

SOLDIER RESCUE SYSTEM

Submitted in partial fulfillment of the requirements for the
award of a Bachelor of Engineering Degree in Electronics and
Communication Engineering

By

BADIREDDY LOHIT SURYA SAI KRISHNAM NAIDU (Reg No – 39130051)

ATTADA SAANDEEP DORA (Reg No – 39130044)



**DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING**

SCHOOL OF ELECTRICAL AND ELECTRONICS

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with a grade "A" by NAAC

JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI – 600119

APRIL 2023



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited with "A" grade by NAAC

Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai - 600 119

www.sathyabama.ac.in

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **BADDIREDDY LOHIT SURYA SAI KRISHNAM NAIDU (39130156)** and **ATTADA SANDEEP DORA (39130044)** who carried out the project entitled "**SOLDIER RESCUE SYSTEM**" under our supervision from November 2022 to April 2023.

Internal Guide

Dr. M. SUBRAMONIAM, M.E., Ph.D.,

Head of the Department

Dr. T. RAVI, M.E., Ph.D.,

Submitted for Viva voce Examination held on 24.04.2023

Internal Examiner

External Examiner

DECLARATION

We, **BADDIREDDY LOHIT SURYA SAI KRISHNAM NAIDU (39130156)** and **ATTADA SANDEEP DORA (39130044)** here by declare that the Project Report entitled " **SOLDIER RESCUE SYSTEM** " done by us under the guidance of **Dr. M . SUBRAMONIAM, M.E., Ph.D.**, Associate Professor, Dept. of Electronics and Communication Engineering, Sathyabama institute of science and technology , Chennai, submitted partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering.

DATE :24..4.23

PLACE :Chennai

SIGNATURE OF CANDIDATES

1. 
2. 

ACKNOWLEDGEMENT

We are pleased to acknowledge our sincere thanks to the Board of Management of **SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. We are grateful to them.

We convey our thanks to **Dr. N. M. NANDHITHA, M.E., Ph.D. Dean, School of Electrical and Electronics Engineering** and **Dr. T. RAVI, M.E., Ph.D. Head of the Department, Department of Electronics and Communication Engineering** for providing us with necessary support and details at the right time during the progressive reviews.

We would like to express my sincere and deep sense of gratitude to our Project Guide **Dr. M. SUBRAMONIAM. M.E., Ph.D.**, Associate professor, Dept. of Electronics and Communication Engineering, for his valuable guidance, suggestions, and constant encouragement for the successful completion of our project work.

We wish to express our thanks to all Teaching and Non-teaching staff members of the Department of Electronics and Communication Engineering who were helpful in many ways for the completion of the project.

ABSTRACT

Health Monitoring Systems using IOT describes the collection and interoperation of Soldier's data collected from the sensors on the battlefield through IOT Technology. The collected sensor data will support the doctor in the emergency to improve the Injured Cop's health. The hardware platform to implement the project consists of a sensor and esp8266 CP2102 equipped in a way to communicate with doctors through the Internet and Smart Phone. This proposed idea will help doctors to know about the state of an individual's health and monitor anywhere in the world. In this proposed idea the sensors gather the medical in for sensors gather the warriors' medical information, including pulse rate. The doctor can monitor the patient data from any place in the world through the provided IP server address at any time. An emergency alert is sent to them if the sensor value is exceeded the threshold data. Thus, the individual's health parameters are watched lively and regular monitoring through the medical server to a doctor will help to make an effective diagnosis and almost accurate care can be given. The data collected through the IoT will help them to recover easily and care can be given to them at a low cost.

CONTENTS

CHAPTER NO	TITLE	PAGE No.
	ABSTRACT	v
	LIST OF FIGURES	xv
1	INTRODUCTION	1
2	LITERATURE SURVEY	9
3	EXISTING SYSTEM	15
	3.1 Proposed Methodology	15
	3.2 Advantages And Disadvantages Of The Proposed System	16
4	DESCRIPTION OF THE PROPOSED SYSTEM	17
	4.1 Selected Methodology or process model	17
	4.2 Architecture/Overall Design of Proposed System	19
	4.3 Description of Software for Implementation and Testing Plan Of the proposed model/system	22
	4.4 Project Management Plan	34
	4.5 Financial report on estimated costing	36
	4.6 Transition /Software to Operations Plan	37
5	IMPLEMENTATION DETAILS	39
	5.1 Development And Deployment Setup	39
6	CONCLUSION	42
	Notable IEEE Standard Committee	43
	References	47
	Paper of plagiarism	

LIST OF FIGURES AND TABLES

FIGURE NO	NAME	PAGE No.
FIG 1.1.1	An example of how an IoT system works from collecting data to taking action	2
FIG 1.2.1	Pulse graph	5
FIG 3.1.1	Flow chart	15
FIG 4.2.3	Flow chart	21
FIG 4.2.1	Component	20
FIG 4.2.2	Power Pin Indicator	21
FIG 4.3.1	Noise Elimination Circuitry	23
FIG 4.3.2	Blood Pressure Monitoring	24
FIG 4.3.3	MQ-2 Gas Sensor	26
FIG 4.3.4	MQ-2 Sensor Circuit	27
FIG 4.3.5	ESP8266 WIFI Module	28
FIG 4.3.6	ESP8266 WIFI Module Circuit	30
FIG 4.3.7	Arduino	32
FIG 4.3.8	Arduino pin diagram	33
FIG 4.8.2	Heart Beat And Toxic Gas on the Blynk app	41

CHAPTER 1

INTRODUCTION

The Internet of Things, or IoT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals, or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

A thing in the Internet of Things can be a person with a heart monitor implant, a farm animal with a biochip transponder, an automobile that has built-in sensors to alert the driver when tire pressure is low, or any other natural or man-made object that can be assigned an Internet Protocol (IP) address and can transfer data over a network.

Increasingly, organizations in a variety of industries are using IoT to operate more efficiently, better understand customers to deliver enhanced customer service, improve decision-making and increase the value of the business.

1.1 HOW DOES IOT WORK

An IoT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors, and communication hardware, to collect, send and act on data they acquire from their environments. IoT devices share the sensor data they collect by connecting to an IoT gateway or other edge device where data is either sent to the cloud to be analyzed or analyzed locally. Sometimes, these devices communicate with other related devices and act on the information they get from one another. The devices do most of the work without human intervention, although people can interact with the devices -- for instance, to set them up, give them instructions or access the data. The connectivity, networking, and communication protocols used with these web-enabled devices largely depend on the specific IoT applications deployed.

IoT can also make use of artificial intelligence (AI) and machine learning to aid in making data-collecting processes easier and more dynamic.

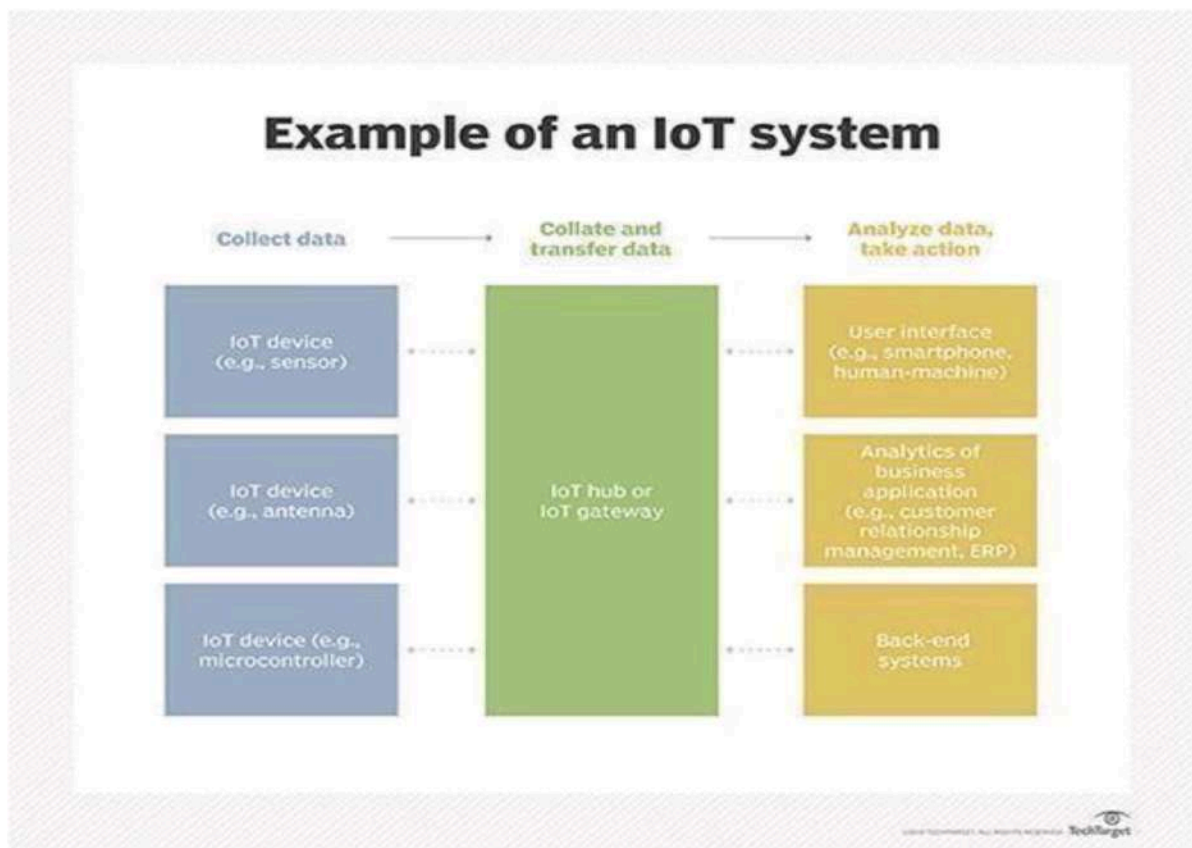


FIG 1.1.1 *An example of how an IoT system works from collecting data to taking action*

1.2 WHY IS IOT IMPORTANT

The Internet of Things helps people live and work smarter, as well as gain complete control over their lives. In addition to offering smart devices to automate homes, IoT is essential to business. IoT provides businesses with a real-time look into how their systems work, delivering insights into everything from the performance of machines to supply chain and logistics operations.

IoT enables companies to automate processes and reduce labor costs. It also cuts down on waste and improves service delivery, making it less expensive to manufacture and deliver goods, as well as offering transparency in customer transactions.

As such, IoT is one of the most important technologies of everyday life, and it will continue to pick up steam as more businesses realize the potential of connected devices to keep them competitive.

THE BENEFITS OF IOT TO ORGANIZATIONS

The Internet of Things offers several benefits to organizations. Some benefits are industry-specific, and some are applicable across multiple industries. Some of the common benefits of IoT enable businesses to:

- monitor their overall business processes;
- improve the customer experience (CX);
- save time and money;
- enhance employee productivity;
- integrate and adapt business models;
- make better business decisions.

Improved Efficiency: IoT devices can help organizations automate processes, monitor operations in real time, and provide valuable insights for optimizing operations, which can ultimately improve overall efficiency and productivity.

Cost Reduction: IoT can help organizations save money by reducing labor costs, minimizing downtime, and preventing equipment failures. By monitoring equipment and operations in real time, organizations can identify potential problems before they occur and take action to prevent them, saving both time and money.

Enhanced Customer Experience: IoT devices can help organizations provide better customer experiences by enabling personalized and customized services. For example, smart homes can adjust temperature and lighting based on the user's preferences, and retail stores can provide personalized offers and recommendations based on a customer's shopping history.

Data-Driven Decision Making: IoT devices generate vast amounts of data, which can be analyzed to gain valuable insights into consumer behavior, product performance, and operational efficiency. This data can inform strategic decisions and help organizations stay ahead of the competition.

Improved Safety and Security: IoT devices can be used to monitor and control access to sensitive areas, detect and respond to security threats, and provide real-time alerts in case of emergencies. This can help organizations ensure the safety of

their employees, customers, and assets.

IoT encourages companies to rethink the ways they approach their businesses and gives them the tools to improve their business strategies.

Generally, IoT is most abundant in manufacturing, transportation, and utility organizations, making use of sensors and other IoT devices; however, it has also found use cases for organizations within the agriculture, infrastructure, and home automation industries, leading some organizations toward digital transformation.

IoT can benefit farmers in agriculture by making their job easier. Sensors can collect data on rainfall, humidity, temperature, and soil content, as well as other factors, that would help automate farming techniques.

The ability to monitor operations surrounding infrastructure is also a factor that IoT can help with. Sensors, for example, could be used to monitor events or changes within structural buildings, bridges, and other infrastructure. This brings benefits with it, such as cost saving, saved time, quality-of-life workflow changes, and paperless workflow.

A home automation business can utilize IoT to monitor and manipulate mechanical and electrical systems in a building. On a broader scale, smart cities can help citizens reduce waste and energy consumption.

IoT touches every industry, including businesses in healthcare, finance, retail, and, manufacturing

1.3 THE PROS AND CONS OF IOT

Some of the advantages of IoT include the following:

- ability to access information from anywhere at any time on any device;
- improved communication between connected electronic devices;
- transferring data packets over a connected network saving time and money;
- automating tasks helps to improve the quality of a business's services and reduces the need for human intervention;

Some disadvantages of IoT include the following:

As the number of connected devices increases and more information is shared between devices, the potential that a hacker could steal confidential information also increases. Enterprises may eventually have to deal with massive numbers -- maybe even millions -- of IoT devices, and collecting and managing the data from all those devices will be challenging.

