations are very sensitive to changes in temperature and humidness amongst other factors. The architecture is sorted into environmental monitoring, navigation system and IoT platform. Internet of things is all about connecting electronic devices together and exchanging data. For areas with dangerous air, climatic conditions are regulated and environments that are hazardous for humans such as remote robots are used. In IoT gateway data is transmitted from sensors, and they are often stored and analyzed by diverse IoT platforms like Blynk, Thinger.io, and Thing speak. The data produced by the robotic vehicle can be seen in an android application via the Internet. System provides new opportunities that arise large scale environmental monitoring.

1.2 OBJECTIVE

- Data are collected and transmitted to phone through IoT.
- System monitors parameters such as temperature, humidity, air quality, and harmful gas concentration.
- Data is analyzed for future prediction.
- Provides new opportunities are arising for large scale environmental monitoring.
- Robotic system is quite cost-effective.

1.3 MOTIVATION

Monitoring and evaluating the health of our natural resources is also essential for effective environmental planning, policymaking and solving environmental pollution. Scientists use robotic systems as a method for data collection for a better understanding of environmental process. This motivates us to propose a model that automates a robotic vehicle to overcome the existing hectic situation.

1.4 PROBLEM STATEMENT

The purpose of this project is to identify the environmental parameters without any human interaction. Due to miscellaneous interactions, limited protocol standardization and complex identification systems to access data, problems arises in field of monitoring hence to overcome these problems we are designing an IoT based GPS controlled robotic system to obtain the environmental data.

SYSTEM ANALYSIS

CHAPTER 2

SYSTEM ANALYSIS

2.1 LITERATURE SURVEY

2.1.1 Smart Environmental Monitoring through Internet of Things (IoT) using Raspberry Pi 3

Srivanka and Siddarama R Pati has proposed a monitoring system which gives information about environmental conditions and briefly touches the technological advancements in monitoring the environment and bringing out the new scope in monitoring the current environment problems. The system is developed using Arduino, Raspberry Pi 3, Zigbee and Adafruit IO which proves to be cost effective and having low power consumption. The sensors will gather the data of various environmental parameters and provide that data to Raspberry Pi via Zigbee from the Arduino. The Raspberry Pi 3 will then upload the processed data on to the internet through python programming and using Adafruit IO as an IoT platform. Experimental results demonstrated that the system is able to accurately measure the concentrations of the carbon monoxide, carbon dioxide, combustible gases, and smoke and air quality.

2.1.2 Intelligent Controlling of Indoor Air Quality based on Remote Monitoring Platform by Considering Building Environment

Shaodan Zhi,Zhen Cao and Yongbin Wei has proposed the Air pollution issues and particularly fine partic ulate matters are worthy of great concerns as a consequence of crowded factories and heavy traffic. Exposure to the fine particulate matters will harm the human health and even cause irreversible damages, which calls for effective monitoring methods. It is necessary to bring in a monitoring platform with sufficient mobility for the places where monitoring stations are not convenient to install. A mobile and portable monitoring platform based on unmanned aerial vehicle is developed by combining promoted sensor board and specific communication module in this paper. Moreover, the air quality monitored by UAV-platform will generate important information for the controlling of

indoor air quality for indoor environment in the buildings. To meet the indoor inhabitants' requirements of health and comfort, a fuzzy control method is proposed in this paper to control the actuators of air cleaner and ventilator. With a good coordination, an intelligent environment which meets the comfort level with good indoor air quality can be achieved.

2.1.3 A Cyber-Physical System for Environmental Monitoring

George Mois, Teodora Sanislav and Silviu C. Folea has proposed the development of a cyber physical system that monitors the environmental conditions or the ambient conditions in indoor spaces at remote locations. The communication between the system's components is performed using the existent wireless infrastructure based on the IEEE 802.11 b/g standards. The resulted solution provides the possibility of logging measurements from locations all over the world and of visualizing and analyzing the gathered data from any device connected to the Internet. This work encompasses the complete solution, a cyber-physical system, starting from the physical level, consisting of sensors and the communication protocol, and reaching data management and storage at the cyber level. The experimental results show that the proposed system represents a viable and straightforward solution for environmental and ambient monitoring applications.

2.1.4 IoT based Temperature and Humidity Controlling using Arduino and Raspberry Pi

LalBihari Barik has proposed a pivotal part in our mundane daily life by controlling electronic devices using networks. The controlling is done by minutely observing the important parameters which generate vital pieces of information concerning the functioning of these electronic devices. Simultaneously, this information will transmit these vital statistics from the transmitting device as well as save the same on the cloud to access by the applications and supplementary procedures to use them. This scrutiny associates the outcomes of the environmental observances like the humidity and temperature measurements using sensors. The gathered information could be profitably used to produce actions like distantly dominant cooling, heating devices, or long term statistics, which will be useful to control the same. The detected data are uploaded to the cloud storage through network and associate using android application. The system employs Arduino UNO with Raspberry Pi, HTU 211D sensor device, and an ESP8266 Wi-Fi module. The experimental

results show the live temperature and humidity of the surroundings and the soil moisture of any plant using Arduino UNO with Raspberry Pi. Raspberry Pi is mainly used here for checking the temperature and humidity through the HTU 211D sensor element. The sensors are used for measuring the temperatures from the surroundings, storing displayed information with different devices. Here, the ESP8266 Wi-Fi module has used for data storing purpose. It is simple and most powerful IoT cloud platform for the development of coming generation. It offers the real time data visualization of sensors data which can be operate from any part of the world irrespective of the position of field.

2.1.5 A Reliable Wireless Sensor System for Monitoring Mechanical Wear-Out of Parts

Huang-Chen Lee, Yu-Chang Chang, and Yen-Shuo Huang has proposed the ball screw is a typical mechanical part that experiences wear-out and is widely used in computer numerical control machine tools to control the movement of processing targets and spindles. These types of parts need frequent checks so that they are replaced before excessive wear occurs. Until now, there was no simple way to measure directly the state of wear quantitatively. An indirect approach is logging the signals during the operation of mechanical parts. This information can be used to construct a wear model for estimating its remaining lifetime. For embedding sensors into mechanical devices, wireless sensors bring advantages in that they may be installed freely without constraints from data or power cables. However, wireless transmission is subjected to interference. we propose a wireless sensor system that emphasizes low-power and low cost in hardware design logs the signals during the operation of a mechanical part that could experience wear; and guarantees that all the logged data can be wirelessly delivered to the data server.

