INTRODUCTION

This project aims to design a multi-parameter monitoring system using a microcontroller that measures and controls various global parameters and the system comprised of wireless mode of communication. These processes are managed using Raspberry Pi. The parameters that can be tracked are gas, temperature, light intensity, fire and PIR alert. The system comprises of a single master and multiple slaves with wireless mode of communication using GSM and a Raspberry Pi system that can either operate on Windows or Linux operating system. Raspberry Pi can send Alert Message (SMS) using GSM modem.

Home and Industrial security and automation are becoming increasingly prominent features on mobile devices. The aim of this project is to design and implement affordable, flexible and fast monitoring industry security system using Raspberry Pi with GSM technology. The system is designed to detect data and send to mobile SMS as well as to get notified through alarm tones. It can detect leaking of harmful gases, the smoke caused by fire as such suspicious activities and report about such incidents accordingly. Also the user can activate all the alarm systems even while going outside through the mobile device.

Keywords: Raspberry Pi 3, Industrial Internet of Things, Python Programming, Sensors, Cloud storage, GSM modem.

FEASIBILITY STUDY

The main considerations in the field of technology are automation, power consumption and cost effectiveness. Automation is intended to reduce man power with the help of intelligent systems, Power saving is the main consideration forever as the source of the power (Thermal, Hydro etc.,) are getting diminished due to various reasons. The main objective of the project is to automatically monitor the different parameters in any industrial unit in an efficient manner. The project deals with various parameters like motion detection, smoke detection, temperature, fire and light which are adequately detected by sensors in the project. This is very useful in terms of an industry and the laborers who work in them since they are appropriately protected from otherwise life-threatening situations.

Now-a-days the accidents in the industries have increased. Even if any explosion occurs it can't be easily known to the laborers and it may cause accidents. So in order to avoid this, a system has been designed and this is allowed to monitor the ambient situations inside the industry. Some of the parameters such as explosions, temperature and water level are sensed by using sensors and the received data from sensors transmitted to the microprocessor used in raspberry PI and then transmitted to the cloud and mobile device through GSM module. By this the human intervention can be avoided inside the industry and the accidents can be prevented.

METHODOLOGY

- **Stage 1**: To learn IIoT (Industrial Internet of Things) - Introduction & Applications, Scope of IIoT, Smart Industries using IoT followed by meeting the hardware requirements of the project.
- **Stage 2:** Powering up Raspberry Pi 3, Connecting and Detecting it.
- **Stage 3:** Python Programming and Interfacing Raspberry Pi 3 using OrCAD.

  Along with this, a learning of Sensing in IoT, Sensors & Data Acquisition will also be done at this stage.
- **Stage 4:** Interfacing Sensors with Raspberry Pi and then reading data from sensors
- **Stage 5**: Setting up Control Devices and Electrical Loads by learning Relays and Electrical Loads, How relay works and keeping in view the Electrical Safety Measures to be taken.
- **Stage 6**: Design of parameter monitoring system by Interfacing the hardware and Programming Logic and then setting up the cloud storage.
- **Stage 7**: Testing the Project

FACILITIES REQUIRED

Software Tools:

- UBUNTU
- Embedded C Programming
- OrCAD

Hardware Tools:

- Raspberry pi3
- MAX232
- LCD (Liquid Crystal Diode) Display
- Power Supply
- PIR (Passive Infrared) Sensor
- Temperature Sensor
- LDR (Light Detecting Resistor) Sensor
- LED (Light Emitting Diode) bulb
- Alarm
- Gas Sensor
- Fire sensor