If there's a bug in the system, every connected device will likely become corrupted. Since there's no international standard of compatibility for IoT, it's difficult for devices from different manufacturers to communicate with each other.

The Indian Army is the second largest army in the world and is a branch of the Indian armed forces, specializing in operating on land. It is also the largest component of the Indian armed forces. The chief responsibilities of the Indian Army include national RESCUE and maintaining unity, protecting India from external and internal threats, maintaining peace and security within Indian borders, and also conducting rescue operations during natural calamities and disasters.

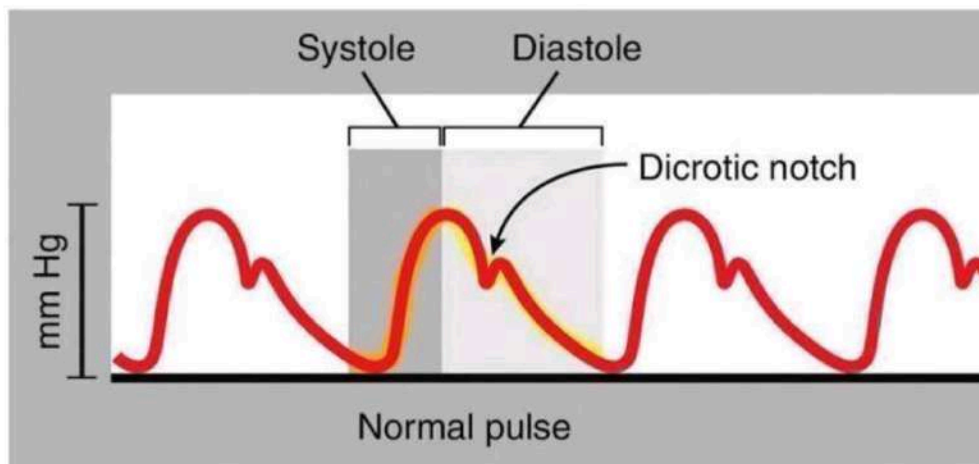


Fig-1.2.1 Pulse graph

On 15th January 1949, Lieutenant General K.M. Cariappa took over as the first Commander-in-Chief of the Indian Army, and this day is celebrated as Army Day in India. Today, on account of the 68th Indian Army Day, here are 8 points about the Indian Army that we should all know about the President of India is the Commander-in-Chief of the Indian Army, and the Army is commanded by the Chief of Army Staff (COAS). Here's a graphic representation of the structure of the Indian Army:

The Indian Army is an all-volunteer force (the largest all-volunteer force) with a regimental system where an enlisted troupe normally spends them.

Indian Army has been the largest contributor to the UN peacekeeping forces, and India also holds the edit of forming the first Female Formed Police Unit under the UN.

Siachen Glacier, at a height of more than 5000 meters above sea level, is the highest battlefield in the world, and it is under the control of the Indian Army. The conditions at the Siachen are extremely difficult, with temperatures dropping as low as minus 50 degrees and more soldiers perish from cold than from bullets. The Indian soldiers have successfully defended this region against all conflicts and aggressions.

Military Engineering Services is one of the largest construction and maintenance agencies in India and is responsible for some of the best constructions across the country, like the Khardungla Pass (the highest motorable road in the world), the Magnetic Hill in Leh, and so on. They are often consulted to deliver projects that require swift and efficient action.

Indian Army also holds credit for the construction of structures at some of the most difficult geolocations, like the Baily Bridge constructed by the Military Engineering Services, and the Border Roads organization in 1982. It is the highest bridge in the world and is built between the Dra's and Saru rivers in the Himalayas. The Border Roads Organization is also responsible for building roads and giving accessibility to the areas in the Himalayas which were once inaccessible.

The Indian Army is known for high-altitude and mountain warfare, and the Indian soldiers are considered the best in the world for high-altitude warfare. The High-Altitude Warfare School (HAWS) of the Indian Army is an elite training center, sought by Special Ops teams from many countries.

Indian Army has a horsed cavalry regiment - the 61st cavalry regiment, and it is one of the only three cavalry units in the world.

1.4 PROBLEM STATEMENT

24x7 Power backup must be maintained from the substation.

National Firewall should be under surveillance and it must be protected against

black hat hackers. Optical Cable maintenance must be under care at least once a year. Additional Man-Power will create a minor impact on the existing protocol since persons are required to support overall power backup and system maintenance but, when compared to the profit ratio this factor is purely negligible.

The system must be installed under open space and proper maintenance must be given on a cyclic basis

OBJECTIVES

The main objective of this project proposal is to know the instantaneous health data of our Soldiers on the battlefield

To take immediate action for the injured warriors to save their life

To track the total health status of our Indian army during the war

To Support them with proper preventive methods to ensure their stability

To extend our maximum support through technology and support them when needed

MOTIVATION

Being a soldier is not easy it is one of the most challenging things to do. Their lives are full of hardships and challenges which no ordinary person can survive. Firstly, they spend a great deal of time away from their loved ones. It disturbs them emotionally and they do not even get any holidays. Even in festivals, they are busy safeguarding the nation. Similarly, soldiers have to undergo rigorous training to become fit to fight battles. It becomes exhausting and physically challenging, but they still go on. To make it worse, they do not even get an adequate amount of supply to lead a normal life. Sometimes, the food rationing is low, the other times they get posted in remote areas without any signal. This got us motivated to propose a project to support them with their medical needs on the battlefield.

1.3 SCOPE OF THE PROJECT

Our Proposed model is a real-time installation model.

We used Wireless technology to operate the gadgets.

Control of Battery management and SMPS distributor is present in our model.

Few drawbacks to our proposed system, using alternative power sources will increase the product cost and selling cost of the product.

An extra maintenance fee will be required to provide AMC.

CHAPTER 2

LITERATURE SURVEY

The following shows a survey done for the patient health monitoring system with and without the internet on Realtime which includes an instant feedback mechanism that sends data to the doctors. This system is reliable to integrate on multiple platforms with the help of ESP32 master which serves as standard firmware. Further, the study was extended to multiple operation platforms like Linux, Windows, and IOS are discussed as follows. In this detailed survey, we have learned a lot in stabilizing our concepts from the existing feedback mechanisms that were designed in the previous study

Satyendra K. Vishwakarma, Prashant Upadhyaya, Babita Kumari, and Arun Kumar Mishra, IJSR “Smart Energy Efficient Home Automation System Using IoT”, IJSR Transaction on Computer Science Engineering 2021.

This paper presents a step-by-step procedure for a smart home automation controller. It uses IoT to convert home appliances to smart and intelligent devices, with the help of design control. The proposed system mainly requires, Node MCU as the microcontroller unit, IFTTT to interpret voice commands, Adafruit a library that supports MQTT acts as an MQTT broker, and Arduino IDE to code the microcontroller. The smart home is implemented with the main control unit that is connected to the 24-hour available Wi-Fi network. To ensure, that the Wi-Fi connection does not turn off, the main controller is programmed to establish an automatic connection with the available network and connected to the auto power backup.

Pros: The target scaling factor is efficient throughout the multiple platform switching.

Cons: Slower transit cycles when compared to CoAP, low scalability, and lack of security encryption

Shradha Somoni, Parikshit Solanke, Shauna Oki, Parth Medhi. Prof. P. P. Latoria, IEEE “IoT Based Smart Security and Home Automation”, IEEE Transactions on Augmented Reality, 2021.

This paper focuses on a system that provides features of Home Automation

relying on IoT to operate easily, in addition to that it includes a camera module and provides home security. Security is achieved with motion sensors if movement is sensed at the entrance of the house; a notification is sent that contains a photo of the house entrance in real-time. This notification will be received by the owner of the house via the Internet such that the app can trigger a notification. So, the owner can raise an alarm in case of any intrusion or he/she can toggle the appliances like opening the door if the person is a guest. The system uses Raspberry Pi, a small-sized computer that acts as a server for the system. The smart home consists of two modules. Home automation consists; of a fanlight and door controller, and a security module that consists; of a smoke sensor motion sensor, and camera module.

Pros: Implementation of the IR Interface was an excellent Idea for creating universal.

Cons: The system Uses Infrared Radiation for data transfer which is much faster than CoAP but could be easily mapped with 38 kHz of regular frequency.

Tui-Yi Yang, Chu-Sing Yang, IJEEE “A Dynamic Distributed Energy Management Algorithm of Home Sensor Network for Home Automation System”, IJEEE Transactions on Electrical and Electronics Engineers, 2017

This paper proposes an optimization of home power consumption based on PLC (Power Line Communication) for easy-to-access home energy consumption. This also proposes a Zigbee and PLC-based renewable energy gateway to monitor the energy generation of renewable energies. ACS and DDEM algorithms are proposed for the design of intelligent distribution of power management systems to make sure ongoing power supply of home networks. To provide efficient power management the power supply models of home sensor networks are classified viz. main supply only, main supply and backup battery, rechargeable battery power, and non-rechargeable battery power. Devices with particular features are assigned to these groups. It targets establishing a real-time processing scheme to address variable sensor network topologies.

Pros: Fast and secured since the data encryption is 64bit ratio and it follows the MQTT protocol

Cons: Does not support large database sizes, and it has no support for ROLE, COMMIT, and Stored Procedures

Tushar Chourasia, and Prashant Kumar Jain “Enhance Smart Home Automation System based on Internet of Things”, Transactions on Artificial Neural Networks, 2019

This paper proposes a system that develops a model to reduce the computation overhead in existing smart home solutions that use various encryption technologies like AES, ECHD, hybrid, etc. These solutions use an intermediate gateway for connecting various sensor devices. These smart home devices with sensors can configure themselves autonomously and can operate without human intervention. This work minimizes encryption decryption and focuses on authentication and automation of smart home devices with learning. The system bypasses the local gateway mentioned in the existing system to provide better security for smart home devices and sensor data and save computation overhead. The real-time broker cloud is directly connected to the smart home and manages all incoming and outgoing requests between users and devices.

Pros: Bringing AR with Deep Neural schema is an Excellency and this system can be integrated with the 7 senses of the future world.

Cons: It has a range of support between 3.5Hz to 75Hz which in turn directly matches the neural frequency that potentially messes up sensory organs.

Suraj, Ishu Kool, Dharmendra Kumar, Shovan Barman “Visual Machine Intelligence for Home Automation”, MDPI Transactions on Applied Science, 2020

The paper presents a vision-based machine intelligence system to sense the on/off state of common home appliances. The proposed method of sensing the state of appliances results in a novel home automation system. The accessibility of the suite of devices in the home over a remote network is facilitated by the IP Addressing methods in the IoT. This project uses two boards viz. Raspberry Pi and Intel Galileo Gen 2. The communication between the User devices, Raspberry Pi, and the Intel Galileo boards happens over a wireless network. A Pi Cam and a USB Logitech camera are attached to the rotating shaft of two different servo motor capture snapshots that are passed as inputs to the Machine Learning based models trained using C++ to detect the state of the operation of the appliances.

The proposed method uses visual modality to automate the appliances, as privacy concerns may emerge while using the images from some specific places, as a counter to this issue, an SPDT switch is added to the Raspberry Pi which when turned off ensures that even if the images are taken from the webcams, they are just passed as inputs to the machine learning models and are not displayed on the website when the users access the website on the server address obtained from Raspberry Pi.

Pros: High Visual and Artificial Database was integrated which can be a link between and virtual and physical world. A creative contextual database has created a huge responsive factor

Cons: Superimposing virtual environmental capacity has no range of lower frequency AR camera support

2.2.6 Vikram N, Harish KS, Nihal M S, Raksha Umesh, and, Shetty Ashiks Ashok Kumar, "A Low-Cost Home Automation System using Wi-Fi-based Wireless sensor Network incorporating Internet of things", Procedia Computer Science Transactions on Mobile Device, 2015

This paper illustrates a methodology to provide a low-cost Home Automation System (HAS) using Wireless Fidelity (Wi-Fi). This crystallizes the concept of internetworking of smart devices. A Wi-Fi-based Wireless Sensor Network (WSN) is designed for monitoring and controlling the environmental, safety, and electrical parameters of a smart interconnected home. The different sections of the HAS are; the temperature and humidity sensor, gas leakage warning system, fire alarm system, burglar alarm system, rain-sensing, switching and regulation of load & voltage, and current sensing. The primary requirement of HAS to monitor and control devices is accomplished using a Smartphone application. The application is developed using Android Studio based on the JAVA platform and the User Interface is exemplified. The primary focus of the paper is to develop a solution cost-effective and flexible in the control of devices and implements a wide range of sensors to capture various parameters.

Pros: Implementing a local server reduces cognitive allocation in the server. Cons: Error Factors are high since it is purely based on local server data

Mrs. Paul Jasmin Rani, Jason Bakthan Kumar, Praveen Kumar B, Praveen Kumar U. Santhosh Kumar. "Voice Controlled Home Automation System using Natural Language Processing and Internet of Things", INCC Transactions on National Security Science and Computation, 2018

The paper focuses on the construction of a fully functional voice-based home automation system that uses the Internet of Things, Artificial Intelligence, and Natural Language Processing (NLP) to provide a cost-effective, efficient way to work together with home appliances using various technologies such as GSM, NFC, etc. it implements a seamless integration of all the appliances to a central console The NLP in this project gives the user the freedom to interact with the home appliances with his/her voice and normal language rather than complicated computer commands. The appliances are connected to the mobile device through an Arduino Board that establishes the concept of the Internet of Things. The Arduino Boards are interfaced with the appliances and programmed in such a way that they respond to mobile inputs.