2.2 EXISTING SYSTEM

The Existing system Robot can store data on the Thing Speak IoT platform. The whole system is realized using a cost-effective ARM-based embedded system called Arduino and Raspberry Pi which communicates through a wireless network to the IoT platform. The system updates its sensor data to IoT server in every 15 seconds. The implementation of existing robotic system cost is high. System monitors parameters such as temperature and gas concentration.

2.2.1 DRAWBACKS OF EXISTING SYSTEM

The Existing system has following disadvantage,

- System Design is more expensive to implement.
- It takes more time to upgrade sensor data to IoT Server.
- Environmental visualization and audio is not obtained.
- To obtain the data, special applications need to be developed.
- Limited environmental parameter is monitored.

2.3 PROPOSED SYSTEM

In our proposed system ” GPS controlled robotic vehicle for environmental impact analysis” Intuitive user interfaces is done in the Application and Autonomous movement after getting instruction from the user. System Framework has established fusing the embedded hardware, IoT segments and software. It updates sensor data to IoT server in every 6 seconds. Two way audio communication and environmental visualization is captured through camera. The design of the system allows adding more sensors to increase the elements to be measured. Sensor data are obtained in the open source blynk android application. Proposed autonomous robotic system can monitor environmental parameters such as temperature, humidity, air quality, light intensity and harmful gas concentration.

2.3.1 ADVANTAGES OF PROPOSED SYSTEM

The Proposed system has the following advantage

- The system is cost-effective.
- The creation of prototypes is quick and efficient.
- System work effectively in remote places to collect data.
- Open source application helps in effective data transfer.
- Controls risk and provide a real-time view of key metrics.
- Provides scalability to monitoring system.

2.4 SYSTEM REQUIREMENTS

2.4.1 HARDWARE REQUIREMENTS

This section gives the details and specification of the hardware on which the system works.

- Arduino Atmega8 microcontroller – 5V
- 7805 Regulated Supply – 5V
- Bluetooth Module HC-05 – 5V
- Filter Capacitor
- NodeMCU
- Sensors
- Motor driver
- DC Motors
- Mobile Phone
- Wireless IP camera

2.4.2 SOFTWARE REQUIREMENTS

This section gives the details of the software that are used for the development process and controlling of robotic system.

- Arduino Coding : Arduino IDE
- NodeMCU coding : Arduino IDE
- Application : Open Source Blynk Application
- Movement controller : Arduino Bluetooth control
- Camera visualization : V380 Pro

2.5 SYSTEM DESCRIPTION

2.5.1 HARDWARE DESCRIPTION

2.5.1.1 ARDUINO

Arduino is open source computer hardware and software in which user community that designs and manufactures microcontroller based kits for building digital devices and interactive objects that can sends and control the physical world. Arduino boards are able to read inputs and turn it into an output. This microcontroller board is based on the ATmega328 and the pin configuration is 14 digital input/output pins. Those 14 pins can be classified as 6 PWM outputs, 6 analog inputs. The Arduino board consists of a reset button, a USB connection a 16 MHz ceramic resonator. The voltage specification includes 5V as Operating voltage; 7-12V recommended for input voltage, 6-20V is the limit for input voltage. Power supply for the Arduino is given by using the USB connection or else we can use external power supply such as battery.

Fig 2.1 Arduino

2.5.1.2 REGULATOR

A voltage regulator is a system designed to automatically maintain a constant voltage level. It may use an electromechanical mechanism or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages. Electronic voltage regulators are found in devices such as power supplies where they stabilize the DC voltages used by the processor and other elements. In automobile alternators and central power station generator plants, voltage regulators control the output of the plants. In an electric power distribution system, voltage regulators may be install at a substation or along distribution

lines so that all customers receive steady voltage independent of how much power is drawn from the line.

2.5.1.3 BLUETOOTH MODULE

HC-05 module is an easy to use Bluetooth Serial Port Peripheral, designed for transparent wireless serial connection setup. The hardware specification includes that it is connected with an integrated antenna and an edge connector. It works based on the PIO control. Whenever the pulse in PIO0 rising, the device will be disconnected. MCU and GPS connection can be established by using this module. Master or Slave configuration is achieved in this Bluetooth module. The module works in slave mode by default. In Slave mode, we can able to accept the external connections, but cannot initiate any connection. In this system we are using this HC-05 module just to transfer data from the arduino to the Mobile phone. The module acts as slave mode in this case.

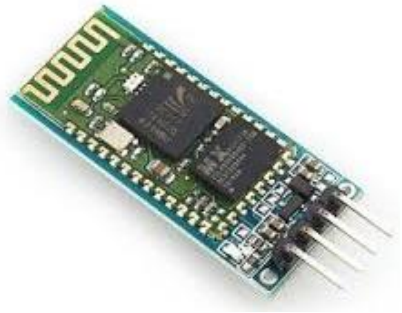


Fig 2.2 Bluetooth Module HC-0

2.5.1.4 CAPACITOR

A capacitor originally known as a condenser is a passivetwo-terminalelectrical component used to store energyelectro statically in an electric field. The forms of practical capacitors vary widely, but all contain at least two electrical conductors separated by a dielectric. The conductors can be thin films of metal, aluminium foil or disks, etc. A dielectric can be glass, ceramic, plastic film, air, paper, mica, etc. Capacitors are widely used as parts of electrical circuits in many common electrical devices. Unlike a resistor, a capacitor does not dissipate energy. Instead, a capacitor stores energy in the form of an electrostatic field between its plates.

2.5.1.5 DC MOTOR

In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion. DC motor is used to control the navigational movement of the vehicle. A DC Motor is a machine which converts electrical energy into mechanical energy. It can be used to drive load at various speeds. The H-Bridge concept allows the voltage to change its direction.

2.5.1.6 MOBILE PHONE

In this proposed system we are using Mobile phone as a user interface to display and to perform autonomous movement based on the instruction given by the user. Using mobile phone the robotic vehicles movement can be controlled, sensor data and camera visualization and two way audio communications is obtained over the android application. System usage is replaced by this mobile phone because it is quick to obtain data and will be more comfort for the user to handle.

2.5.1.7 WIRELESSIP CAMERA

Wireless IP camera is used to monitor the environmental condition through visualization. In our proposed system we are using remote pan and tilt function camera that allows us to watch live recording. The camera automatically switches on the night vision as soon as the ambient light stops. The infrared enable night vision to see clearly in low light or dark condition. Remote viewing through either local network or internet, record from anywhere anytime. The inbuilt mike catches the sound and records it for future inspection and surveillance. The camera can rotate up to 355 degree towards side and 110 degree towards the upside angle. Since it can pan and tilt at either sides the clear information about the environment is obtained.

