**CHAPTER 1**

**INTRODUCTION**

**1.1 GENERAL BACKGROUND**

With the rapid development of urbanization, urban hardening area is also increasing. At the same time, global warming, water cycle changes, atmospheric circulation anomalies and other factors caused by complex situation which the abnormal weather and climate events continue to occur. Heavy precipitation and other disastrous weather frequency, intensity has increased, the trend of strengthening, the management of sewers is more and more demanding. However, the current sewer monitoring system is only for a certain aspect of the sewer to detect, the most common is to monitor the sewer toxic gas situation. There is no comprehensive sewer monitoring program, which gives the sewer management a great deal of inconvenience, which makes it impossible for departments involved in the operation of the sewer system to be able to grasp and monitor in real time, while the data systems in the management department are inconsistent, the data cannot be organic integration, in the event of danger cannot be timely warning and targeted, effective exclusion. So, it is particularly important to place sensors in areas where people are not easy to reach. Therefore, the establishment of an efficient sewer monitoring system is not only an important part of urban environmental monitoring, but also an important component of safety early warning of facilities.

In the future development of technology IoT has a profound influence. In addition, with the development low power embedded technology, sensor technology is widely used. Constructing the wireless sensor network of sewer can increase the monitoring area, reduce the artificial blind spot of the sewer and improve the accuracy of monitoring. In India sewage cleaning from manholes and drains are a difficult and risky job for anyone. In 2013, Supreme Court of India gave a decision that all such jobs would be done by machines and wherever human intervention is required, proper safety equipment should be provided to the workers. However, the municipalities give contract to contractors who hire local people to clean the sewage.

* 1. **ABOUT THE PROJECT**

In this project we are mainly focusing on the safety of sewage workers. Here we are using a helmet which consist of various sensors to detect hazardous gas and other contents in the sewage. Also, we have sensor to monitor the body temperature of the sensor. The data from these sensors will be send the mobile of the team outside the sewage. In their mobile they can see the data send by the sensors and they will get alert if any abnormality is found. Also, the helmet has an emergency button. If the worker feels any hesitations or any discomfort, he can press the emergency button and an alert will be send to the mobile of the co-worker.

Here we are constructing an advanced sewage workers safety monitoring system. For this we are using various sensors. These sensors will be embedded on a helmet and the sewers can wear this helmet. This helmet has a carbon monoxide sensor, hydrogen sulphide sensor, methane sensor, and also an ultrasound sensor to detect the obstacles and it has a temperature sensor to detect the body temperature sensor of the sewer.

* 1. **OBJECTIVE AND SCOPE**

**SEWAGE WORKERS SAFETY MONITORING SYSTEM BASED ON IoT is** a project which take care of the sewage workers, those people who work for the society. This smart safety system will help to monitor the safety measures of a sewage workers who works in the sewages to keeps our city clean.

The proposed system will mainly be focusing on the safety of the sewage workers. Here the system will be using a helmet which consist of various sensors to detect hazardous gases inside the sewage. The readings from various sensors will send to the mobile of the person who stand out side the sewage through a Bluetooth data monitoring app. Through this we can save the life of the worker from the deadly poisoning gases inside a sewage. Also the helmet has an emergency button which will help the worker to notify his helper when he feel suffocated or uncomfortable.

**CHAPTER 2**

**LITERATURE SURVEY**

**2.1 STUDY OF SIMILAR WORK**

**Underground Drainage Monitoring System**

The underground drainage system is an important component of urban infrastructure. Most management on underground drainage is manual therefore it is not efficient to have clean and working underground system also in such big cities, it is difficult for the government personnel to locate the exact manhole which is facing the problem. Therefore, it is essential to develop a system which can handle underground drainage without human intervention. Underground Drainage involves sewerage system, gas pipeline network, water pipeline, and manholes. This project describes various functions used for maintenance and monitoring of underground drainage system. It provides a system which is able to monitor the water level, atmospheric temperature, water flow and toxic gasses. If drainage system gets blocked and water overflows it can be identified by the sensor system. And that sensor sends information via the transmitter which is located in that area to the corresponding managing station.