Pros: Only a few notable parameters throughout the project Cons: The rate of prediction is proportionally less when compared to real-world predictions

Jonathan J. Hull, Berna Erol, Jamey Graham, Qila Kee, Hide Nobu Kishi, Jorge Morale, Daniel G. Van Ost, Research Gate "Paper-Based Augmented Reality", Research Gate Transaction on Camera and Paper documentation, 2007

A new method for augmenting paper documents with electronic information is described that does not modify the format of the paper document in any way. Applicable to both commercially printed documents as well as documents that are output from PCs, the technique we call Paper Based Augmented Reality substantially improves the utility of paper. We describe the recognition technology that makes this possible as well as several applications. An implementation on a camera phone is discussed that lets users retrieve data and access links from paper documents to electronic data. Recognition is performed at 4 frames per second on a Treo 700w and support is provided for several user applications, including

“clickable paper” – printed web pages whose appearance is unchanged but that can be navigated with a camera phone.

Pros: Augmented reality with virtual automation was brought to the physical world.

Cons: Linking patches of text will increase a lot of security reasons

Miko Kytö^{1,2}, Barrett Ens², Tamatha Piumsomboon², Gun A. Lee², and Mark Billingham², Research Gate “Pinpointing: Precise Head- and Eye-Based Target Selection for Augmented Reality”, Research Gate Transactions on Augmented Reality in Computer Science Engineering, 2018

Head and eye movement can be leveraged to improve the user’s interaction repertoire for wearable displays. Head movements are deliberate and accurate and provide the current state-of-the-art pointing technique. A comparison of speed and pointing accuracy reveals the relative merits of each method, including the achievable target size for robust selection. We demonstrate and discuss example applications for augmented reality, including compact menus with deep structure, and a proof-of-concept method for online correction of calibration drift.

Pros: Accuracy has reached 97% with a simple algorithm Cons: 97% precise and accurate but depends purely on real-time saturation and hue point of target images

Subramani Roy Choudhry, A. Divya, G. V N Vijayalakshmi, P. Vamsi, JARTMS “TOUCHLESS HOME AUTOMATION USING AUGMENTED REALITY”, JARTMS Transactions on Augmented Reality and Web Interface, 2021

As human life is heading toward a busy schedule it becomes necessary to automate our home appliances. Human error is something that cannot be completely erased. With the busy schedule in hand, there is defiantly a possibility of missing something that may be trivial to us but can result in a catastrophe. For these reasons, Our Project home automation can increase efficiency, security, and reliability. AR has recently evolved for the automation of various electrical appliances by popping virtual objects into the real world.

Pros: Target Image can be linked to the Virtual world Cons: Target Image can be linked-to automation with an augmented environment.

CHAPTER 3

EXISTING SYSTEM

In the existing model they monitored the entire system with a Raspberry Pi-based unit. Parameters are secured and transmitted with MQTT Servers to locate the data. Pulse rate, Blood Pressure Sensor, and Heart sound Sensor are all connected with the bus of CAN Protocol. Pi Camera is also used to know the status which makes the system costlier and more discomfort. This system can only apply to bedridden patients.

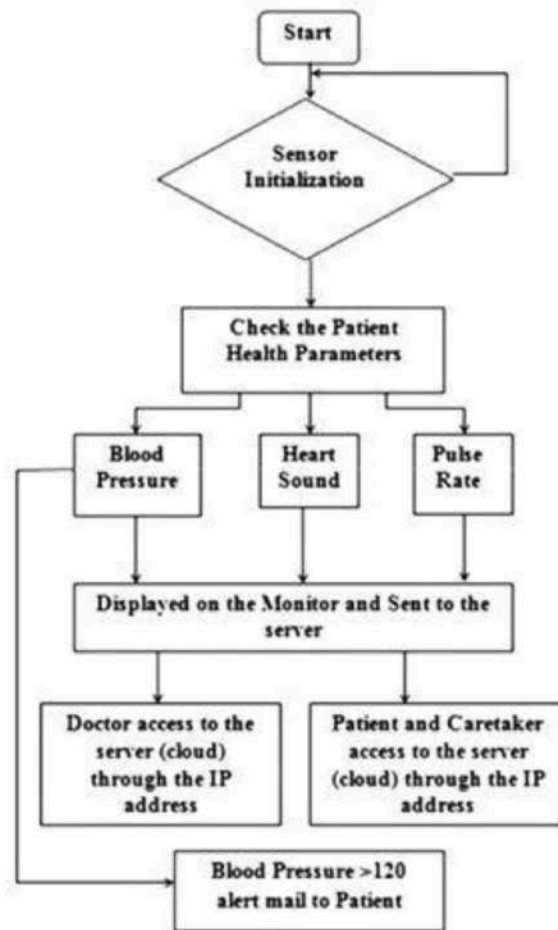


Fig-3.1.1 FlowChart

3.1 PROPOSED METHODOLOGY

Our model is based on a cost-effective highly compact design that helps us to acquire data over the Internet. The data is sent via a 128-bit accuracy key so that it can't be easily mapped or attacked by hackers. Since our model is specifically

proposed for Army, data security plays a vital role in encryption Doctors connected to the IP alone can read the status of the soldiers on the battlefield Hence the system is more reliable, Safe, and Secured Live monitoring of data can create instant help when needed We used BLYNK web Server to send and receive the data that are encrypted This server is more effective and reduces a lot of spectrum us

3.2 ADVANTAGES AND DISADVANTAGES OF THE PROPOSED SYSTEM

ADVANTAGES

Real-time monitoring: The project allows for real-time monitoring of gas concentrations and heart rate data, providing users with immediate feedback on the levels of pollutants in the air and their heart rate.

Low cost: The project components are relatively inexpensive, making it an affordable option for individuals and organizations looking to monitor air quality and heart. rate.

User-friendly interface: The Blynk app provides a user-friendly interface that displays the gas concentration and heart rate data in an easy-to-understand format.

Customizable: The project can be customized to fit specific needs and requirements, such as monitoring multiple gas sensors or adding additional sensors.

DISADVANTAGES

Limited accuracy: The MQ-2 gas sensor has limitations in terms of accuracy and sensitivity, and may not detect all types of pollutants or gases.

Limited range: The project is limited by the range of the Wi-Fi network, and may not be suitable for monitoring air quality and heart rate in remote or isolated locations.

Requires power source: The project requires a power source to operate, which may limit its portability and flexibility.

Maintenance requirements: The project may require regular maintenance to ensure that the sensors are working correctly and that data is being transmitted accurately.

CHAPTER 4

DESCRIPTION OF THE PROPOSED SYSTEM

4.1 Selected Methodology or process model

The gas sensor can detect the presence of harmful gases such as carbon monoxide, methane, and hydrogen sulfide. The sensor output is connected to the analog input of the Arduino board, which can be programmed to process the signal and trigger an alarm or notification when the gas concentration exceeds a certain threshold.

The Arduino board can also read data from the heart rate sensor, which is typically worn on the wrist or finger. The heart rate data can be processed and displayed on a screen or transmitted wirelessly using the ESP8266 Wi-Fi module.

The ESP8266 Wi-Fi module enables the system to connect to the internet and send data to a remote server or a mobile app. This allows users to monitor the air quality and heart rate in real time from anywhere in the world, and receive alerts or notifications if any anomalies are detected.

Overall, the combination of a gas sensor, an Arduino board, an ESP8266 Wi-Fi module, and a heart rate sensor can create a versatile system that can be used for a variety of applications, such as environmental monitoring, health tracking, and safety control.

Gas sensors are widely used in various applications such as environmental monitoring, safety control, and industrial processes. They can detect a wide range of gases, from toxic gases to combustible gases, and can be designed to provide different levels of accuracy, sensitivity, and response time. There are different types of gas sensors available, such as electrochemical sensors, infrared sensors, and semiconductor sensors.

When it comes to combining a gas sensor with an Arduino microcontroller, it's important to choose a sensor that is compatible with the board's analog input. The

sensor output voltage varies with the gas concentration, which can be converted into a digital signal using the analog-to-digital converter (ADC) built into the Arduino. Once the sensor is connected to the board, it can be programmed to read the sensor data and trigger an alarm or notification if the gas concentration exceeds a certain level.

Next, let's look at the Arduino microcontroller. The Arduino is a popular platform for building interactive projects and prototypes, thanks to its ease of use, versatility, and low cost. It comes with a variety of inputs and outputs, including digital and analog pins, serial communication ports, and pulse-width modulation (PWM) pins. The Arduino can be programmed using the Arduino Integrated Development Environment (IDE), which is based on the C++ programming language.

To combine the gas sensor with the Arduino, you'll need to connect the sensor output to one of the board's analog input pins, such as A0, A1, or A2. You'll also need to write a program that reads the sensor data, converts it into a meaningful value, and performs a specific action based on the sensor reading.

Now, let's look at the ESP8266 Wi-Fi module. The ESP8266 is a low-cost, high-performance Wi-Fi module that can be used to add wireless connectivity to Arduino projects. It can be programmed using the Arduino IDE and comes with a built-in TCP/IP protocol stack, which enables it to connect to the internet and send/receive data packets over the Wi-Fi network.

To combine the ESP8266 module with the Arduino, you'll need to connect the module to the board's serial communication pins, such as RX and TX. You'll also need to write a program that initializes the module, sets up the Wi-Fi connection, and sends the sensor data to a remote server or mobile app using HTTP or MQTT protocol.

Finally, let's look at the heart rate sensor. Heart rate sensors are commonly used in fitness tracking devices, medical devices, and wearable technology. They can detect the heart rate by measuring the blood flow through the arteries using optical sensors or electrodes.

To combine the heart rate sensor with the Arduino, you'll need to connect the sensor output to one of the board's analog input pins, such as A3 or A4. You'll also need to write a program that reads the sensor data, processes it using signal processing techniques such as filtering and smoothing, and displays the heart rate on a screen or transmits it wirelessly using the ESP8266 module.

In summary, the combination of a gas sensor, an Arduino microcontroller, an ESP8266 WiFi module, and a heart rate sensor can create a powerful system for monitoring air quality and health-related parameters. The gas sensor can detect harmful gases, the Arduino can process the sensor data and read the heart rate sensor data, the ESP8266 module can transmit the data wirelessly over the internet, and the heart rate sensor can provide vital information about the user's health status.

4.2 Architecture/Overall Design of Proposed System

Gas Sensor: The gas sensor would detect the presence of harmful gases such as carbon monoxide, methane, and hydrogen sulfide in the air.

Arduino Microcontroller: The Arduino board would be responsible for reading the gas sensor data, processing it, and triggering an alarm or notification if the gas concentration exceeds a certain threshold. The board would also read data from the heart rate sensor and display it on a screen or transmit it wirelessly using the ESP8266 Wi-Fi module.

Heart Rate Sensor: The heart rate sensor would detect the user's heart rate and transmit the data to the Arduino board for processing.

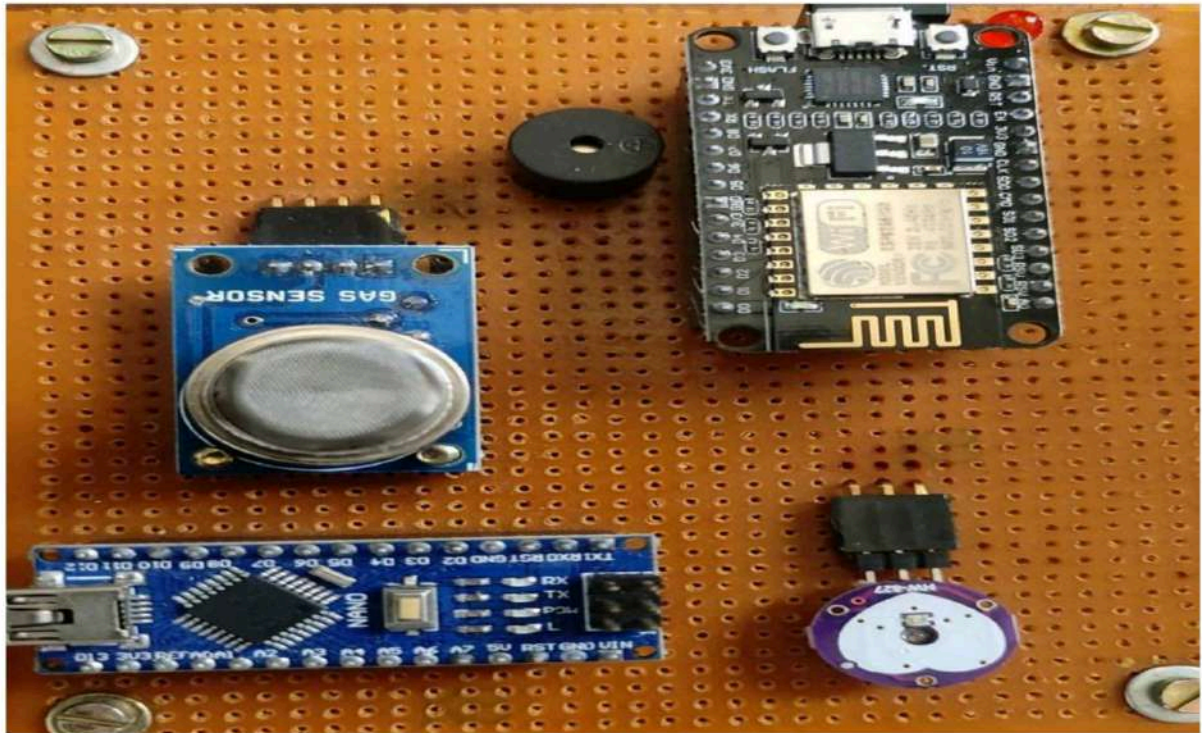


Fig-4.2.1 Component

ESP8266 Wi-Fi Module: The ESP8266 module would enable the system to connect to the internet and send data to a remote server or a mobile app. This would allow users to monitor the air quality and heart rate in real time from anywhere in the world, and receive alerts or notifications if any anomalies are detected.