BLOCK DIAGRAM

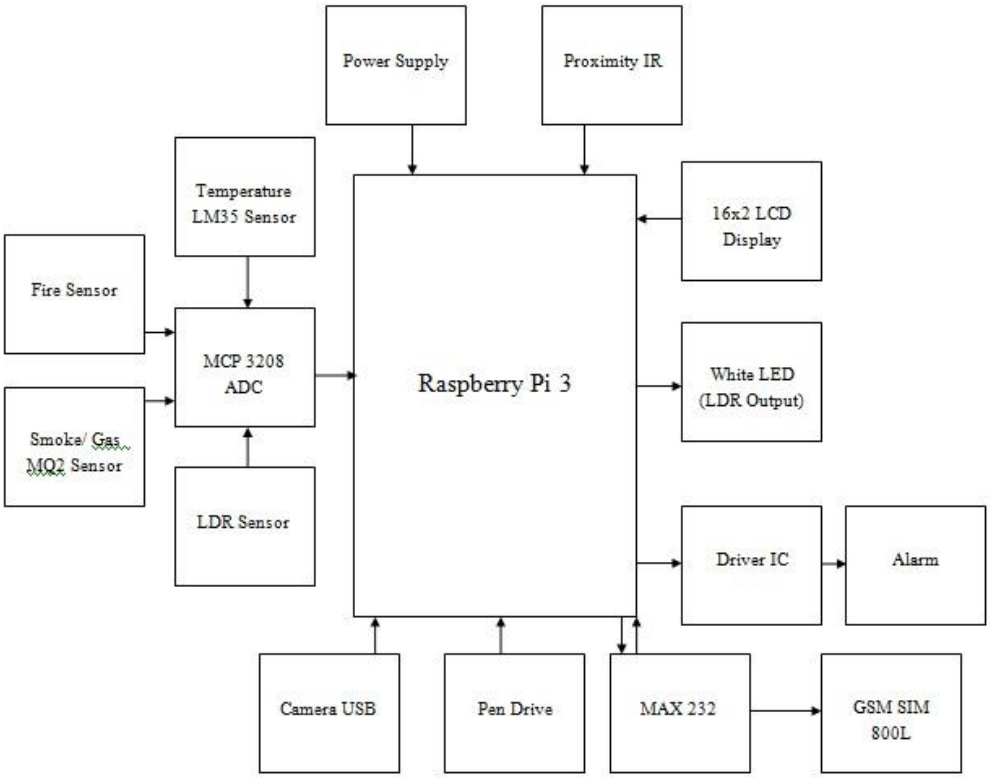

Figure 1: Block Diagram

Power Supply:

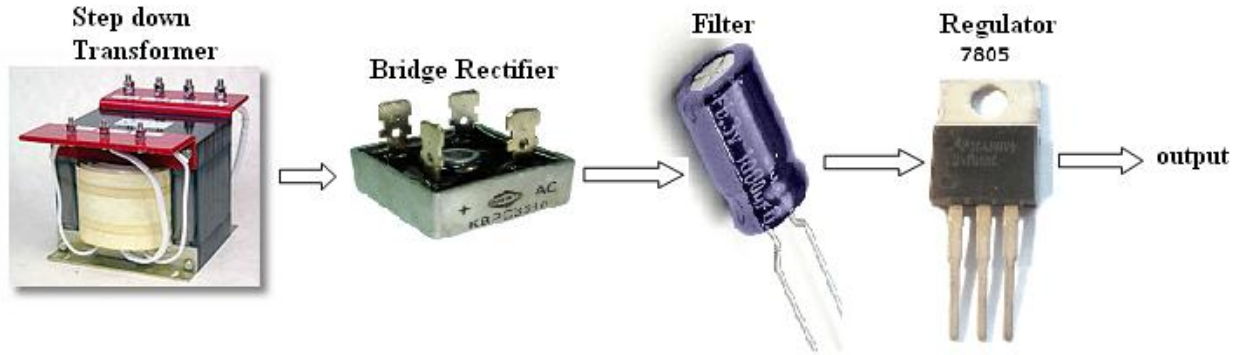

Figure 2: Power Supply Elements

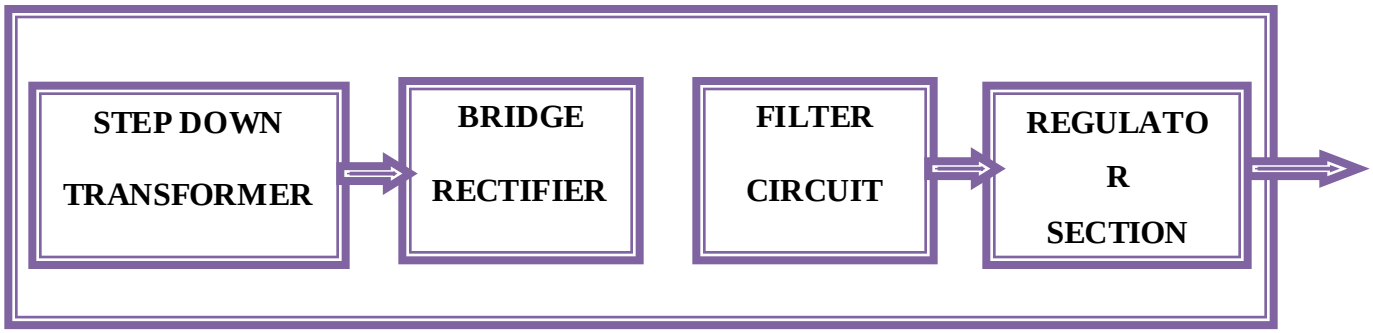

Figure 3: Block Diagram of Power Supply

Receiving Station for SMS alert:

Figure 4: Sample mobile unit for SMS alerts

Schematic diagram:

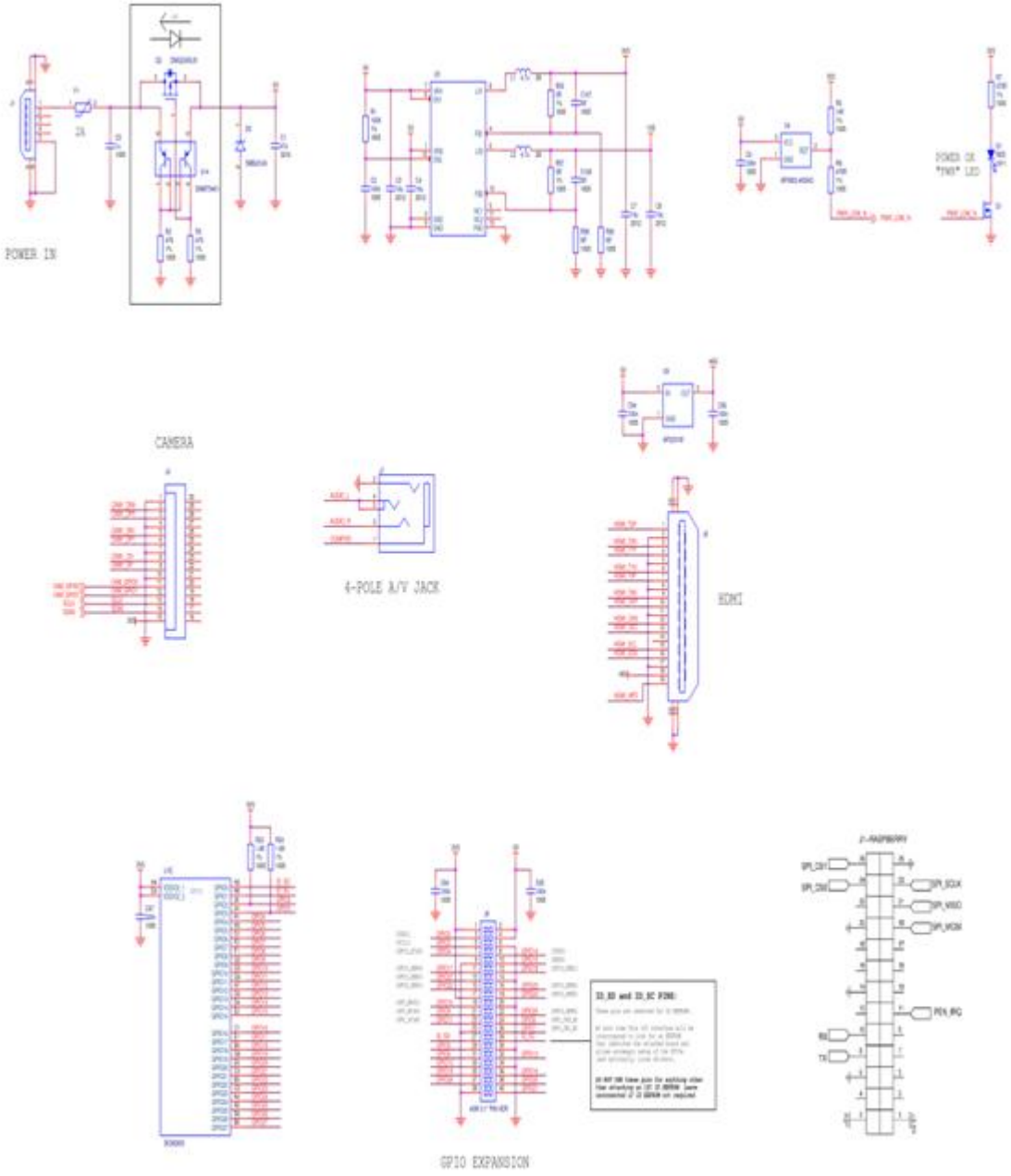

Figure 5: Schematic Diagram of Components

CONCLUSION

The designed system is reliable to use and can be used in any working environment. The sensors which are used are quite sensitive. The suffocation of the labors working inside the mine is avoided. The accidents are prevented which are caused by ambient conditions. This application can be used for all industrial area where human intervention for security can be avoided. In hospitals, shopping malls also this application can be used.

Future Scope

The system can be enhanced for wave form representation of data in an excel sheet using Raspberry pi. The additional slaves can be added for measures various other parameters. Also controlling action can be set for some predefined cases in the master module which enables the automatic operation at certain cases. A dedicated video processor can be used in raspberry pi to display graphical and three dimensional view of the industry.

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