Fig 2.3 Wireless IP camera

2.5.1.7 POWER SUPPLY

In our prototype model input available power source is an Ac voltage arrives at 230V. Since our electronic circuits require only very minimal voltage and current we use step down power transformer. Step down transformer is designed in such a way that the input is 230V and output of 12V. The electronic circuits operate in DC where as available output of transformer is Ac of 12V. So rectifier circuit is used to convert AC to DC. Rectifier circuit consists of four diodes formed in bridge fashion so as to convert incoming AC to DC.

2.5.1 SENSORS DESCRIPTION

2.5.2.1 TEMPERATURE SENSOR

The LM35 series are precision integrated circuit temperature sensors, whose output voltage is linearly proportional to the Celsius temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in Kelvin as the user is not required to subtract a large constant voltage from its output to obtain convert centigrade scaling. It monitors the environmental temperature and transfers the data to the mobile application.

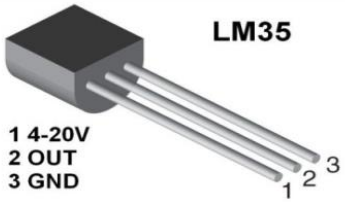


Fig 2.4 Temperature sensor

2.5.2.2 GAS SENSOR

Air quality sensor is for detecting a wide range of gases, including NH3, NOx, alcohol, benzene, smoke and CO2. It is ideal for use in environment. MQ135 gas sensor has high sensitivity to Ammonia, Sulfide and Benze steam, also sensitive to smoke and other harmful gases. It is with low cost and particularly suitable for Air quality monitoring application. It requires an input power of 5V.

2.5.2.3 HUMIDITY SENSOR

The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin no analog input pins needed. It is simple to use, but requires careful timing to grab data. Humidity is the measure of water vapour present in the air. The level of humidity in air affects various physical, chemical and biological processes. In industrial applications, humidity can affect the business cost of the products, health and safety of the employees. So, in semiconductor industries and control system industries measurement of humidity is very important. Humidity measurement determines the amount of moisture present in the gas that can be a mixture of water vapour, nitrogen, argon or pure gas etc.

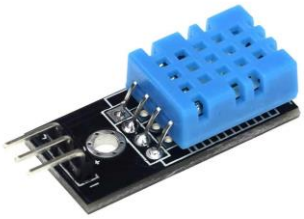


Fig 2.5 Humidity sensor

2.5.2.4 LDR SENSOR

A Light Dependent Resistor also known as a photo resistor or LDR is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light-sensitive devices. They are also called as photoconductors, photoconductive cells or simply photocells. They are made up of semiconductor materials that have high resistance.

2.5.2.5 ATM PRESSURE SENSOR

Atmospheric pressure sensor also known as a newer form of barometer is an Arduino compatible tool used for atmospheric pressure measurement in environments. Such measurements mainly allow for forecasting of short term changes in the weather. It is responsible for measuring the atmospheric pressure of the environment that the vehicle is driving in.

2.5.3 SOFTWARE DESCRIPTION

2.5.3.1 ARDUINO IDE

The Arduino Integrated Development Environment (IDE), a cross-platform application that helps to write Arduino code. Arduino IDE is developed in embedded c programming. Compiling and uploading programs, syntax highlighting, brace matching and automatic indentation are the special features in the Arduino IDE. “Wiring”, a software library can be used in Arduino IDE that enables us to perform with many common input/ output operations.

2.5.3.1 BLYNK APPLICATION

Blynk is a platform with iOS and android application to control Arduino over the internet. It's a digital dashboard where we can build a graphic interface for the system by merely dragging and dropping widgets. It's extremely easy to set everything up and may begin tinkering in less than five minutes. Blynk is not tied to some specific board or protect. Instead, it's supporting hardware and software of your choice. Whether Arduino or Raspberry Pi is linked to the web over Bluetooth, Wi-Fi, local area network or new ESP8266 chip, Blynk can get you on-line and prepared for the Internet of Your Thing.

SYSTEM DESIGN

CHAPTER 3

SYSTEM DESIGN

3.1 SYSTEM ARCHITECTURE

System Architecture is a model that explains the entire behaviour of the system. It explains the hardware, software and human interactions in the system. System architecture diagram explains the relationships between several elements in the system.