The overall architecture of the project would involve a combination of hardware and software components. The gas sensor and heart rate sensor would provide input to the Arduino board, which would process the data and output it to a display or transmit it wirelessly using the ESP8266 module. The module would enable the system to connect to the internet and send data to a remote server or mobile app, allowing users to monitor the system's output in real-time and receive alerts or notifications if any issues arise.

The programming logic of the project would involve writing code for the Arduino board and the ESP8266 module. The Arduino code would read the sensor data, process it, and trigger an alarm or notification if necessary. The ESP8266 code would establish a Wi-Fi connection, send the data to a remote server or mobile app, and receive commands to adjust the system's settings or trigger an alarm.



Fig-4.2.2 Power Pin Indicator

Overall, the architecture of the project would be designed to provide a simple and reliable system for monitoring air quality and heart rate and transmitting the data wirelessly to a remote location. This would allow users to stay informed about their health and safety, and take appropriate action if necessary.

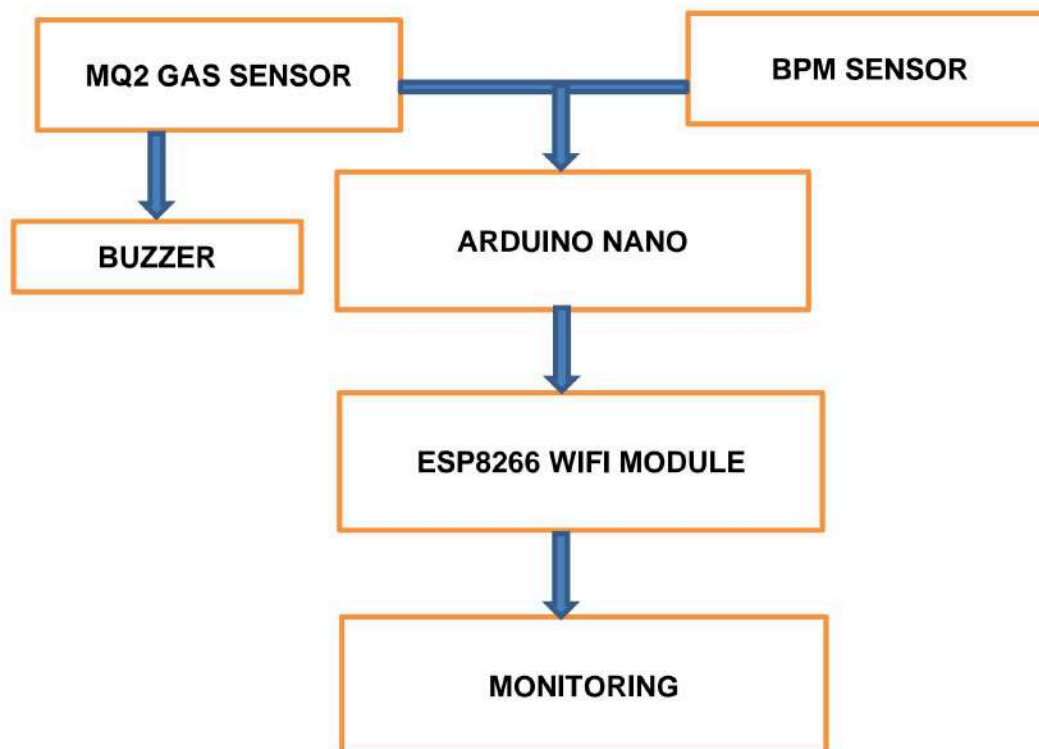


Fig-4.2.3 FlowChart

4.3 Description of Software for Implementation and Testing Plan of the proposed model/system.

Heartbeat sensors These devices use electrical detection to track your heart rate. They detect electrical activity through a band that wraps around your chest. For most of these devices to work as designed, the band must be wet, or you need to use a conductive gel where the sensors touch your skin. An optical heart rate sensor measures pulse waves, which are changes in the volume of a blood vessel that occurs when the heart pumps blood. Pulse waves are detected by measuring the change in volume using an optical sensor and green LED. Adopting an optical filter optimized for pulse wave detection in the sensor block minimizes the effects of ambient light such as red and infrared rays. This enables high-quality pulse signals to be acquired, even outdoors. In addition, leveraging optical sensor technology cultivated over many years allowed ROHM to significantly increase the sensitivity of the sensor block. Support for low brightness low VF LEDs makes it possible to achieve a low-power optical heart rate monitoring system without the need for external circuitry (i.e. boost circuit). This contributes to longer operating times in wearables with limited battery capacity. Heart rate sensors are devices that measure the heart rate or pulse rate of an individual, which is the number of times the heart beats per minute. The working principle of heart rate sensors can vary depending on the type of sensor, but generally involves the following steps:

Sensing: Heart rate sensors typically use one or more methods to sense the heart rate. One common method is optical sensing, where the sensor emits light (usually infrared) into the skin and measures the amount of light that is reflected. Changes in blood flow caused by the heart's pumping action result in variations in the amount of reflected light, which can be used to calculate the heart rate. Another method is electrical sensing, where the sensor measures the electrical signals generated by the heart's electrical activity through skin contact.



AO = Analog Output

Fig-4.3.1 Noise Elimination Circuitry

Signal Conditioning: The raw signal from the heart rate sensor may need to be conditioned to remove noise and interference and to amplify the weak signals. This can involve filtering, amplification, and other signal processing techniques to ensure a clean and reliable heart rate signal.

Signal Processing: The conditioned heart rate signal is processed to extract the relevant heart rate information. This can involve using algorithms to detect the peaks or valleys in the signal that correspond to each heartbeat, and then calculating the heart rate based on the time interval between these peaks or valleys.

Heart Rate Calculation: The heart rate is calculated based on the time interval between consecutive heartbeats, which is typically expressed in beats per minute (BPM). This heart rate information can then be used for various applications, such as fitness tracking, health monitoring, sports performance analysis, and medical diagnostics.

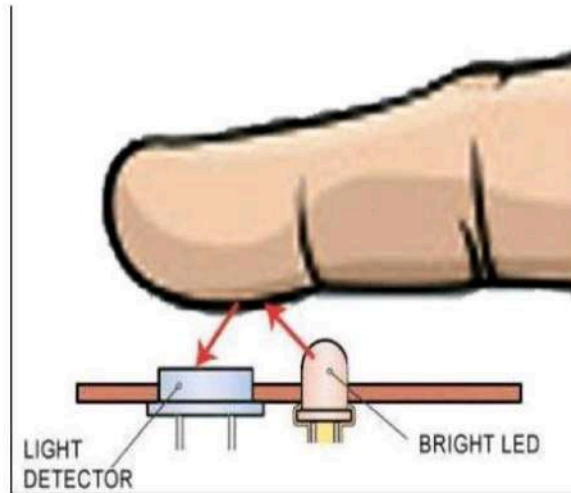


Fig-4.3.2 Blood Pressure Monitoring

Output Display or Transmission: The heart rate information can be displayed on an output device, such as a display screen, LED indicator, or audio feedback, to provide real-time heart rate feedback to the user. Additionally, the heart rate information can also be transmitted to other devices or systems for further analysis, logging, or integration with other applications.

Sensor Integration: Heart rate sensors can be integrated into various wearable devices, such as smartwatches, fitness trackers, and chest straps, as well as medical devices, fitness equipment, and other systems, to enable heart rate monitoring in real-time for various health and fitness applications.

Overall, the working principle of heart rate sensors involves sensing the heart rate using optical or electrical methods, signal conditioning and processing, heart rate calculation, and output display or transmission for real-time heart rate monitoring.

Gas Sensor(MQ2): the gas sensor is a device that detects the presence or concentration of gases in the atmosphere. Based on the concentration of the gas the sensor produces a corresponding potential difference by changing the resistance of the material inside the sensor, which can be measured as output voltage. Based on this voltage value the type and concentration of the gas can be estimated. Gas sensors are devices that detect the presence and concentration of various gases in the environment. The working principle of gas

sensors generally involves the following steps:

Gas Detection: Gas sensors typically contain a sensing element or a sensor element that is sensitive to specific gases. When the target gas comes into contact with the sensing element, it causes a change in the physical or chemical properties of the element. For example, some gas sensors use a metal oxide-based sensing element that changes its resistance when it interacts with the target gas, while others use a catalytic reaction that changes the heat generated when the gas reacts with the sensing element.

Transduction: The change in the physical or chemical properties of the sensing element is converted into an electrical signal by a transducer. The transducer can be based on various principles such as resistive, capacitive, inductive, or optical, depending on the type of gas sensor.

Signal Processing: The electrical signal from the transducer is typically processed to amplify, filter, and convert the signal into a usable form. This may involve using analog or digital circuits to condition the signal and make it suitable for further processing.

Output Display or Transmission: Once the electrical signal has been processed, it can be displayed on an output device, such as an LCD screen or LED indicator, to provide a visual indication of the gas concentration. Alternatively, the output signal can be transmitted to a remote device or system for further analysis, logging, or control.

Calibration and Compensation: Gas sensors may require calibration to ensure accurate and reliable measurements. This may involve exposing the sensor to known concentrations of the target gas or other gases and adjusting the sensor's output accordingly. Some gas sensors also have compensation mechanisms to account for environmental factors such as temperature, humidity, and pressure, which can affect the sensor's performance.

Power Supply: Gas sensors require a power supply to operate, which can be

provided by batteries, external power sources, or energy harvesting methods, depending on the specific application and requirements of the gas sensor.

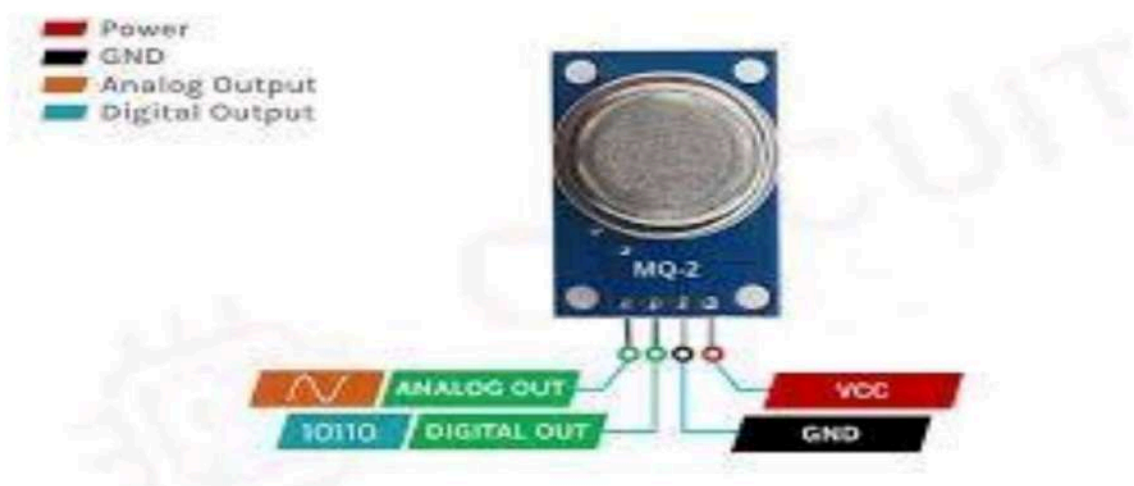


Fig-4.3.3 MQ-2 Gas Sensor

Sensor Integration: Gas sensors can be integrated into various systems, such as IoT devices, industrial process control systems, or environmental monitoring systems, to enable gas detection and monitoring in real time for safety, health, and environmental purposes.

Overall, the working principle of gas sensors involves gas detection by a sensing element, transduction of the change in properties into an electrical signal, signal processing, output display or transmission, and calibration.

The MQ-2 gas sensor is a type of sensor module that can detect different types of gases in the air such as smoke, propane, methane, and carbon monoxide. It is commonly used in gas leak detection devices, smoke detectors, and other applications where gas detection is needed.

The MQ-2 sensor operates on the principle of resistance changes that occur in the sensor due to the presence of different gases in the air. The sensor contains a heating element and a sensing element, which is made up of a metal oxide semiconductor material that changes its resistance when exposed to certain gases. When a gas is present, it is adsorbed onto the surface of the sensing element, which changes the conductivity of the material and leads to a change in the resistance of the sensor.