As most of the cities in India have adopted underground drainage system, it is very important that this system should work in a proper manner to keep the city clean, safe and healthy. If they fail to maintain the drainage system the pure water may get contaminated with drainage water and can spread infectious diseases. So different kind of work has been done to detect, maintain and manage these underground systems. Also, leaks and bursts are unavoidable aspects of water distribution system management and can account for significant water loss within a distribution network if left undetected for long period. This project represents the implementation and design functions for monitoring and managing underground drainage system with different approaches. It also gives a description of water wise system and detection method to detect leakage defects in sewer pipeline. Also, some part of condition rating model for underground Infrastructure Sustainable Water Mains and Intelligent system for underground pipeline assessment, rehabilitation and management are explained.

**Automated IoT for Underground Drainage Monitoring System**

The Internet of Things (IoT) consists of real-life objects, communication devices attached to sensor networks in order to provide communication and automated actions between real world and information world. IoT came into existence because, without human interaction, computers were able to access data from objects and devices, but it was aimed at, to overcome the limiting factors of human entered data, and to achieve cost, accuracy and generality factors. Sensor Network is a key enabler for IoT paradigm. It represents the implementation and design function of an Underground Drainage and Manhole Monitoring System (UDMS) for IoT applications. The vital considerations of this design are low cost, low maintenance, fast deployment, and a high number of sensors, long life-time and high quality of service. The proposed model provides a system for monitoring the water level and atmospheric temperature and pressure inside a manhole and to check whether a manhole lid is open. It also monitors underground installed electric power lines. In real time, UDMS can remotely monitor current states of the manholes.

**Smart Real Time Drainage Monitoring System Using IoT**

Drainage system monitoring plays an important role to keep city clean. In fact, not all areas have drainage monitoring team. It leads to irregular monitoring of the drainage condition. The irregular monitoring leads to the blocking of the drainage that imply to the salutation which trigger flood. Manual monitoring is also incompetent. It requires a professional but they can only monitor very finite and maintain low accuracy. Also, sometimes due to lack of knowledge the worker may meets to an accident as they have no idea that how will be the conditions in those manholes. This paper represents the application and design function of a smart and real-time Drainage and Manhole Monitoring System with the help of Internet of Things. The manholes present in the drainage will have a module which is having microcontroller interfaced with gas sensor, level indicator, NRF. The system will monitor if the blockage is occurred in between two manholes and also it will sense the rise in amount of various gases which are harmful to the human beings, and also a system of monitoring the water level then it will trigger an alarm and will provide that information to the health departments from which the particular action will be taken. The system will able to monitor all these things in real-time scenario which will allow us to take proper actions of the particular problem in drainage system.

**2.1.1 Existing System**

A large number of sanitation workers die every year due to erratic and lack of facilities available, and harmful toxic gases released while cleaning the sewage. Real time health and safety monitoring system for such workers will prove helpful. In the existing system there are no efficient real time health and safety monitoring system. So many researchers proposed so many ideas, but they are not reliable. In the existing system they use very limited facilities like a gas sensor and a heartbeat sensor. Under the drainage the possibilities of current monitoring system implementation are quite difficult. There is no unified equipment that can provide all the services in one place. Today’s drainage system is not computerized due to which it is hard to know if blockage is occurring in particular location. Also, sometimes due the waste in those drainage lines can produce various gases like methane (CH4), carbon monoxide (CO), etc which are harmful and can cause serious problem if inhaled by humans in large amount and these problems are generally faced by the drainage workers due to which death can occurs. Also, we don’t get early alerts of the blockage or rise in amount of those gases or the increase in water level.

**2.1.2 Drawbacks of Existing System**

* Lack of safe and security
* Less Efficient
* Implementation Issues
* High Expenses
* Difficulty in Maintenance

**CHAPTER 3**

**OVERALL DESCRIPTION**

**3.1 PROPOSED SYSTEM**

In our proposed system we are introducing a new system which can solve all the problems in the existing system. Here we are using a helmet which can wear by the sewage workers. This helmet consists of various sensors, which will measure the various gas levels, oxygen level, and body temperature of the sewer. Here we are also including an ultra-sonic sensor to detect the obstacle in the drainage. Also, we are providing a facility for alert the co-workers when the things will go worse. Also, our safety smart helmet has an emergency button that can be used by the sewage worker when he feels any suffocation. Here we are unifying all the services and facilities that we can provide, in one equipment, that is, through a helmet, which will work efficiently to save the life of sewage workers. The expenditure our proposed system is very cost effective.