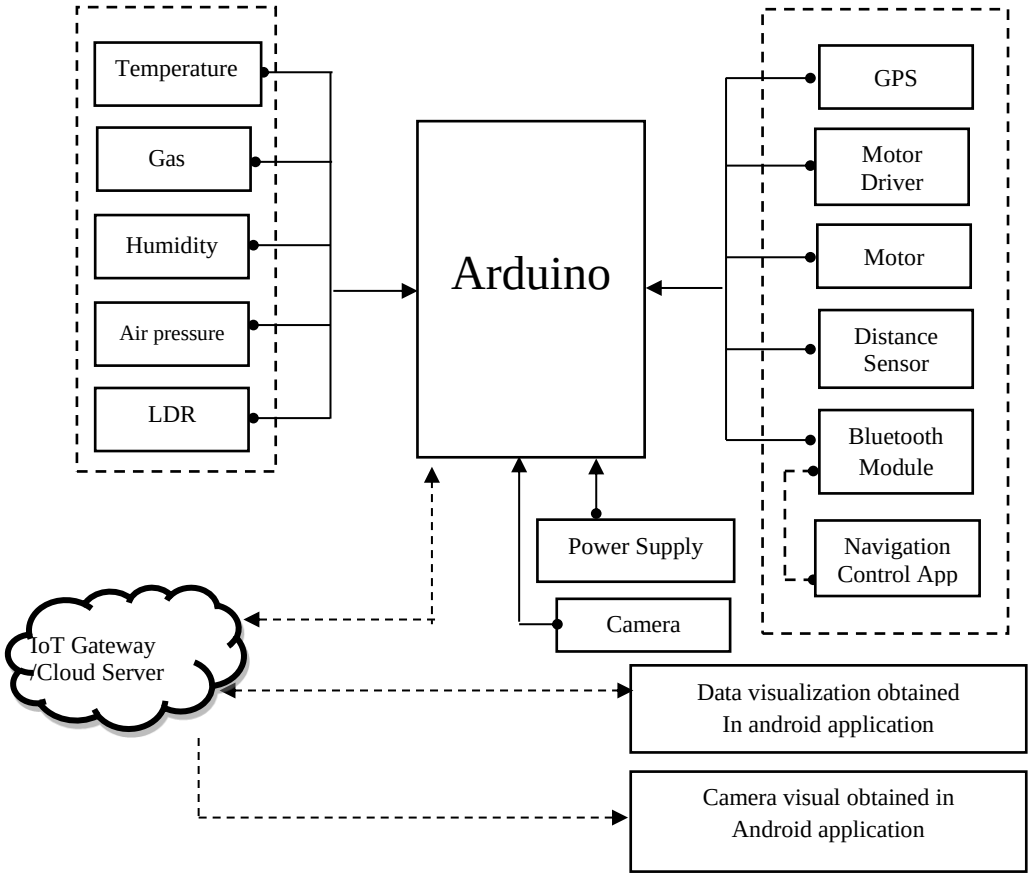


Fig 3.1 Block Diagram of Proposed System

3.2 HARDWARE IMPLEMENTATION

The proposed framework has established fusing the embedded hardware, IoT segments, and software. The methodological development of this research was based on IoT

System. This system aims to apply IoT techniques, embedded system and electronic sensors in the design and implementation of a low-cost robotics to monitoring the condition in the environment. The robotic system is constructed by using mechanical and electrical components. It is of the wheeled type for autonomous movement.

Our proposed system is wireless and therefore the increasing internet technology like Wi-Fi, cloud network, wireless system are often used from everywhere and anytime. The controlling vehicles for the environment monitoring in system is an Arduino. The data send using mobile app is received by IoT module connected to Arduino. Then, it reads the data and decides the output of electrical devices connected to it through Internet. The system can update data to IoT server for every 6 seconds. LM35, MQ-2, Humidity Sensor, digital air pressure sensor and LDR sensor are the sensors used for environment monitoring. HC-05 is the Bluetooth module used in the robotic system. It can be used for both master and slave configuration.

Blynk is an open source android application acts as an interface between the smart phone and hardware which is accountable for the communication. Systems can also use Blynk cloud or compile our private Blynk server. A power supply of 5V is given to the electronic circuit from the Battery. Camera is connected to the circuit in order to obtain the environmental visualization and two audio communication.Remote Pan & Tilt Function allows you to watch live recording. The camera automatically switches on the night vision as soon as the ambient light stops.the robotic vehicle navigation is monitored by GPS module.

3.3 MODULE DESCRIPTION

The following are the modules present in the robotic vehicle.

- Sensor
- Navigation and control
- IoT gateway
- Visualization

3.3.1 SENSOR MODULE

The robotic monitoring system uses sensors such as a temperature sensor (LM35), Gas and smoke sensor (MQ-2), Photo resistor (LDR), Humidity sensor (DHT11), Atmospheric Pressure sensor(Digital air pressure sensor). LM35 is a temperature measuring system. The sensitivity of LM35 is ten degree Celsius. As temperature increases, output voltage conjointly will increase. The MQ-2 Smoke LPG Butane Hydrogen Gas Sensor Locator Module is valuable for gas spillage identification. It is reasonable for recognizing H2, LPG, CH4, CO, Liquor, Smoke or Propane. A photo resistor may be a resistor whose resistance decreases with increasing incident lightweight intensity. It exhibits electrical conduction. The DHT11 is a humidity sensor. It uses an electrical phenomenon humidity device and a semiconductor unit to measure the surrounding air and spits out a digital signal on the information pin. Data collected from these sensors are transmitted to IoT. All the sensors are connected to arduino.

3.3.2 NAVIGATION AND CONTROL MODULE

For navigation and control the system requires GPS module with arduino mega. Global Positioning System is a satellite-based navigation system that provides vital positioning capabilities to the robotic vehicle. It has two links uplink and down link. Motor driver is a microcircuit chip that is usually used to control motors in robots. L293D motor driver IC is used to control the autonomous movement. The mobile application is divided into two major sections. They are controlling the robotic vehicle and monitoring the system.

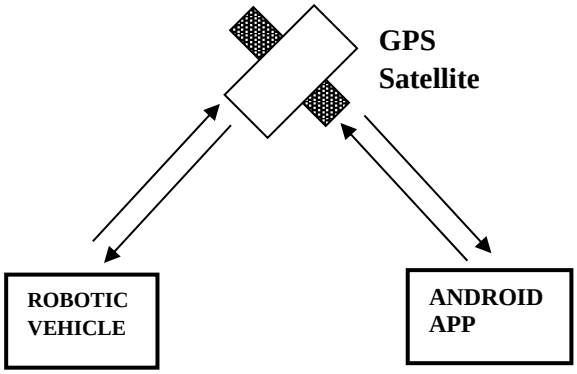


Fig 3.2 GPS module

3.3.3 IOT GATEWAY MODULE

An Internet of Things (IoT) gateway is a physical device or software program that serves as the connection point between the cloud and controllers, sensors and intelligent devices. Sensors generate tens data points per second. A gateway provides a place to pre-process that data locally at the edge before sending it on to the cloud. When data is aggregated, summarized and tactically analyzed at the edge, it minimizes the volume of data that needs to be forwarded on to the cloud, which can have a big impact on response times and network transmission costs.Sensors sense the data from the environment and transmit it to the cloud server using wireless communication. Visualization obtained from the camera mounted on the robotic vehicle is transmitted to the android application through IoT gateway. Data from the Blynk server is then transmitted to android blynk application.

3.3.4 VISUALIZATION MODULE

Environmental visualization is obtained through smart camera system. With the use of camera in sensing element network one can produce vital applications like video surveillance which helps in environmental monitoring. IoT Smart camera captures the video visuals from the surroundings and IoT gateway which is connected to Internet that transmits the data to the cloud server using wireless communication. The data from the cloud is then transferred to the mobile application. Transferring video signal consumes less time when compared to other application. The camera can rotate up to 355 degree towards side and 110 degree towards the upside angle. Two-way Audio Communicate with can also be performed. Audio and video can be recorded

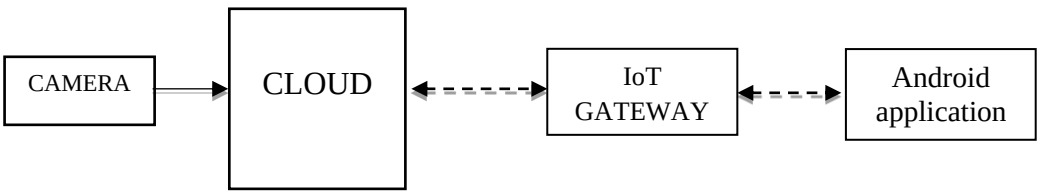


Fig 3.3 Environmental Visualization Obtained Through Camera

3.4 USE CASE DIAGRAM

Use Case Diagram is a behavioural diagram that shows the relationship between the user and use cases. By using this use case diagram the overview of the system will be easily identified. It gives high level view about the system.