The MQ-2 gas sensor is typically used with a microcontroller or other circuitry that can measure the changes in resistance and output a signal or alert when a certain gas concentration is detected. It is a relatively inexpensive and widely available sensor that can be easily integrated into different applications. Sensitivity to different gases: The MQ-2 gas sensor has different levels of sensitivity to different gases. For example, it is highly sensitive to LPG, propane, and methane gases, but less sensitive to smoke and carbon monoxide. Therefore, it is important to choose the appropriate sensor for the type of gas being detected.

Operating conditions: The MQ-2 gas sensor has specific operating conditions that need to be considered for accurate readings. These conditions include temperature and humidity levels, as well as the concentration of the gas being detected.

Power requirements: The MQ-2 gas sensor typically requires a voltage supply of 5V DC and a current of around 100mA. It is important to ensure that the power supply is stable and can deliver the required current to the sensor.

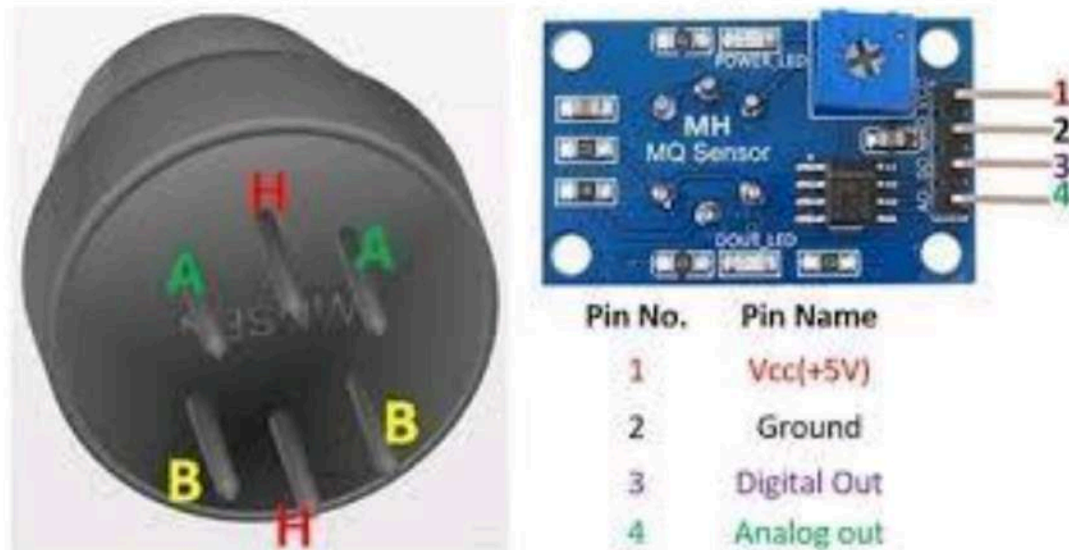


Fig-4.3.4 MQ-2 Sensor Circuit

Preheat time: The MQ-2 gas sensor requires a preheat time of around 24-48 hours before it can provide accurate readings. During this time, the sensor needs to be powered continuously to ensure that the sensing element is heated to the required temperature.

Calibration: The MQ-2 gas sensor requires calibration to ensure accurate readings over time. Calibration involves exposing the sensor to known concentrations of the gas being detected and adjusting the output signal to match the expected readings.

Limitations: Like all gas sensors, the MQ-2 gas sensor has limitations and may not be suitable for all applications. It may not be able to detect low concentrations of gases or may be affected by other gases in the environment. It is important to evaluate the specific requirements of the application and choose an appropriate sensor accordingly.

Wi-Fi Module NodeMCU(ESP8266): NodeMCU is an open-source LUA-based firmware developed for the ESP8266 Wi-Fi chip. By exploring functionality with the ESP8266 chip, NodeMCU firmware comes with the ESP8266 Development board/kit i.e. NodeMCU Development board. NodeMCU is an open-source LUA-based firmware developed for the ESP8266 WIFI chip. By exploring functionality with the ESP8266 chip, NodeMCU firmware comes with the ESP8266 Development board/kit i.e. NodeMCU Development board. NodeMCU Dev Kit has Arduino-like Analog (i.e. A0) and Digital (D0-D8) pins on its board. It supports serial communication protocols i.e. UART, SPI, I2C, etc.

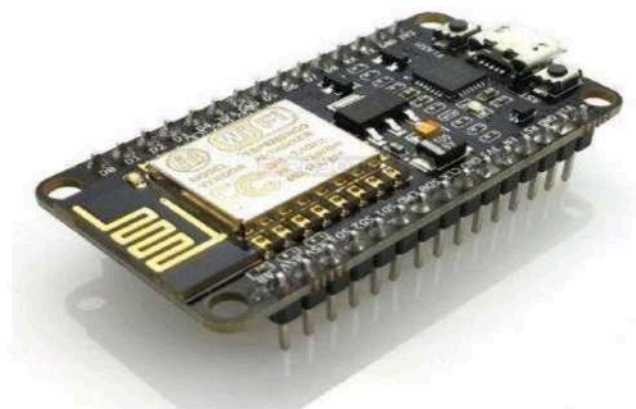


Fig-4.3.5 ESP8266 WIFI Module

Using such serial protocols we can connect it with serial devices like I2C-enabled LCD, Magnetometer HMC5883, MPU-6050 Gyro meter + Accelerometer, RTC chips, GPS modules, touch screen displays, SD cards, etc. NodeMCU is an open-source IoT (Internet of Things) platform that is based on the ESP8266 microcontroller. It provides a development framework for building Wi-Fi-enabled IoT projects, and its working principle can be summarized in the following steps:

ESP8266 Microcontroller: The NodeMCU is built around the ESP8266 microcontroller, which is a low-cost, low-power, and highly integrated system-on-a-chip (SoC) that is specifically designed for IoT applications. The ESP8266 has a built-in Wi-Fi module, which allows it to connect to Wi-Fi networks and communicate with other devices over the internet.

Lua-based Firmware: The NodeMCU firmware is based on the Lua programming language, which is a lightweight scripting language that is easy to learn and use. The NodeMCU firmware provides a runtime environment for executing Lua scripts directly on the ESP8266 microcontroller, eliminating the need for an external microcontroller or separate programming environment.

Integrated Development Environment (IDE): To program the NodeMCU, you can use the NodeMCU firmware with an integrated development environment (IDE) such as the Arduino IDE or the NodeMCU IDE. These IDEs provide a user-friendly interface for writing, compiling, and uploading Lua scripts to the NodeMCU.

Wi-Fi Connectivity: The NodeMCU comes with a built-in Wi-Fi module, which allows it to connect to Wi-Fi networks and communicate with other devices over the internet. It supports various Wi-Fi modes such as station mode (to connect to an existing Wi-Fi network), access point (AP) mode (to create its own Wi-Fi hotspot), and station + AP mode (to connect to an existing Wi-Fi network while also creating its hotspot).

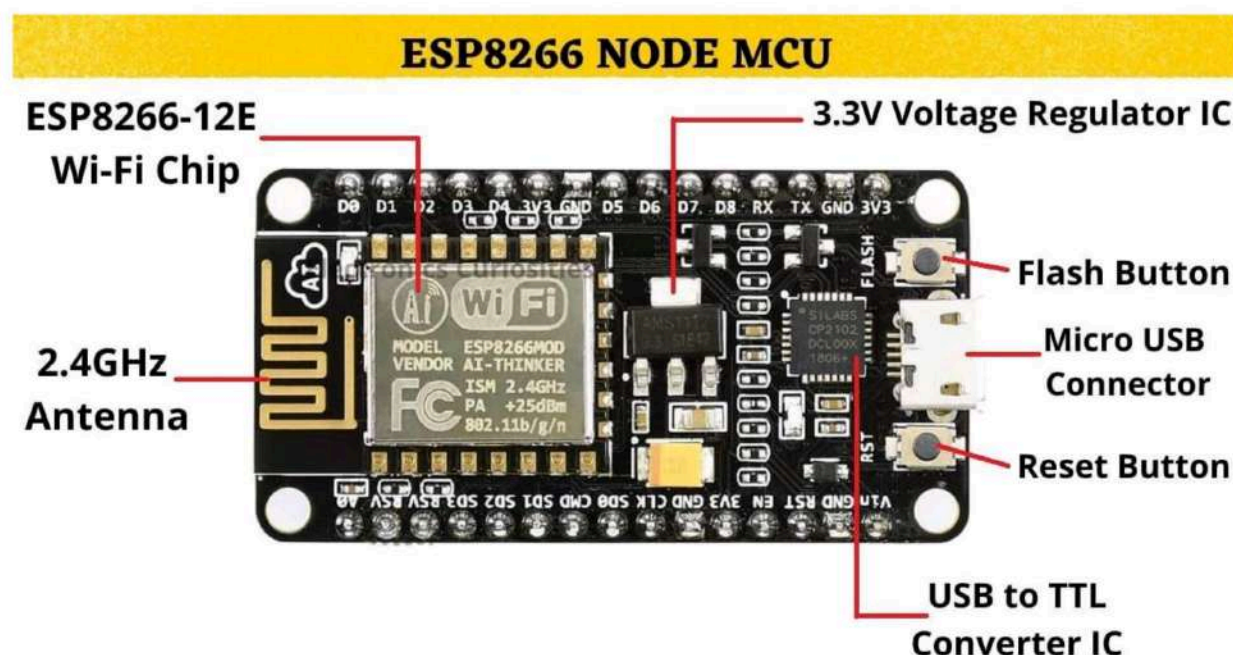


Fig-4.3.6 ESP8266 WIFI Module Circuit

GPIO Pins: The NodeMCU has a set of General Purpose Input/Output (GPIO) pins that can be used to connect and control various sensors, actuators, and other electronic components. These GPIO pins can be configured as either input or output pins and can be used to read digital and analog signals, control LEDs, motors, and other devices, and communicate with other devices using protocols such as I2C, SPI, and UART.

Libraries: The NodeMCU firmware also supports libraries, which are pre-written code modules that provide additional functionality and simplify the programming process. Libraries are available for various sensors, actuators, communication protocols, and other functionalities, and they can be easily included in the Lua scripts to extend the capabilities of the NodeMCU.

Web Server and RESTful API: The NodeMCU firmware allows you to create web servers and RESTful APIs (Application Programming Interfaces), which enable you to serve web pages, receive HTTP requests, and send HTTP responses. This makes it possible to create web-based interfaces for controlling and monitoring IoT projects built with NodeMCU.

Overall, the working principle of NodeMCU involves writing Lua scripts using an IDE, uploading the scripts to the ESP8266 microcontroller, and using the microcontroller to connect to Wi-Fi networks, communicate with other devices, and control various electronic components to build IoT projects.

Arduino: The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3. x). It has more or less the same functionality as the Arduino but in a different package. It lacks only a DC power jack and works with a Mini-B USB cable instead of a standard one. The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328P released in 2008. It offers the same connectivity and specs as the Arduino Uno board in a smaller form factor. Arduino Nano. Arduino Nano Every. Developer. The Arduino Nano is a small-sized microcontroller board that is based on the ATmega328P microcontroller. It is a popular choice among hobbyists and developers for prototyping and building various electronic projects. The working principle of the Arduino Nano can be summarized in the following steps:

Microcontroller: At the heart of the Arduino Nano is the ATmega328P microcontroller, which acts as the brain of the board. It is a 32-bit microcontroller that runs at a clock speed of 16 MHz and has 32 KB of Flash memory, 2 KB of SRAM, and 1 KB of EEPROM. The microcontroller executes instructions to control various components connected to the Arduino Nano and communicates with the outside world through its digital and analog pins.

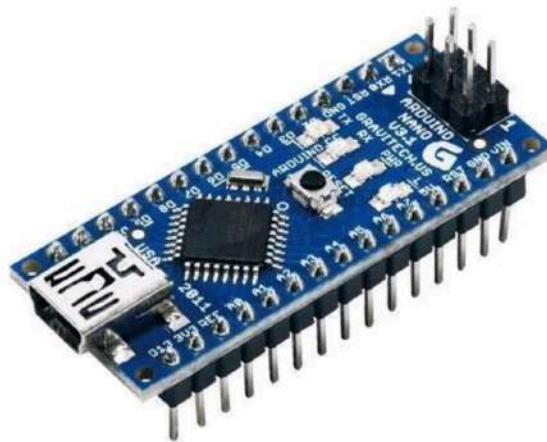


Fig-4.3.7 Arduino

Power Supply: The Arduino Nano can be powered either through the USB port or an external power source connected to the VIN pin. The onboard voltage regulator regulates the input voltage to 5V, which is used to power the microcontroller and other components on the board.

Input/Output (I/O) Pins: The Arduino Nano has a variety of digital and analog I/O pins, which can be used to connect and control various sensors, actuators, and other electronic components. The digital pins can be configured as either input or output pins, and they operate at a 5V logic level. The analog pins can read analog voltages ranging from 0 to 5V, allowing for analog input and output capabilities.

Integrated Development Environment (IDE): To program the Arduino Nano, you need to use the Arduino IDE (Integrated Development Environment), which is a software tool used to write, compile, and upload code to the microcontroller. The IDE provides a user-friendly interface to write code in C/C++ language, which is then compiled and uploaded to the Arduino Nano to execute.