**3.2 FEATURES OF PROPOSED SYSTEM**

* Cost Effective
* Efficient
* Can Implement Easily
* Safe and Secure
* Easy to maintain
* Can easily add advanced technologies
* User Friendly
* Light Weight
* Ease of Use

**3.3 FUNCTIONS OF PROPOSED SYSTEM**

* Portability: Our smart sewage safety helmet can be wearing easily without any hesitation and it can be kept wherever we need.
* Easy Maintenance: It is very easy to keep the maintenance of our helmet.
* Low Cost: The rate of sensors used in this helmet is affordable and the price of helmet is satisfiable.
* Adaptive: This proposed system can be easily adapted to any new technology.
* The proposed system will take care of gas levels and other parameters and will give alert to the mobile of the co-worker if any problem occurs.

**3.4 REQUIREMENT SPECIFICATION**

System analyst talk to a variety of persons to gather details about the business process and their opinions of why things happen as they do and their ideas for changing the process. These can be done through questionnaire, detailed investigation, observation, collection of samples etc. As the details are collected, the analyst study the requirements data to identify the features of the new system must have, including both the information the system should produce and operational features such as processing controls, response times and input-output methods.

Requirements specification simply means, “Figuring out what is to be made before making it”. It determines what people need before starting to develop a product for them. Requirement definition is the is the activity of translating the information gathered in to a document that defines a set of requirements. These should reflect what consumer wants.

The requirements of SEWAGE WORKERS SAFETY MONITORING SYSTEM BASED ON IoT are: Helmet, Gas Sensors, Ultra Sonic Sensor, Temperature Sensor, Mobile Phone, EmbeddedC, Arduino IDE, Bluetooth Data Monitoring App, ATMEGA 328.

**3.5 FEASIBILITY ANALYSIS**

The initial investigation points to be question whether the project is feasible. The feasibility study concerns with the considerations made to verify whether the system fit to be developed in all terms. Once the idea to develop software is put forward, the question that rises first will pertain to be the feasibility aspects. Feasibility study is a test of proposed system regarding its efficiency, impact on the organization, ability to meet the need of users and effective use of resources.

Thus, when a new project is proposed, it normally goes through a feasibility study before it is approved for development. A feasibility study is conducted to select the best system that meets the system performance requirements. This entitles an identification description, an evaluation of candidate system and the selection of the best system for the job.

During system analysis, a feasibility study of the proposed system was carried out to see whether it was beneficial to the organization. Three key considerations that are involved in the feasibility study. They are,

* Technical Feasibility
* Economic Feasibility
* Behaviour Feasibility
* Operational Feasibility

**3.5.1 Technical Feasibility**

Technical Feasibility centres on the existing computer system hardware, software, etc. and to some extent how it can support the proposed addition. This involves financial considerations to accommodate technical enhancements. Technical support is also a reason for the success of the project. The techniques needed for the system should be available and it must be reasonable to use. Technical Feasibility is mainly concerned with the study of function, performance, and constraints that may affect the ability to achieve the system. By conducting an efficient technical feasibility, we need to ensure that the project works to solve the existing problem area.

Since the project is designed using EmbeddedC as programming language. It is very efficient and user friendly. Here we are using MCU 328 micro controller to feed the program and the readings from various sensors are send to the mobile phones using Bluetooth data monitoring app which easy to use and maintain.

**3.5.2 Economic Feasibility**

The role of interface design is to reconcile the differences that prevail among the software engineer’s design model, the designed system meet the end user requirement with economical way at minimal cost within the affordable price by encouraging more of proposed system. Economic feasibility is concerned with comparing the development cost with the income/benefit derived from the developed system. In this we need to derive how this project will help the management to take effective decisions.

Economic Feasibility is mainly concerned with the cost incurred in the implementation of the project. Since this project is developed using EmbeddedC which is more commonly available and even the cost involved in the installation process is not high.