3.4.1 LEVEL 0 DIAGRAM

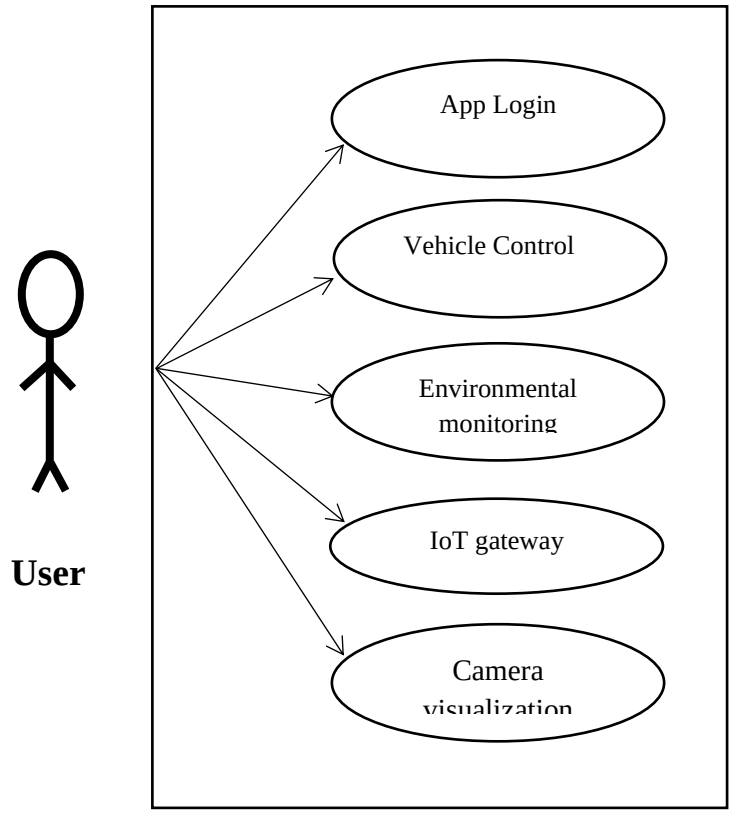


Fig 3.4.1 Level 0

3.5 SYSTEM FLOW DIAGRAM

3.5.1 LEVEL 1 DIAGRAM

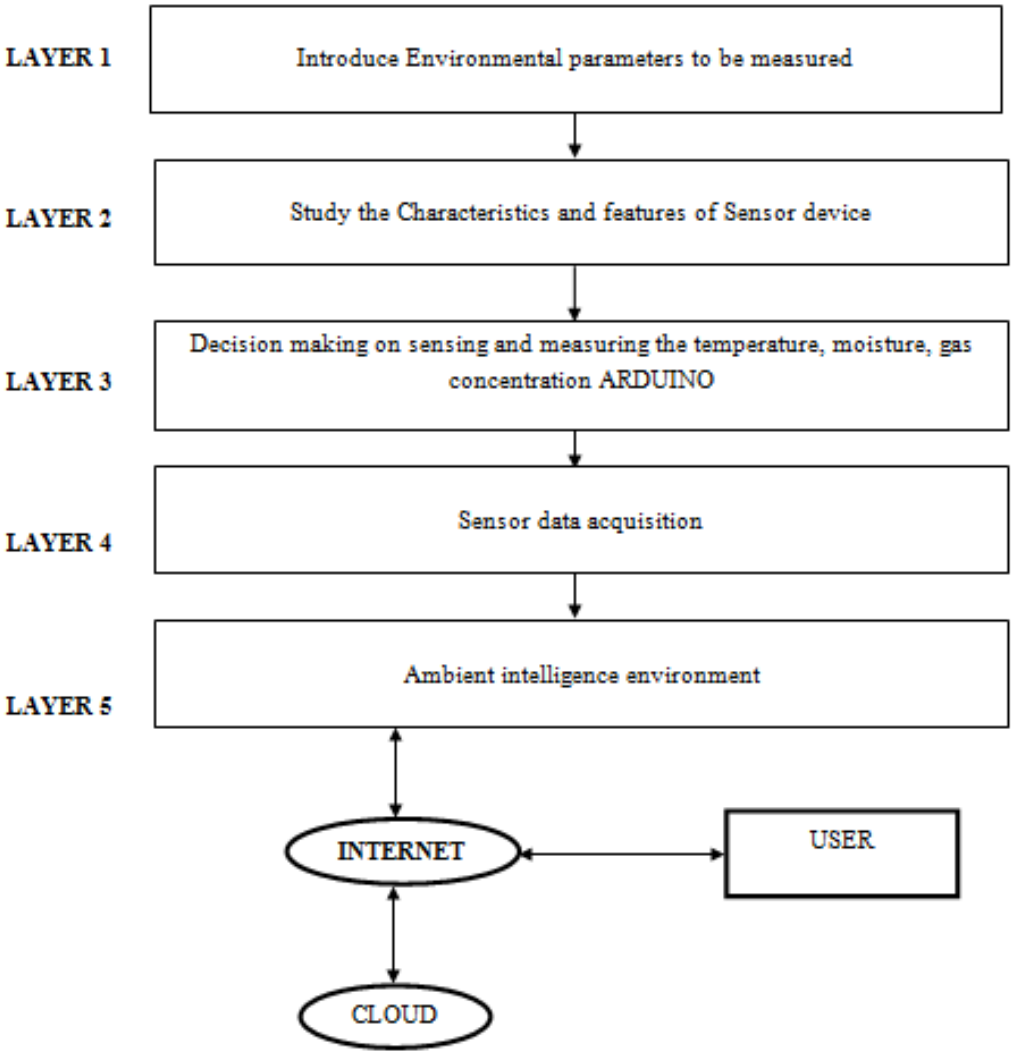


Fig 3.5.1 Level 1

3.6 DATA FLOW DIAGRAM

Data Flow Diagram explains how the information is flowing throughout the system. Flow of input, processing and output generation process are depicted in the data flow diagram.