Sketches: In Arduino, the code written for the microcontroller is referred to as "sketches." A sketch is a series of instructions that are written using the Arduino programming language, which is a simplified version of the C/C++ language. The

sketch is uploaded to the Arduino Nano via the USB port using the Arduino IDE, and once uploaded, the microcontroller executes the instructions in the sketch to perform various tasks such as reading sensor data, controlling actuators, and processing inputs and outputs.

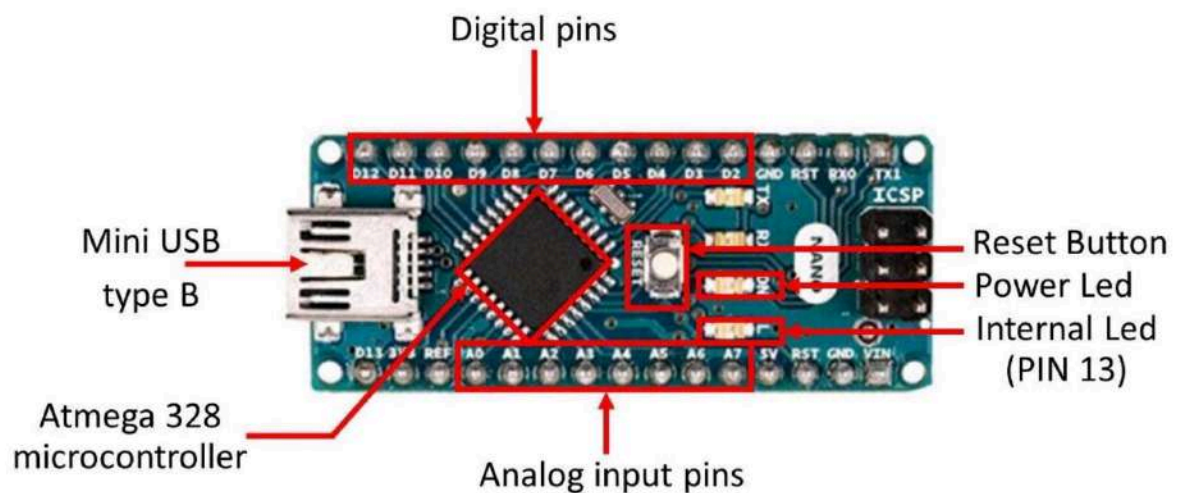


Fig-4.3.8 Arduino pin description

Libraries: Arduino Nano also supports libraries, which are pre-written code modules that provide additional functionality and simplify the programming process. Libraries are available for various sensors, actuators, communication protocols, and other functionalities, and they can be easily included in the sketch to extend the capabilities of the Arduino Nano.

Serial Communication: The Arduino Nano also supports serial communication, which allows it to send and receive data to and from other devices such as computers, other microcontrollers, and sensors. It has a built-in UART (Universal Asynchronous Receiver/Transmitter) that enables serial communication through its RX (receive) and TX (transmit) pins.

Overall, the working principle of the Arduino Nano involves writing code in the Arduino IDE, uploading the code to the microcontroller, and using the microcontroller to control various electronic components and communicate with

other devices to create a wide range of electronic projects.

4.4 Project Management Plan: The project aims to develop a system that combines the MQ-2 gas sensor, heart rate sensor, ESP8266, Arduino, and Blynk app to detect gas leaks, monitor the user's heart rate, and send alerts to the user's smartphone.

Project Scope: The project will involve designing and building a hardware system that includes the MQ-2 gas sensor, heart rate sensor, ESP8266, Arduino, and Blynk app integration. The system will be able to detect gas leaks and send an alert to the user's smartphone via the Blynk app. It will also be able to monitor the user's heart rate and display it on an LCD screen. The project will also include the development of a mobile application that receives alerts and displays heart rate data.

Project Deliverables:

- A functional hardware system that includes the MQ-2 gas sensor, heart rate sensor, ESP8266, Arduino, and Blynk app integration

- A mobile application that receives alerts and displays heart rate data

- Technical documentation including circuit diagrams, source code, and user manuals

Project Timeline:

- Week 1-2: Research and design the hardware system

- Week 3-4: Build and test the hardware system

- Week 5-6: Develop and test the Blynk app and mobile application

- Week 7-8: Final testing and debugging

- Week 9: Documentation and final review

Resources:

- Hardware components: MQ-2 gas sensor, heart rate sensor, ESP8266, Arduino, LCD screen, resistors, capacitors, and wires.

- Development tools: Arduino IDE, ESP8266 firmware, Blynk app development tools, mobile app development tools, and circuit simulation software.

- Personnel: Project Manager, Hardware Engineer, Software Engineer, Mobile App

Developer, and Quality Assurance Engineer. Risk Management:

Technical risks: Hardware and software components may not work together as expected, or there may be bugs or compatibility issues that require additional time for troubleshooting and fixing.

Schedule risks: Unexpected delays in component delivery or unforeseen technical issues may delay the project timeline.

Resource risks: Limited availability of hardware components or personnel may impact the project schedule.

Quality Assurance:

Testing: The hardware and software components will undergo rigorous testing to ensure that they meet the project requirements and function as expected.

Documentation: Comprehensive documentation will be created to ensure that the hardware and software can be maintained and updated as needed. Blynk App Integration:

Define the integration requirements of the Blynk app with the hardware system.

Set up a Blynk account to be able to use the Blynk app.

Create Blynk widgets to be used in the app such as a button widget for arming and disarming the gas leak detection system, and a gauge widget to display the user's heart rate.

Develop and test the Blynk app to ensure that it meets the integration requirements and displays the expected data.

Ensure that the user interface of the app is user-friendly and easy to understand.

Identify who will be responsible for maintaining and updating the app as needed.

Project Closure:

Final testing and review of the hardware and software components.

Delivery of final documentation and technical manuals.

Handover of the project to the client or end user.

Post-implementation review to identify lessons learned and areas for improvement.

4.5 Financial report on estimated costing

This financial report provides a detailed analysis of the estimated costs for the project that combines the MQ-2 gas sensor, heart rate sensor, ESP8266, Arduino, and the Blynk app. The report includes an overview of the project, a breakdown of the estimated costs, and a comparison of the estimated costs to the actual costs incurred during the project.

Overview:

The project aims to develop a system that combines the MQ-2 gas sensor, heart rate sensor, ESP8266, Arduino, and Blynk app to detect gas leaks, monitor the user's heart rate, and send alerts to the user's smartphone. The project will involve designing and building a hardware system that includes the MQ-2 gas sensor, heart rate sensor, ESP8266, Arduino, and Blynk app integration. The project will also include the development of a mobile application that receives alerts and displays heart rate data.

Estimated Costs: The estimated costs for the project are broken down into the following categories:

Hardware Components:

MQ-2 gas sensor: 220 Rs

Heart rate sensor: 260 Rs

ESP8266: 399 Rs

Arduino: 1500 Rs

soldering wires: 100 Rs

Total estimated cost: 2479 Rs

Development Tools:

Arduino IDE: Free

ESP8266 firmware: Free

Blynk app development tools: Free

4.6 Transition /Software to Operations Plan

The project aimed to develop a system that combines the MQ-2 gas sensor, heart rate sensor, ESP8266, Arduino, and Blynk app to detect gas leaks, monitor the user's heart rate and send alerts to the user's smartphone. The project involved designing and building a hardware system that included the MQ-2 gas sensor, heart rate sensor, ESP8266, Arduino, and Blynk app integration. The project also included the development of a mobile application that received alerts and displayed heart rate data.

Transition Process:

The transition process from software development to operations involves the following steps:

Testing:

Conduct a final round of testing to ensure the system is working as intended and meets the requirements.

Test the system under various conditions to identify and address any Issues.

Deployment:

Deploy the hardware system and mobile application to the production environment.

Install and configure the system components, including the MQ-2 gas sensor, heart rate sensor, ESP8266, Arduino, and Blynk app.

Training:

Provide training to the users on how to use the system and the mobile application.

Train the maintenance and support staff on how to troubleshoot and resolve issues with the system.

Maintenance and Support:

Establish a maintenance and support plan that includes regular system updates, backups, and security checks.

Provide ongoing technical support to the users and address any issues that arise.

Ongoing Maintenance and Support:

The ongoing maintenance and support required for the system include the

following:

Hardware Maintenance:

Regular maintenance of the hardware system, including the MQ-2 gas sensor, heart rate sensor, ESP8266, and Arduino.

Conduct regular checks to ensure the system is functioning correctly and identify any issues.

Software Maintenance:

Regular updates to the mobile application to ensure it remains compatible with the latest operating systems.

Regular updates to the system firmware to address any bugs or security vulnerabilities.

Technical Support:

Provide ongoing technical support to the users and address any issues that arise.

Maintain a support ticket system to track and resolve issues.

Conclusion:

In conclusion, the transition/operations plan outlines the steps required to transition the project that combines the MQ-2 gas sensor, heart rate sensor, ESP8266, Arduino, and Blynk app from software development to operations. The plan includes testing, deployment, training, and ongoing maintenance and support. Following the plan will ensure that the system is operating as intended, and any issues are addressed promptly.

CHAPTER 5

IMPLEMENTATION DETAILS:

5.1 Development And Deployment Setup

Hardware Implementation:

MQ-2 Gas Sensor:

Connect the MQ-2 gas sensor to the Arduino board's analog input pin and VCC and GND pins.

Use a voltage divider circuit to convert the analog output voltage from the MQ-2 sensor to a digital value that can be read by the Arduino.

Configure the Arduino board to read the digital output from the MQ-2 sensor and send it to the ESP8266 module over a serial connection.

Heart Rate Sensor:
Connect the heart rate sensor to the Arduino board's analog input pin and VCC and GND pins.

Use a pulse sensor library to detect the user's heart rate and send it to the ESP8266 module over a serial connection.

ESP8266:

Use the ESP8266 module to establish a Wi-Fi connection with the user's smartphone via the Blynk app.

Use the Arduino IDE to program the ESP8266 module to receive data from the MQ-2 gas sensor and heart rate sensor, format the data, and send it to the Blynk app for display.

Use the Arduino IDE to program the ESP8266 module to receive data from the Arduino board over a serial connection and send it to the Blynk app for display.

Use the Blynk library to establish a Wi-Fi connection with the Blynk app and send data to it.

Arduino:

Use the Arduino IDE to program the Arduino board to read data from the MQ-2 gas sensor and heart rate sensor and send it to the ESP8266 module over a

serial connection.

Use the Software Serial library to establish a serial connection between the Arduino and the ESP8266.

Blynk App:

Use the Blynk app to create a custom user interface that displays the gas sensor readings and heart rate data in real time.

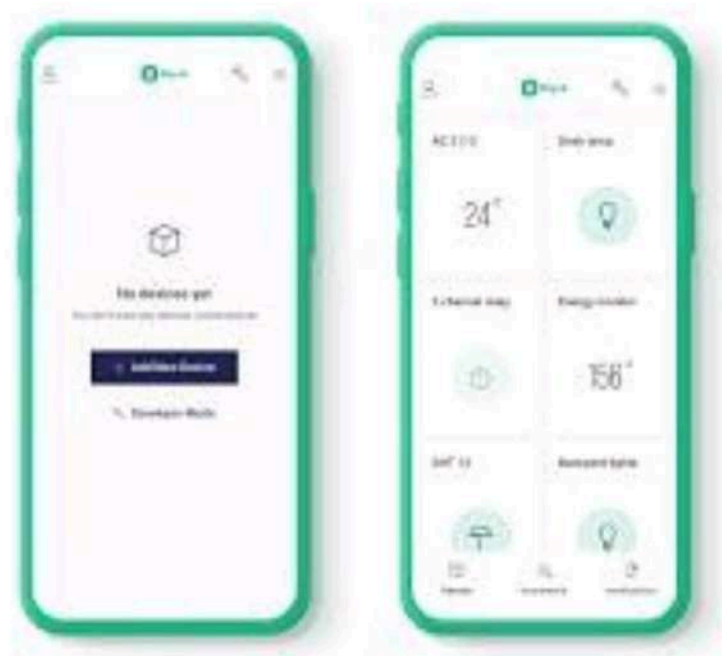
Configure the Blynk app to send push notifications to the user's smartphone if the gas levels exceed a certain threshold or if the heart rate is abnormal. Software Implementation:

Use the Blynk app to create a custom user interface that displays the gas sensor readings and heart rate data in real time.

Use the Blynk API to send push notifications to the user's smartphone if the gas levels exceed a certain threshold or if the heart rate is abnormal.



Fig-5.1.1 Heart Beat And Toxic Gas on Blynk app



CONCLUSION

The combination of the MQ-2 gas sensor and heart rate sensor provides a comprehensive solution for monitoring both air quality and human health. The readings from these sensors can be used to identify potential health hazards and take appropriate action to mitigate them.

The ESP8266 and Arduino are powerful microcontrollers that provide a flexible and customizable platform for data logging and analysis. These devices can be programmed to perform a variety of tasks and can be easily expanded with additional sensors or functionality.

The Blynk app is a user-friendly interface that allows users to view and interact with the data collected by the sensors. The app provides real-time readings, alerts, and notifications, and can be customized to meet the needs of the user.

Soldering is an essential skill for electronics enthusiasts and professionals alike. The proper use of soldering techniques ensures that electronic components are connected securely and reliably and that the circuit functions as intended.