This project has various sensors which is available at low cost in the market. The helmet used in this project is also low cost. Also, the price of micro controller MCU 328 is affordable. The installation cost of Bluetooth data monitoring app, Arduino IDE are also free.

The system once developed must be used efficiently. Otherwise there is no meaning for developing the system. For this a careful study of the existing system and its drawbacks are needed. The user should be able to distinguish the existing one and Proposed one, so that one must be able to appreciate the characteristics of the proposed System, the manual one is not highly reliable and also is considerably fast. The proposed system is efficient, reliable and also quickly responding.

**3.5.3 Behaviour Feasibility**

Proposed projects are beneficial only if they can be changed in to information system that will meet operation requirement of the organization. People are inherently resistant to change and computers have been known to facilitate changes. An estimate should be made of how strong reaction the user staff is likely to have towards the development of a computerized system.

In this project the system is only used by the worker and the data will send to his co-worker only who stand outside the drainage. There is no data storage is needed. The co-worker will get the live readings from the sewage.

**3.5.3 Operational Feasibility**

There is not much difficulty in implementing the system. The proposed system is effective, user friendly and functionally efficient. The user of the system must be unaware of the internal working of the system so that the user will not face any problems running the system. In our system we are using MCU 328 microcontroller and various sensors. We can extend or add any features to the system easily

The sensors will give accurate value according to the programs that are fed in to the micro controller. The user can easily use the system and app. There is no need to worry about the internal procedures of the system.

**CHAPTER 4**

**OPERATING ENVIRONMENT**

**4.1 HARDWARE REQUIREMENTS**

Processor : Intel Pentium4, Arduino UNO

RAM : 1GB or above

Hard Disk : 250GB or above

Display Size : 14” Colour Monitor or above

Screen Resolution : 1024\*768 pixels or above

Keyboard : PC/AT Enhanced Type

Mouse : Logitech PS/2 Port Mouse

Micro Controller : ATMEGA 328

Temperature Sensor : LM35 TO-92-3 Board Mount

Gas Sensors : MQ4, MQ7, MQ9

Ultrasonic Sensor : HC-SR04

Helmet

**4.2 SOFTWARE REQUIREMENTS**

Operating System : Windows7 or higher

Front End : Bluetooth Data Monitoring App

Back End : EmbeddedC

IDE : Arduino IDE

**4.3 TOOLS AND PLATFORMS**

**4.3.1 Arduino IDE**

Arduino is an open-source electronics platform based on easy-to-use hardware and software. [Arduino boards](https://www.arduino.cc/en/Main/Products) are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the [Arduino programming language](https://www.arduino.cc/en/Reference/HomePage) (based on [Wiring](http://wiring.org.co/)), and [the Arduino Software (IDE)](https://www.arduino.cc/en/Main/Software), based on [Processing](https://processing.org/).

Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of [accessible knowledge](http://forum.arduino.cc/) that can be of great help to novices and experts alike.

**4.3.2 EmbeddedC**

Embedded C Programming is the soul of the processor functioning inside each and every [embedded system](https://www.elprocus.com/ieee-projects-on-embedded-systems/) we come across in our daily life, such as mobile phone, washing machine, and digital camera. Each processor is associated with an embedded software. The first and foremost thing is the embedded software that decides functioning of the embedded system. Embedded C language is most frequently used to [program the microcontroller](https://www.elprocus.com/how-to-program-the-microcontroller/).

Earlier, many embedded applications were developed using assembly level programming. However, they did not provide portability. This disadvantage was overcome by the advent of various high-level languages like C, Pascal, and COBOL. However, it was the C language that got extensive acceptance for embedded systems. The C code written is more reliable, scalable, and portable; and in fact, much easier to understand.