3.6.1 LEVEL 2 DIAGRAM

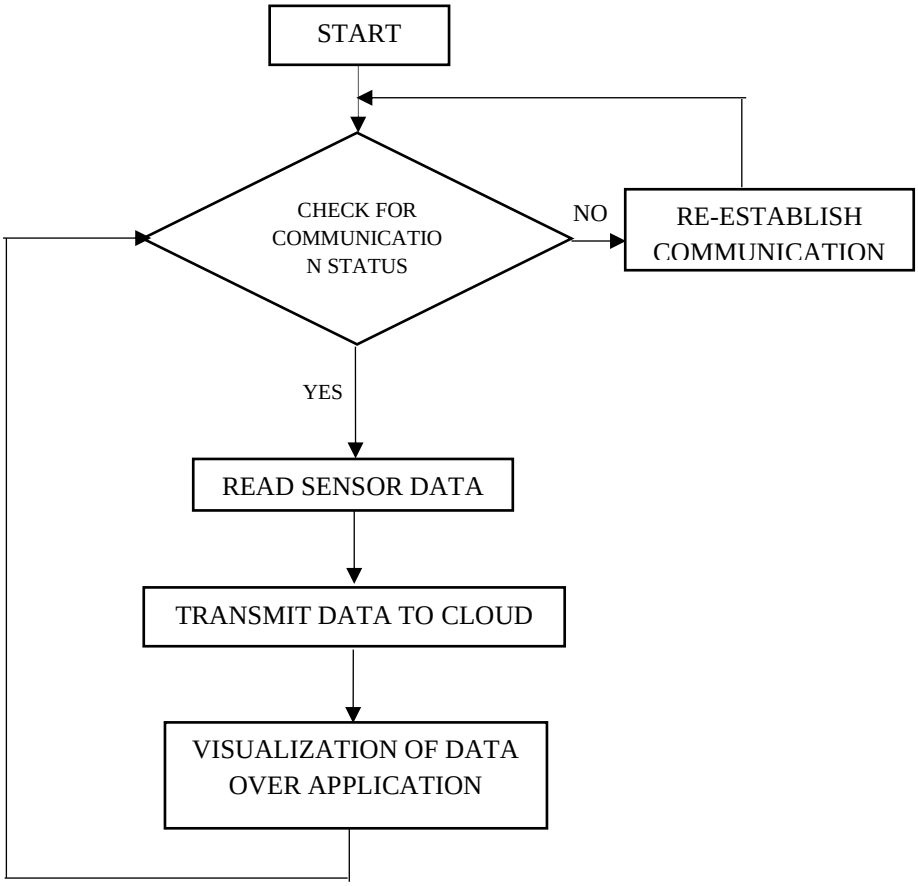


Fig 3.6.1 Flow Chart for environment sensing

3.6.2 LEVEL 3 DIAGRAM

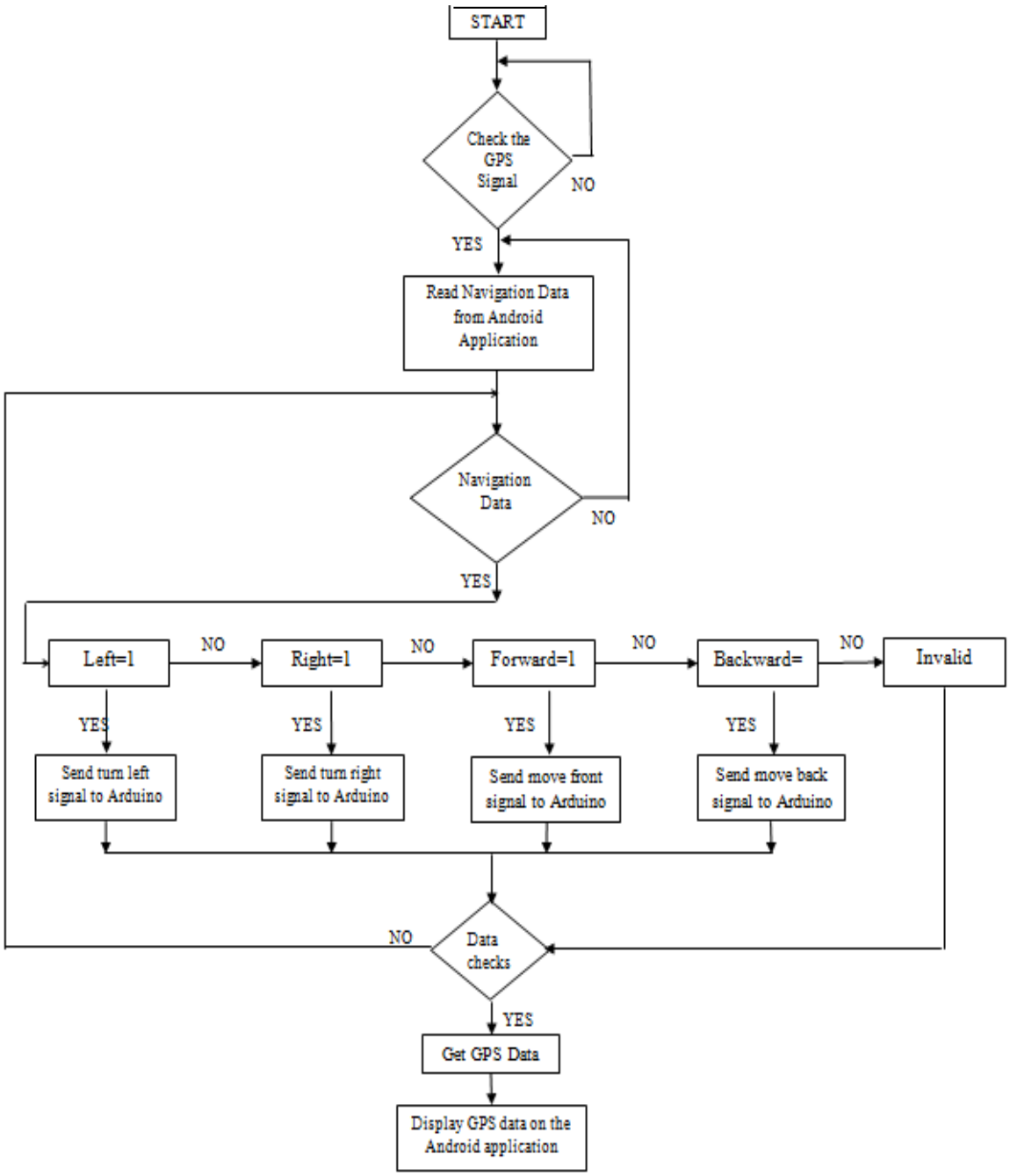


Fig 3.6.2 Flow Chart of Navigation System

3.7 GANTT CHART

3.7.1 GANTT TABLE

ACTIVITY NAME	DURATION (In Days)	DEC				JAN				FEB				MAR	
		W 1	W 2	W 3	W 4	W 5	W 6	W 7	W 8	W 9	W 10	W 11	W 12	W 13	W 14
Analysis of Existing Systems	5														
Planning	13														
Requirement Analysis	15														
Analysis Refinement	15														
Design	10														
Software Implementation	20														
Hardware Implementation	10														
Implementation	15														
Testing	11														

3.8 DATABASE DESIGN

The most important consideration in designing the database is how information will be used. In this project we use Blynk Online database stored in blynk server. Blynk is a mobile platform that helps you quickly develop high-quality apps, grow your user base, and earn more money. Blynk application is made up of complementary features that you can mix-and-match to fit your needs, with Data Analytics for application at the core. The main objectives of designing a database are Data Integration and Data Independence.

3.8.1 DATA INTEGRATION

In a database, information from several files are coordinated, accessed and operated upon as through it is in a single file. Logically, the information are centralized, physically, the data may be located on different devices, connected through data communication facilities. 0 Data integrity means storing all data in one place only and how each application to access it. This approach results in more consistent information, one being sufficient to achieve a new record status for all application, which uses it. This leads to less data redundancy. Data items need not be duplicated. A reduction in the direct access storage requirement.

3.8.2 DATA INDEPENDENCE

Data independence is the insulation of application programs from changing aspects of physical data organization. This objective seeks of to allow changes in content and organization of physical data without reprogramming of application and to allow modifications to application programs without reorganizing the physical data.

3.9 TABLE STRUCTURE

3.9.1 LOGIN TABLE

Unique **:** Email id

FIELD NAME	DATA TYPE	SIZE	CONSTRAINTS
Email id	Varchar	50	Primary key
Password	Varchar	20	Not Null

3.9.2 DATA TABLE

Unique **:** Field name

FIELDNAME	DATATYPE	SIZE	CONSTRAINTS
Temperature	Varchar	50	Not Null
Humidity	Varchar	50	Not Null
Atm pressure	Varchar	50	Not Null
LDR	Varchar	50	Not Null
Gas concentration	Varchar	50	Not Null

SYSTEM STUDY

CHAPTER 4

SYSTEM STUDY

System Study is the process of analyzing a system thoroughly in order to identify how the system is designed, how the system is performing, what are all the input and output that are involved in the system and so on. This study will give us a detailed insight about the system.

4.1 FEASIBILITY STUDY

Feasibility Study is the study of project that ensures whether the project is worthy or not. This study will analyze the project in different perspective and explain the benefits of proposing such a robotic system. It also deals with the negative area, what are all the consequences that have to be overcome to complete the project successfully. The future scope and existence of the project is also identified with the help of this study. It also look for the beneficiaries of the proposed system.

After undergoing feasibility study on our project "GPS CONTROLLED ROBOTIC VEHICLE FOR ENVIRONMENTAL IMAPCT ANALYSIS", we have identified the motive to propose this model, and several consequences are identified and rectified accordingly.

The Feasibility Study includes

- Social Study
- Technical Study
- Economical Study

4.1.1 SOCIAL STUDY