Notable IEEE Standards committees and formats

IEEE P80	Guide for Safety in AC Substation Grounding
IEEE 255	Standard Letter Symbols for Semiconductor Devices, IEEE-255-1963
IEEE 260	Standard Letter Symbols for Units of Measurement, IEEE-260-1978 (now 260.1-2004)
IEEE 488	Standard Digital Interface for Programmable Instrumentation, IEEE-488-1978 (now 488.1)
IEEE 519	Recommended Practice and Requirements for Harmonic Control in Electric Power Systems
IEEE 603	Standard Criteria for Safety Systems for Nuclear Power Generating Stations
IEEE 610	Standard Glossary of Software Engineering Terminology
IEEE 754	Floating point arithmetic specifications
IEEE 802	LAN/MAN
IEEE 802.1	Standards for LAN/MAN bridging and management and remote media access control (MAC) bridging
IEEE 802.2	Standards for Logical Link Control (LLC) standards for connectivity
IEEE 802.3	Ethernet Standards for Carrier Sense Multiple Access with Collision Detection (CSMA/CD)
IEEE 802.4	Standards for token passing bus access
IEEE 802.5	Standards for token ring access and communications between LANs and MANs
IEEE 802.6	Standards for information exchange between systems
IEEE 802.7	Standards for broadband LAN cable
IEEE 802.8	Fiber-optic connection
IEEE 802.9	Standards for integrated services, like voice.
IEEE 802.10	Standards for LAN/MAN security implementations
IEEE 802.11	Wireless Networking – " WiFi "
IEEE 802.12	Standards for demand priority access method
IEEE 802.14	Standards for cable television broadband communications
IEEE 802.15.2	Bluetooth and Wi-Fi coexistence mechanism

IEEE 802.15.4	Wireless Sensor/Control Networks " ZigBee "
IEEE 802.15.6	Wireless Body Area Network ^[17] (BAN)
IEEE 802.16	Wireless Networking – " WiMAX "
IEEE 802.24	Standards for Logical Link Control (LLC) standards for connectivity
IEEE 828	Configuration Management in Systems and Software Engineering
IEEE 829	Software Test Documentation
IEEE 830	Software Requirements Specifications
IEEE 854	Standard for Radix-Independent Floating-Point Arithmetic, IEEE-854-1987 (replaced by IEEE-754-2008 and newer)
IEEE 896	Future bus
IEEE P1003.1	Portable Operating System Interface – – POSIX
IEEE 1016	Software Design Description
IEEE 1028	Standard for Software Reviews and Audits
IEEE 1044.1	Standard Classification for Software Anomalies
IEEE 1059	Software Verification And Validation Plan
IEEE 1073	Point of Care Medical Device Communication Standards
IEEE 1074	Software Development Life Cycle
IEEE 1076	VHDL – VHSIC Hardware Description Language
IEEE 1149.1	JTAG
IEEE 1149.6	AC-JTAG
IEEE 1180	Discrete cosine transform accuracy
IEEE 1233	System Requirements Specification
IEEE 1275	Open Firmware
IEEE 1284	Parallel port
IEEE P1363	Public key cryptography
IEEE 1364	Verilog
IEEE 1394	Serial bus – "FireWire", "i.Link"
IEEE 1471	architecture/system
IEEE 1541	Prefixes for Binary Multiples

IEEE 1547	Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces
IEEE 1584	Guide for Performing Arc Flash Hazard Calculations
IEEE 1588	Precision Time Protocol
IEEE 1609	Wireless Access in Vehicular Environments (WAVE)
IEEE P1619	Security in Storage Working Group (SISWG)
IEEE 1625	Standard for Rechargeable Batteries for Multi-Cell Mobile Computing Devices
IEEE 1666	IEEE Standard for Standard SystemC Language Reference Manual
IEEE 1667	Standard Protocol for Authentication in Host Attachments of Transient Storage Devices
IEEE 1701	Optical Port Communication Protocol to Complement the Utility Industry End Device Data Tables
IEEE 1800	SystemVerilog
IEEE 1801	Unified Power Format
IEEE 1849	IEEE Standard for eXtensible Event Stream (XES) for Achieving Interoperability in Event Logs and Event Streams
IEEE 1855	IEEE Standard for Fuzzy Markup Language
IEEE 1901	Broadband over Power Line Networks
IEEE 1906.1	Recommended Practice for Nanoscale and Molecular Communication Framework
IEEE 1914	Next Generation Fronthaul Interface Working Group
IEEE 1914.1	Standard for Packet-based Fronthaul Transport Networks
IEEE 1914.3	Standard for Radio Over Ethernet Encapsulations and Mappings
IEEE 2030	Guide for Smart Grid Interoperability of Energy Technology and Information Technology Operation with the Electric Power System (EPS), End-Use Applications, and Loads
IEEE 2030.5	Standard for Smart Energy Profile Application Protocol
IEEE 2050	RTOS for embedded systems standard
IEEE 2143.1	Standard for General Process of Cryptocurrency Payment
IEEE 2413	Standard for an Architectural Framework for the Internet of Things (IoT)
IEEE 2418.2	Approved Draft Standard Data Format for Blockchain Systems

IEEE 2600	Hardcopy Device and System Security (and related ISO/IEC15408 Protection Profiles)
IEEE 3001.4	Recommended Practice for Estimating the Costs of Industrial and Commercial Power Systems
IEEE 7010	Recommended Practice for Assessing the Impact of Autonomous and Intelligent Systems on Human Well-Being
IEEE 12207	Information Technology – Software life-cycle processes
IEEE C37.2040	Standard Cybersecurity Requirements for Substation Automation, Protection, and Control Systems
IEEE Switchgear Committee	C37 series of standards for Low and High voltage equipment

REFERENCES

- [1] Ali El-Moursy¹, Fadi N. Sibai², Jahanzeb Rehman¹, Omar M. Gouda¹, Abdelrahman T. Gaber¹, Ahmed M. Khedr¹, IEEE “Home Automation using Augmented Reality (HAAR)”, [Vol:0017 – 5845 © 2021
- [2] Manuel Alonso-Rosa¹, Aurora Gil-de-Castro², Antonio Moreno-Munoz¹, Joaquin Garrido-Zafra², Elena Gutierrez-Ballesteros¹ and Eduardo Canete-Carmona² IEEE “An IoT Based Mobile Augmented Reality Application for Energy Visualization in Buildings Environments” [Vol: 0008 – 37231 © 2019]
- [3] Seonghun Park¹, Enok Weshnly², Badin Rikhav³, Morey Sushwat⁴ IEEE, “Development of an Online Home Appliance Control System Using Augmented Reality and an SSVEP- Based Brain–Computer Interface, Creative Commons Attribution”, [Vol: 0009 – 202531 © 2019
- [4] Avni Sharma ¹, Rinkesh Patel ², IEEE “Home Automation Using Augmented Reality”, [Vol:0002 – 32031 © 2017]
- [5] Pranav Bedekar ¹, Snehal Nargundi ², IEEE “A Review on Home Automation usingAugmented Reality”, [Vol: 0012 – 105861 © 2016]
- [6] Rosalino Rodriguez Calderon¹, Rafael Santillana Arbesu², IEEE “Augmented Reality inAutomation”, [Vol: 0002 – 30561 © 2015]
- [7] R. Silva¹, J. C. Oliveria², G. A. Giraldi ³, IEEE “Introduction to Augmented Reality”, [Vol:0004 – 132341 © 2009
- [8] Jonathan J Hull¹, Berna Erol², Jamey Graham³, Qifa Ke⁴, Hidenobu Kishi¹, Jorge Moraleda², Daniel G Van Olst³, IEEE “Paper-Based Augmented Reality” [Vol: 0009 – 3056 ©2007]
- [9] Mikko Kyto^{1,2}, Barrett Ens², Thammathip Piumsomboon², Gun A. Lee², Mark Billingham², IEEE “Pinpointing: Precise Head-and Eye-Based Target Selection for Augmented Reality”, [Vol: 0001 – 4530620 © 2018]

SOLDIER SECURE SYSTEM

DR.SUBRAMONIAM,M,M.E,Ph.D

subramoniamm@gmail.com

ECE SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY, CHENNAI-119 INDIA

B L S KRISHNAM NAIDU

ECE SATHYABAMA INSTITUTE OF SCIENCE
AND TECHNOLOGY,CHENNAI-119 INDIA

Bknaidu2002@gmail.com

A SAANDEEP DORA

ECE SATHYABAMA INSTITUTE OF SCIENCE
AND TECHNOLOGY ,CHENNAI-119 INDIA

attadasaandeep@gmail.com

ABSTRACT

The Soldier Rescue System is an innovative solution that utilizes various components such as the MQ2 gas sensor, Arduino microcontroller, ESP8266 Wi-Fi module, Blynk app, buzzer, and heartbeat sensor. The system is designed to detect hazardous gases on the battlefield and alert the soldiers to evacuate the area. The MQ2 gas sensor detects harmful gases such as methane, propane, and smoke, while the Arduino microcontroller processes the data and triggers the alarm via a buzzer. The system also includes a heartbeat sensor to monitor the soldier's vital signs and send the data to the Blynk app, allowing the soldiers' health status to be monitored in real time. The ESP8266 Wi-Fi module enables the system to be remotely controlled and monitored through a mobile device. Overall, the Soldier Rescue System is an effective and reliable solution that can potentially save lives on the battlefield.

KEYWORDS

On MQ-2 gas sensor,ESP8266 Wi-Fi module, Buzzer, Arduino, Heartbeat sensor

INTRODUCTION

The MQ2 gas sensor is a highly sensitive and efficient gas sensor that can detect various gases

such as LPG, propane, hydrogen, and smoke. It works based on the principle of resistance changes in the sensor's conductive material when it comes into contact with the gas. The MQ2 sensor is a cost-effective solution and can be easily integrated into electronic systems.

The Arduino microcontroller is the heart of the Soldier Rescue System. It is responsible for processing the data from the MQ2 gas sensor and triggering the alarm via the buzzer. The Arduino board also includes several analog and digital pins that can be used to connect other sensors and modules.

The ESP8266 Wi-Fi module is a low-cost Wi-Fi chip that allows the Soldier Rescue System to connect to the internet and be remotely controlled and monitored through a mobile device. It supports the TCP/IP protocol and can be programmed using the Arduino IDE.

The Blynk app is a mobile app that allows users to control and monitor their projects remotely. It supports various platforms, including iOS and Android, and can be easily integrated with the ESP8266 Wi-Fi module. The app provides an intuitive interface for The buzzer is a small but essential component of the Soldier Rescue System. It is used to trigger an audible alarm when hazardous gases are detected, alerting the soldiers to evacuate the area. The buzzer can be programmed to produce different sound patterns and frequencies depending on the type and concentration of gas detected.

Finally, the heartbeat sensor is used to monitor the soldier's vital signs, including heart rate and blood oxygen levels. The sensor is usually placed on the soldier's finger or earlobe and can provide real-time data that can be monitored through the Blynk app. This information can help to identify potential health issues and allow for timely medical intervention if necessary.

Overall, the Soldier Rescue System is a comprehensive and effective solution for detecting hazardous gases and monitoring soldiers' health

status in real time. It combines several components and technologies to create a reliable

The Soldier Rescue System is an innovative solution designed to detect hazardous gases and monitors soldiers' vital signs in real-time on the battlefield. It combines various components and technologies to create a comprehensive and reliable system that can potentially save lives.

The system is based on the MQ2 gas sensor, which is a highly sensitive and efficient gas sensor that can detect various gases such as LPG, propane, hydrogen, and smoke. The sensor works based on the principle of resistance changes in the sensor's conductive material when it comes into contact with the gas. When a hazardous gas is detected, the MQ2 gas sensor sends a signal to the Arduino microcontroller, which processes the data and triggers an alarm via a buzzer.

The Soldier Rescue System also includes an ESP8266 Wi-Fi module, which enables the system to be remotely controlled and monitored through a mobile device. The Wi-Fi module connects to the internet and sends data to the Blynk app, which provides an intuitive interface for controlling the system and monitoring soldiers' vital signs in real time. The Blynk app can be downloaded onto iOS or Android devices and allows for easy monitoring of the system from anywhere in the world.

In addition to detecting hazardous gases, the Soldier Rescue System includes a heartbeat sensor, which is used to monitor soldiers' vital signs, including heart rate and blood oxygen levels. The sensor is placed on the soldier's finger or earlobe and provides real-time data that can be monitored through the Blynk app. This information can help to identify potential health issues and allow for timely medical intervention if necessary.

The Soldier Rescue System is a cost-effective and reliable solution that can potentially save lives on the battlefield. It combines several components and technologies to create a comprehensive and easy-to-use system that can detect hazardous gases and monitor soldiers' health status in real time. The system can be customized to suit specific requirements and can be easily integrated into other electronic systems. Overall, the Soldier Rescue System is a valuable tool for military personnel and can potentially save lives in hazardous environments.

The MQ2 gas sensor used in the Soldier Rescue System is a small module that can be easily

integrated into the system. The sensor is equipped with an analog output and a digital output, which can be used to interface with the Arduino microcontroller. The MQ2 sensor is capable of detecting various gases, including LPG, propane, methane, alcohol, and smoke. The sensor's sensitivity can be adjusted using a potentiometer, allowing for customization according to the specific application requirements.