**4.3.3 Windows 10**

Windows 10 is a major version of the Microsoft [Windows](https://techterms.com/definition/windows) operating system that was released on July 29, 2015. It is built on the Windows NT [kernel](https://techterms.com/definition/kernel) and follows [Windows 8](https://techterms.com/definition/windows_8). Part of the reason Microsoft decided to name the 2015 release "Windows 10" (and skipped "Windows 9") is because the [operating system](https://techterms.com/definition/operating_system) is designed to be a new direction for Microsoft. One of the primary aims of Windows 10 is to unify the Windows experience across multiple devices, such [desktop computers](https://techterms.com/definition/desktop_computer), [tablets](https://techterms.com/definition/tablet), and [smartphones](https://techterms.com/definition/smartphone). As part of this effort, Microsoft developed Windows 10 Mobile alongside Windows 10 to replaces Windows Phone – Microsoft's previous mobile OS. Windows 10 also integrates other Microsoft services, such as Xbox Live and the Cortana voice recognition assistant.

While Windows 10 includes many new features, it also brings back the [Start Menu](https://techterms.com/definition/start_menu), which was dropped in Windows 8. The new and improved Start Menu provides quick access to settings, [folders](https://techterms.com/definition/folder), and [programs](https://techterms.com/definition/program) and also includes tiles from the Windows 8 interface. The bottom of the Windows 10 Start Menu includes a search bar that allows you to search both your local [PC](https://techterms.com/definition/pc) and the web.

**4.3.4 AT** **Mega 328**

AT Mega-328 is basically an Advanced Virtual RISC (AVR) micro-controller. It supports the data up to eight (8) bits. AT Mega-328 has 32KB internal builtin memory. This micro-controller has a lot of other characteristics. You should also have a look at [Introduction to PIC16F877a](https://www.theengineeringprojects.com/2017/06/pic16f877a.html) (it’s a [PIC Microcontroller](https://www.theengineeringprojects.com/2015/03/pic-microcontroller-projects.html)) and then compare functions of these two Microcontrollers.

AT Mega 328 has 1KB Electrically Erasable Programmable Read Only Memory (EEPROM). This property shows if the electric supply supplied to the micro-controller is removed, even then it can store the data and can provide results after providing it with the electric supply. Moreover, AT Mega 328 has several different features which make it the most popular device in today’s market. These features consist of advanced RISC architecture, good performance, low power consumption, real timer counter having separate oscillator, 6 PWM pins, programmable [Serial USART](https://www.theengineeringprojects.com/2015/06/serial-port.html), programming lock for software security, throughput up to 20 MIPS etc. ATmega-328 is mostly used in [Arduino](https://www.theengineeringprojects.com/2015/03/arduino-projects.html).

**CHAPTER 5**

**DESIGN**

**5.1 SYSTEM DESIGN**

System design is a reduction of an entire system by studying the various operations performed and their relationships within the system and the requirements of its success. One aspect of design is defining the boundaries of the system and determining whether or not the candidate system should consider other related system. System can be defined, as an orderly grouping of interdependent components can be simple or complex.

The idea of the systems has been most practical and necessary in computerizing the interrelationships and integration of operations, especially when using computers. Thus, it’s a way of thinking organizations and their problems. An organization consists of several interrelated and interlocking components.

The most creative and challenging phase of the system life cycle is system design. The term design describes a final system and the process by which it is developed. It refers to the technical specifications that will be applied in implementing the candidate system. It also includes the construction of programs and program testing.

The first step in the system design is to determine how the output is to be produced and in what format. Samples of the output and the inputs are also presented. In the second step, input data and master files are to be designed to meet requirement of the proposed output. The processing phase’s system’s objectives and complete documentation. System design has two phases:

* Logical
* Physical

The logical design reviews the present physical system, prepares the input and output and also prepares a logical design walk- through.

Physical design maps out the details of the physical system, plans the system implementation, devices a test and implementation plan and new hardware and software.

**5.1.1 Block Diagram**

**HC-SR04**

**MQ-4**

**MQ-7**

**MQ-9**

**LM35** **TO-92-3** **BOARD** **MOUNT**

**MC 328**

# **5.1.1** **Data Flow Diagrams**

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It can be manual, automated, or a combination of both. It shows how data enters and leaves the system, what changes the information, and where data is stored.

The objective of a DFD is to show the scope and boundaries of a system as a whole. It may be used as a communication tool between a system analyst and any person who plays a part in the order that acts as a starting point for redesigning a system. The DFD is also called as a data flow graph or bubble chart.