Social Study is a kind of feasibility study that analyzes user's comfort of handling the system. Motive of every new project is to achieve innovation and to reduce hardness in existing ideas. The main victory of a project is that it should be user felicitous. The result of the study also helps us how to make the project more compatible in the social world. Undergoing this study helps us to develop our project in a good-natured environment.

4.1.2 TECHNICAL STUDY

Technical Study is the study where the project is validated whether it is strong in its technical functionalities. Technical field includes how the project is working and it deals how it is implemented in terms of their input, processing and their outputs. Undergoing this study will enable the user to identify the internal functionalities of the project.This technical study identifies how our project accepts the input from the android application, how the data is processed to observe the environmental conditions. .

4.1.3 ECONOMICAL STUDY

Economical Study of the project deals with the cost of the system. Every new project is advancement to its field. Profit is an essential part for advancement. This study ensures profitability of the project in the core area. It also includes how the project completes its work in a desired time.

4.2 SYSTEM TESTING

4.2.1 TEST APPROACH

4.2.1.1 UNIT TESTING

Unit Testing is the first level of testing in which testing is performed at each and every individual units of the software. Usually a unit consists of very small input and output. The main aim of unit testing is to ensure that every unit is working correctly and gives the estimated output or not. The software developers often take care about the unit testing. The major advantage of performing this unit testing is that the failure in any unit is identified and rectified easily. Performing unit test also adds efficiency to the code. In this system, unit testing is performed for all the four modules. At the end of unit testing, functionality of every module is verified successfully.

4.2.1.2 INTEGRATION TESTING

Integrated Testing is the second level of software testing. In this integrated testing, several individual units are combined together and tested. After completion of unit testing,

there exists a case when certain units are combined together to perform specific tasks. In such cases, integration testing is held to ensure validity between those interfaces. This testing is carried out by either developers or testers.

In our system, among the four modules, the last two modules are integrated together so that the system works in a correct way. The two modules are integrated to attain better efficiency and to satisfy the expected output.

4.2.1.3 SYSTEM TESTING

System Testing is the third level of software testing. The major concept behind system testing is to perform testing on integrated system with respect to the specified requirements. This system testing is taken care by independent testers. This testing ensures validation of the entire complete software along with the integrated components. The system is tested in an end - to - end manner in order to attain more efficiency.

In our system, the last two integrated modules are then tested with the first module. This checks whether data is obtained correctly or not. This system testing achieves better efficiency for the proposed model in a successful manner.

4.2.1.4 ACCEPTANCE TESTING

Acceptance Testing is the final level of software testing. This testing ensures whether the proposed system meet the business requirements or external user requirements. This testing is used to check whether the system sustain in the external world or not. It is carried out by external users, business people and other who has not involved in the software development.