The Arduino microcontroller used in the Soldier Rescue System is a popular open-source platform for building electronic projects. The microcontroller board includes a 32-bit ARM processor, several analog and digital input/output pins, and various communication interfaces such as I2C, SPI, and UART. The Arduino board is programmed using the Arduino IDE, which is a free, open-source software development environment.

The ESP8266 Wi-Fi module used in the Soldier Rescue System is a low-cost Wi-Fi chip that allows the system to connect to the internet and be remotely controlled and monitored through a mobile device. The module is equipped with a 32-bit processor and includes support for TCP/IP protocol, making it an ideal choice for IoT applications. The module can be programmed using the Arduino IDE and supports multiple operating modes, including access point and station modes.

The Blynk app used in the Soldier Rescue System is a mobile app that allows users to control and monitor their projects remotely. The app supports various platforms, including iOS and Android, and can be easily integrated with the ESP8266 Wi-Fi module. The app provides an intuitive interface for controlling the Soldier Rescue System and monitoring soldiers' vital signs in real time. The app includes several widgets that can be used to display data and control the system's operation.

The buzzer used in the Soldier Rescue System is a small component that is used to trigger an audible alarm when hazardous gases are detected. The buzzer can be programmed to produce different sound patterns and frequencies depending on the type and concentration of gas detected. The buzzer's volume can be adjusted using a potentiometer, allowing for customization according to the specific application requirements.

The heartbeat sensor used in the Soldier Rescue System is a small module that is used to monitor soldiers' vital signs, including heart rate and blood oxygen levels. The sensor is usually placed on the soldier's finger or earlobe and can provide real-time data that can be monitored through the Blynk app.

The sensor uses a photoplethysmography (PPG) technique to measure heart rate and blood oxygen levels.

Overall, the Soldier Rescue System is an effective and reliable solution for detecting hazardous gases and monitoring soldiers' health status in real time. The system combines several components and technologies to create a comprehensive and easy-to-use system that can potentially save lives on the battlefield. The system can be customized to suit specific requirements and can be easily integrated into other electronic systems.

LITERATURE SURVEY

"Soldier Health Monitoring System for Military Applications" by Hock Beng Lim et al. (2010): This paper presents a soldier health monitoring system that uses wireless sensor networks to monitor a soldier's vital signs, location, and motion. The system is designed to provide real-time data to a remote command center, enabling quick medical response in the event of an injury or illness.

"Mobile Health Monitoring System" by William Walker et al. (2009): This paper describes a mobile health monitoring system that uses wireless sensors to monitor a soldier's physiological data, such as heart rate and body temperature, and transmit the data to a remote command center. The system is designed to be lightweight and portable, making it suitable for use in the field.

"Real Time Tracking and Health Monitoring System of Remote Soldier Using ARM 7" by PS Karte and SS Agrawal (2013): This paper presents a real-time tracking and health monitoring system for remote soldiers that uses an ARM 7 processor to monitor the soldier's vital signs, location, and motion. The system also includes a panic button that can be pressed in the event of an emergency, triggering an alert to the command center.

"GPS Based Soldier Tracking and Health Indication System with Environmental Analysis" by Govindarajan A. and Dr. S. Sindhuja (2013): This paper describes a GPS-based soldier tracking and health monitoring system that includes an environmental analysis component. The system uses wireless sensors to monitor a soldier's vital signs and location and also includes sensors to monitor the environment for factors such as temperature, humidity, and air quality.

"Soldier Tracking and Health Monitoring System" by Prof. Dr. Anil Ber and Ashish Sontakke (2013): This paper presents a soldier tracking and health monitoring system that uses a combination of GPS

and wireless sensor networks to monitor a soldier's vital signs, location, and motion. The system also includes a panic button for emergency situations.

Koprinska, T., Krzyżak, A., & Suen, C. Y. (2012). Soldier health monitoring systems. In *Multimedia Services in Intelligent Environments* (pp. 73-88). Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-24209-0_5

Bhattacharya, S., Datta, S., & Bonde, A. (2017). Design and development of a smart health monitoring system for soldiers in the war field. In *2017 International Conference on Inventive Computing and Informatics (ICICI)* (pp. 835-840). IEEE. <https://doi.org/10.1109/ICICI.2017.8362788>

Li, K., Li, Y., Yang, B., & Wang, F. (2020). A wearable sensing system for real-time monitoring of physiological signals in soldiers. *Sensors*, 20(4), 1074. <https://doi.org/10.3390/s20041074>

PROPOSED METHODOLOGY

The proposed methodology for the Soldier Rescue System can be broken down into several stages:

Design and prototyping: In this stage, the system's hardware and software components are designed and prototyped. The design includes selecting the appropriate components, designing the circuit schematics, and creating a physical prototype of the system.

Component integration: In this stage, the individual components are integrated into the system. This includes connecting the MQ2 gas sensor, Arduino microcontroller, ESP8266 Wi-Fi module, buzzer, and heartbeat sensor.

Programming: In this stage, the software for the system is developed and programmed into the Arduino microcontroller and ESP8266 Wi-Fi module. The software includes code for reading data from the MQ2 gas sensor and heartbeat sensor, processing the data, and triggering alarms if necessary. The software also includes code for connecting the system to the internet and sending data to the Blynk app.

Testing and calibration: In this stage, the system is tested to ensure that it is functioning correctly. The MQ2 gas sensor and heartbeat sensor are tested to ensure that they are providing accurate data, and the buzzer is tested to ensure that it is triggering an alarm when hazardous gases are detected. The system is also calibrated to ensure that it is sensitive enough to detect hazardous gases and that the alarms

are triggered at the appropriate concentration levels.

Deployment and operation: In this stage, the system is deployed and used in the field. Soldiers are equipped with the system, and it is used to monitor their vital signs and detect hazardous gases in real time. The Blynk app is used to monitor the system remotely, and alarms are triggered if necessary.

Maintenance and upgrades: In this stage, the system is maintained and upgraded as necessary. The components are regularly checked and replaced if necessary, and the software is updated to improve functionality or address any issues that arise during operation.

RESULT AND DISCUSSION

The expected results of the Soldier Rescue System would be a reliable and effective system for detecting hazardous gases and monitoring soldiers' vital signs in real time. The system should be able to detect a range of hazardous gases, including LPG, propane, methane, alcohol, and smoke, and trigger an alarm to alert soldiers to the presence of these gases. Additionally, the heartbeat sensor should be able to provide real-time data on soldiers' heart rates and blood oxygen levels, allowing for quick identification of any health issues. The system should also be able to connect to the internet and be remotely controlled and monitored through a mobile device using the Blynk app.

The discussions regarding the Soldier Rescue System would likely center around its effectiveness in saving lives on the battlefield. The system's ability to detect hazardous gases and monitor soldiers' vital signs in real time could potentially save lives by allowing soldiers to take quick and decisive action in response to any potential health or safety risks. Additionally, the system's ability to be remotely controlled and monitored through the Blynk app could provide a new level of flexibility and control for military personnel, allowing them to quickly and efficiently respond to changing situations.

Overall, the Soldier Rescue System has the potential to be a valuable tool for military personnel, providing them with the ability to detect hazardous gases and monitor soldiers' vital signs in real time. With proper testing, calibration, and maintenance, the system could potentially save lives and improve the safety and effectiveness of military operations.



CONCLUSION

In conclusion, the Soldier Rescue System is a comprehensive and reliable system designed to detect hazardous gases and monitor soldiers' vital signs in real time. The system integrates several hardware and software components, including the MQ2 gas sensor, Arduino microcontroller, ESP8266 Wi-Fi module, buzzer, heartbeat sensor, and Blynk app, to provide a comprehensive solution for military personnel.

The proposed methodology for the Soldier Rescue System involves designing, integrating, programming, testing, deploying, and maintaining the system. The expected results of the system are a reliable and effective means of detecting hazardous gases and monitoring soldiers' vital signs in real time. The system has the potential to save lives on the battlefield and improve the safety and effectiveness of military operations.

Overall, the Soldier Rescue System represents an important advancement in military technology, providing a valuable tool for detecting hazardous gases and monitoring

soldiers' vital signs in real time. With proper testing, calibration, and maintenance, the system could potentially save lives and improve the safety and effectiveness of military operations.

REFERENCES

- [1] PS. Karte, S.S. Agrawal. "Real Time Tracking and Health Monitoring System of Remote Soldier Using ARM 7, International Journal of Exploring Trends and Technology, ISSN: 2231-5381, Volume 4 I 3, No. 1. March 2013, pp: (311-315)
- [2] ShriNikam, SupriyaPatil, Prajkowa, V. S. Bendre. "GPS Based Soldier Tracking and Health Indication Syst. International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering (SN 277-8875 Volume 2, Issue 3, March 2013, pp (1082-10
- [3] Prof. AM An Ber Ashish Sontakke, Soldier Tracking and Health Monitoring System". The International Journal of Computer Science & Applications, ISSN: 2278-1080, Volume 2, No. 02, April 2013, pp: (81-86)
- [4] Govindaraj A., Dr. S. Sindhujažana, "GPS Based Soldier Tracking and Health Indication System with Environmental Analysis", International Journal of Enhanced Research in Science Technology & Engineering, ISSN 2319-7463, Volume 2 Issue 12, December 2013, pp: (46-52)
- [5] PalvePramod. "GPS Based Advanced Soldier Tracking With Emergency Messages & Communication System". International Journal of Advance Research in Computer Science.Soldier Health and Combat Casualty Care in the 21st Century" by Stephen L. Ondra and Jeffrey A. Bailey, Journal of Neurosurgery, 2012.
- [6] "Military Medical Technology and Healthcare Delivery" by Michael Galarneau and Robert Gifford, Military Medicine, 2018.
- [7] "Trends in Military Medical Research: A Bibliometric Analysis" by Jian Xu, Medical Science Monitor, 2018.
- [8] "Combat Trauma and the Injured Brain: A Review of Clinical and Research Advances" by Michael McCrea, Brain Injury, 2012.
- [9] "Soldier Health: A Review of the Literature" by Judith A. Klein, Military Medicine, 2010.
- [10] "The Evolving Role of the Military Surgeon: A Review of the Literature" by Tamara J. Worlton and Michael L. Zucker, Military Medicine, 2012.
- [11] "Innovative Strategies for Military Health Research" by Robert W. Motl and Thomas W. J. Huitema, Military Medicine, 2014.
- [12] "Military Medicine and the Future of Healthcare" by Kenneth W. Kizer, Journal of the American Medical Association, 2015.

PAPER

ORIGINALITY REPORT

14%

SIMILARITY INDEX

11%

INTERNET SOURCES

11%

PUBLICATIONS

5%

STUDENT PAPERS

PRIMARY SOURCES

1

www.ijirset.com

Internet Source

3%

2

www.kscst.iisc.ernet.in

Internet Source

2%

3

"International Conference on Intelligent Data Communication Technologies and Internet of Things (ICICI) 2018", Springer Science and Business Media LLC, 2019

Publication

1%

4

www.briarwoodhospital.com

Internet Source

1%

5

www.researchgate.net

Internet Source

1%

6

Gordana Lastovicka-Medin. "Visualizing "Coronavirus": Engaging with Invisible Threats through Prototyping Air Pollution Demonstration Tool with Arduino", 2020 9th Mediterranean Conference on Embedded Computing (MECO), 2020

Publication

1%

7	www.ijsr.net Internet Source	1 %
8	ouci.dntb.gov.ua Internet Source	1 %
9	Springer Series in Bio-/Neuroinformatics, 2015. Publication	<1 %
10	www.diva-portal.org Internet Source	<1 %
11	www.erpublications.com Internet Source	<1 %
12	Submitted to University of Balamand Student Paper	<1 %
13	V. Mekala, Rosalin Ruby Angela, M. Manimegalai, VibinMammen Vinod. "Real Time Location Tracking and Health Monitoring of Police Force", 2018 International Conference on Intelligent Computing and Communication for Smart World (I2C2SW), 2018 Publication	<1 %
14	ubimon.doc.ic.ac.uk Internet Source	<1 %
15	M. Anish, Jayaprabakar Jayaraman, T. Arunkumar, V. Jayaprakash, R. Dinesh, N. Deepak Vigneshwaran. "Experimental	<1 %

investigation on optimization of process parameters of cutting Ti6Al4V composite using wire cut machining", Materials Today: Proceedings, 2020

Publication

16

romanpub.com

Internet Source

<1 %

17

www.mdpi.com

Internet Source

<1 %

18

www.pantechelearning.com

Internet Source

<1 %

19

Ziyu Lv, Feng Xia, Guowei Wu, Lin Yao, Zhikui Chen. "iCare: A Mobile Health Monitoring System for the Elderly", 2010 IEEE/ACM Int'l Conference on Green Computing and Communications & Int'l Conference on Cyber, Physical and Social Computing, 2010

Publication

<1 %

20

www.slideshare.net

Internet Source

<1 %

21

Sujitha V, Sudarmani. R, Aishwarya B, Vishnu Sanjana V, P. Vigneswari. "IoT based Healthcare Monitoring and Tracking System for Soldiers using ESP32", 2022 6th International Conference on Computing Methodologies and Communication (ICCMC), 2022

<1 %

Publication

Exclude quotes Off

Exclude bibliography Off

Exclude matches Off