**The following observations about DFDs are essential:**

1. All names should be unique. This makes it easier to refer to elements in the DFD.
2. Remember that DFD is not a flow chart. Arrows is a flow chart that represents the order of events; arrows in DFD represents flowing data. A DFD does not involve any order of events.
3. Suppress logical decisions. If we ever have the urge to draw a diamond-shaped box in a DFD, suppress that urge! A diamond-shaped box is used in flow charts to represents decision points with multiple exists paths of which the only one is taken. This implies an ordering of events, which makes no sense in a DFD.
4. Do not become bogged down with details. Defer error conditions and error handling until the end of the analysis.

**Basic DFD Symbols**

* **Rectangles-**Representing external entities which ate sources or destination of data.
* **Arrows-**Representing the data glows, this can either be electronics data or physical items. It shows the directional movement of data to and from external entities, the process and data stores.
* **Open-ended rectangles or two parallel lines-**Representing data stores, including electronic stores such as databases or XML files and physical stores such as filling cabinets or stack of paper.
* **Circle or a Rounded Rectangle-**Representing process, which take data as input, do something to it, and output it. It is used to represent functions.

**Components** **of** **Data** **Flow** **Diagram**

* **Source** **or** **Destination** **of** **Data**
* **Data** **Flow**
* **Data** **processing**
* **Data** **Storage**

**5.3 INPUT DESIGN**

The input design is the link between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put transaction data into a usable form for processing data entry. The activity of putting data into the computer for processing can be achieved by inspecting the computer to read data from a written or printed document or it can occur by having people keying the data directly into the system. The design of input focuses on controlling the amount of input required, controlling errors, avoiding delay, avoiding extra steps and keeping the process simple.

The system needs the data regarding the asset items, depreciation rates, asset transfer, physical verification for various validation, checking, calculation and report generation.. The error raising method is also included in the software, which helps to raise error message while wrong entry of input is done.

So in input design the following things are considered.

• What data should be given as input?

• How the data should be arranged or coded?

• The dialogue to guide the operating personnel in providing input.

• Methods for input validations and steps to follow when error occur.

Input Design is the process of converting a user-oriented description of the input into a computer-based system. This design is important to avoid errors in the data input process and show the correct direction to the management for getting correct information from the computerized system.It is achieved by creating user-friendly screens for the data entry to handle large volume of data. The goal of designing input is to make data entry easier and to be free from errors. The data entry screen is designed in such a way that all the data manipulates can be performed. It also provides record viewing facilities.When the data is entered it will check for its validity. Data can be entered with the help of screens.

Appropriate messages are provided as when needed so that the user will not be in maize of instant. Thus the objective of input design is to create an input layout that is easy to follow.

In the proposed system , the input values are the readings that are sensed by the sensors. All the sensors will sense the values of the parameters that the sensors functioned for. There are no user entered input value. When the connection with the sensors get activated, the readings will be measured by the sensors and send to the mobile of the co-worker. There is no need to enter any data. The user only has initiate the connection by opening the app and bluetooth.

OUTPUT DESIGN

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system’s relationship to help user decision-making.

Output design phase of the system is concerned with the convergence of information to the end user-friendly manner. The output design should be efficient, intelligible so that system relationship with the end user is improved and they’re by enhancing the process of decision-making.The basic requirements of output are that it should be accurate, timely and appropriate, in terms of content, medium and layout for its intended purpose. Hence it is necessary to design output so that the objectives of the system are met in the best possible manner.

1. Designing computer output should proceed in an organized, well thought out manner; the right output must be developed while ensuring that each output element is designed so that people will find the system can use easily and effectively. When analysis design computer output, they should Identify the specific output that is needed to meet the requirements.

2 .Select methods for presenting information.

3. Create document, report, or other formats that contain information produced by the system. The output form of an information system should accomplish one or more of the following objectives.

 Signal important events, opportunities, problems, or warnings.

 Trigger an action.

 Confirm an action

The output is designed in my project in such a way that the readings that the sensors are sensed will be send to the mobile through a Bluetooth Data Monitoring App. This readings are the also the output of our system. The readings will be displayed on the mobile phone and the user will get alerts according to the data send by the sensors.