In the proposed system, the entire four modules are combined to verify the correctness of the program. Based on the given criteria, the system meets the user requirements in a successful way.

CONCLUSION AND FUTURE ENHANCEMENT

CHAPTER 5

CONCLUSION AND FUTURE ENHANCEMENT

5.1 CONCLUSION

The GPS controlled robotic vehicle concept provides a new way for monitoring the environmental conditions such as temperature, humidity, air quality, air pressure and light intensity. Sensors sense the data from the environment and transmit it to the cloud server using wireless communication. Then the data are updated to android application for every six second. The key benefits of the system are the user interfaces within the App and Autonomous movement after obtaining instruction from the user. The proposed robotic vehicle work effectively in remote places to collect data and it is easy to implement. The environmental visualization and two way audio communications can be monitored in android application which is obtained through the camera in the system. Data obtained through the internet of things platform can be used for future prediction.

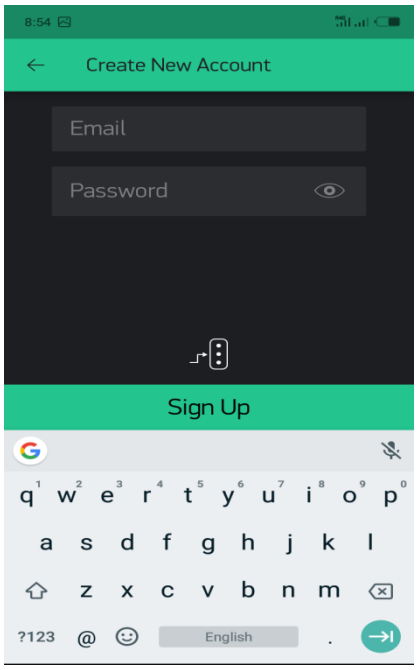
5.2 FUTURE ENHANCEMENT

In the future, the design method can also be applied in drone technology to make it even more dynamic. Enhance the reliability and security in data transmission over the IoT communication platform can be done. Solar cell battery charging along with the power supply can be implemented in the design for backup power system. The system can be linked to satellite communication for the long-range access of the vehicle.

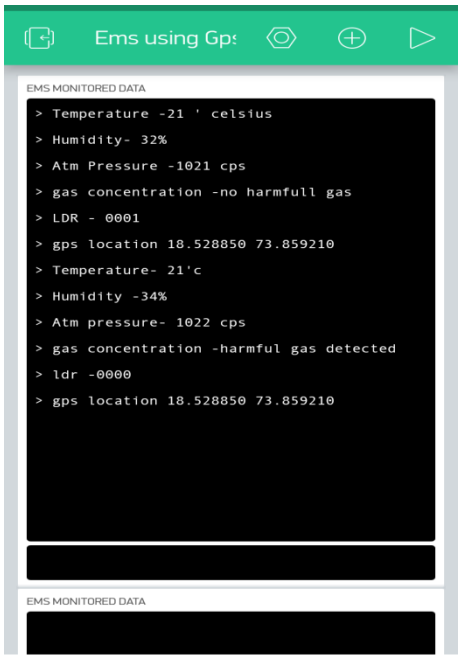
APPENDIX

SCREENSHOTS

LOGIN FOR BLYNK



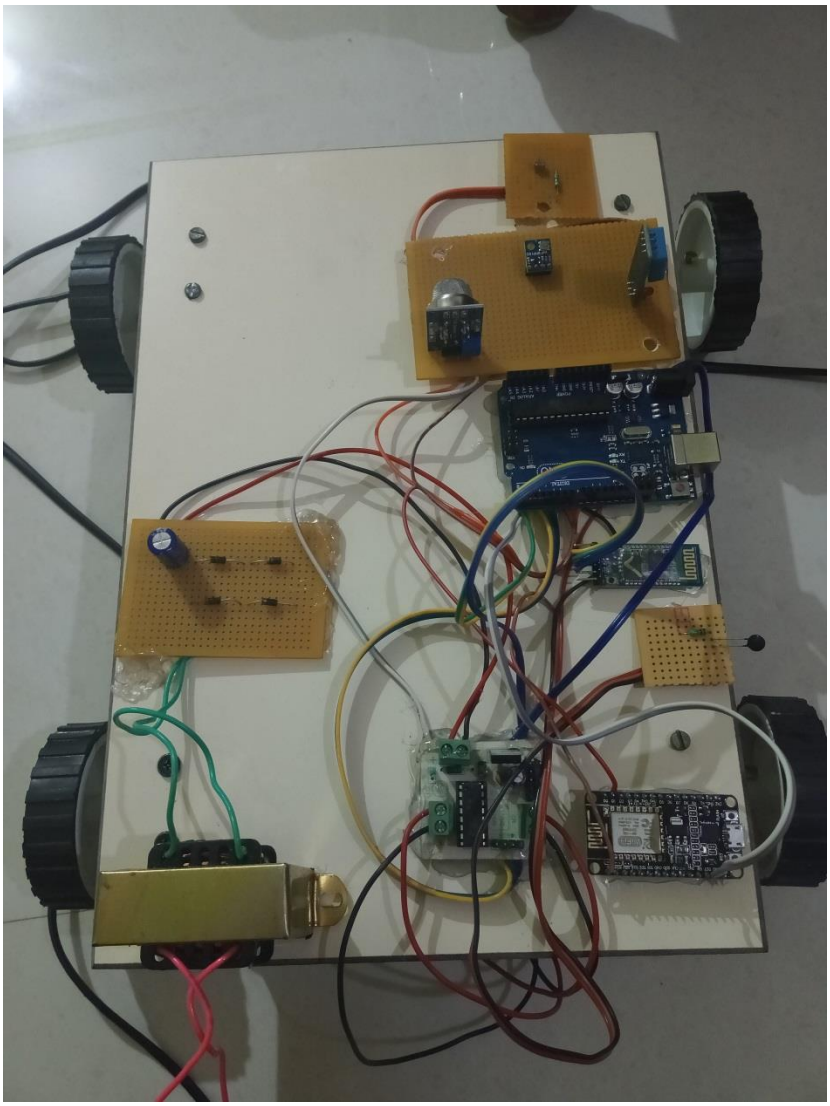
D ATA DISPLAY OVER APP



ARDUINO BLUETOOTH CONTROL

WIRELESS IP CAMERA VISIULIZATION AND TWO WAY AUDIO COMMUNICATION

OUR PROTOTYPE



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