Energy Efficient Industrial Application Using IOT

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Abstract— In this paper security based and energy efficient system is developed for the intelligent industrial automation. The system works on a solar energy. Raspberry Pi 3 used in this system. Gas leakage and temperature information are sensed by sensors. And this information is sent to the android phone and a laptop via WiFi. The gas leakage and temperature in the industries automatically detect which controls solenoid valve and fan, which is connected to the Raspberry Pi 3. The solenoid valve is use of this system for the purpose of gas leakage valve close and exhaust fan use for cooling purpose. Automatically alert about critical situation in the industry via an alarm. The main two parts of this system; detection of gas and temperature, live video streaming and whole this information is sent to the laptop and mobile. Camera used in this system sends live video to the laptop. The aim of the proposed system is managing the power utilizes and control the critical situation in the industries.

Keywords—Gas Sensor, Temperature Sensor, Raspberry Pi 3, Solar Panel, Camera,

I. INTRODUCTION

Automation is one of the most important factor which is used in industries as well as for domestic applications. Automation reduces human efforts by replacing self-operated system. In this paper automation provides far better service to eliminate the human efforts and also, achieve accuracy and speed in work. The use of the Open - Source environment make, it's cost effective. Linux based raspbian Operating system used in Raspberry Pi3, and Python is freely available for users to use and to develop the required application [1].

Security will be a very important critical aspect of many next generation applications and devices, especially these applications and devices are applied in specific domains of our everyday life as well as industry, education and in hospitals. This will provide privacy to all domestic and industrial applications. This paper implements a system for industrial purpose. Using this system we can alert person in critical condition in case of gas leakage in industries and temperature is going high. The gas leakage and abnormal temperature in the industry is detected automatically using sensors. Output of sensor controls solenoid valve and exhaust fan, which are connected to Raspberry Pi 3.

II. RELATED WORK

Various systems are used in home or industries for the security purpose. Energy efficiency is an important concern to deal with. This system deals with it using solar energy. System design includes sensor network, raspberry pi and the solar panel is used for make system energy efficient

In paper [1]. Subhashini M.et.al have described The proposed system consists of two main components. Sensor Networking and Automation used in domestic and industrial applications using raspberry pi 2. First part is the server , which presents the system core that manages, controls, and monitors users home. Users and system administrators can locally or remotely manage and control system code. Second part is hardware module, which provides the appropriate interface to sensors and actuator of home automation system. In paper [2] V.Ramya.et.al has proposed secured and energy efficient wireless system is developed for industrial automation purpose. The system works on a solar energy. The aim of this system is to manage the power utilities and also monitor employees work using the wi fi network. The main focus of this project is to reduce power usage and to alert the people about the critical situations in the industry. This system, uses solar panels. It detects gas leakage in industry using gas sensor and boiler temperature detect using temperature sensor. The system will activate the alarm interface with the raspberry pi during the critical situations.

This paper [3] CheahWai Zhao.Et.al introduce techniques uses raspberry pi for server to server communication using various wireless techniques such as WiFi and Zigbee. Thousands of sensors used in industries for different work, such as a pressure transmitter, flow meter, temperature transmitters, gas sensor level transmitter and so on. Wireless networks are mainly used to send data wirelessly to a base station(laptop or mobile) by connecting different sensor. It brings advantage as it provides reliable and stable communication system for instruments and controls. This paper proposes the system based on raspberry pi to function copy and store the file over the network and this information send to the laptops. S.Thenmozhi.et.al [4]. In the greenhouse environment, we have to detect harmful gases, which can harm the plants which can be used in my system.

Robotics is a very quickly growing innovated field. With the advantages in technology, with combining wireless networking and robotics has a great advantages in many aspects. Presently home automation is possible with smart devices by an internet control of home appliances. So wireless network and sensors using for controlling a robotic arm remotely has greater advantages for industry as well as home. There are many techniques to control the robots. Paper [5] R. Thomas et.al describes the using internet of things for control the robotic arm automatically from a remote end. In this paper [6] A. chawane. et.al presents industrial automation using raspberry pi. Gas sensor, temperature sensor and fire sensor, relay system, LCD display are mantion in paper. It is used for security purpose in the industry. A. Velankar et..al introduces Wireless Electronic Nose for Gas Identification in this paper [7]. Different different gas sensors are used and output of that sensors given to the laptop using RF Zigbee serial communication. K.Bhosale et.al. Present industrial automation using IOT based in this paper in [8]. The system depends on microcontroller when gas leakage detected in the industry at that time alarm, turn on and alarts about critical condition. Industrial automation is also using microcontroller which is described in paper [9].

III. METHODOLOGY

Automation is used to control the system in industry. Industrial automation is used to the increase the quality of product. An advantages of the industrial automation are high productivity, high flexibility, high safety, high information accuracy. Using different protocols operated different mobile node it is one method which is described in paper [10].

This paper is composed of Raspberry Pi 3. The system is for industrial automation using various sensors.It is an energy efficient circuit because the energy used for the system is Solar energy and whole circuitry works on battery which is charged by solar panels. To increase security in industries, industrial automation is an important part of human life. Industrial automation is based on cloud computing it is the future scope of this system [11].

In this paper gas sensor is used to detect gas in industry and temperature sensor is used to detect high temperature . Gas sensor MQ3 and temperature sensor DS18B20 are two main sensors used in this system. Voltage measure and charging and discharging of the battery are connected to the relay circuitry and that relay circuitry is interfaced with the Raspberry pi 3. 5v power supply is given to gas sensor and buzzer circuitry. The embedded main part is Raspberry Pi 3 is interfaced with the gas and temperature sensors for used the sensing purpose , solar panel, buzzer, ADC circuit and current measurement unit. This model is useful for industrial site to increase the security in critical condition.
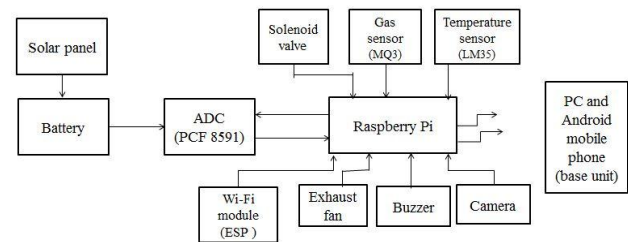

Fig 1: Block diagram of system

A. SOFTWARE

First extract the Linux zip files to the raspbian operating system. Import files from raspberry pi 3 to raspbian operating system Rpi.GPIO, OS,GLOB Initialization of GP I/O, board and sensors and header files enable. Initialize analog to digital IC PCF8591 for converting the sensor output. Read ADC channel (0). Sudo/nano.modprob W1-GPIO. Calibrate ADC and print voltage. When voltage is greater than 12v then go to turn off charging and if the voltage is less than 10v at that time start charging. Read gas sensor if gas leakage is detected, then turn on the alarm , turn off solenoid valve and when gas leakage was not detected at that time turn on solenoid valve and alarm off. Parally read the temperature when the temperature is greater than 40^0c that time fan will be on. When the temperature is less than 38^0c that time fan will be off, and return back to check the sensor output

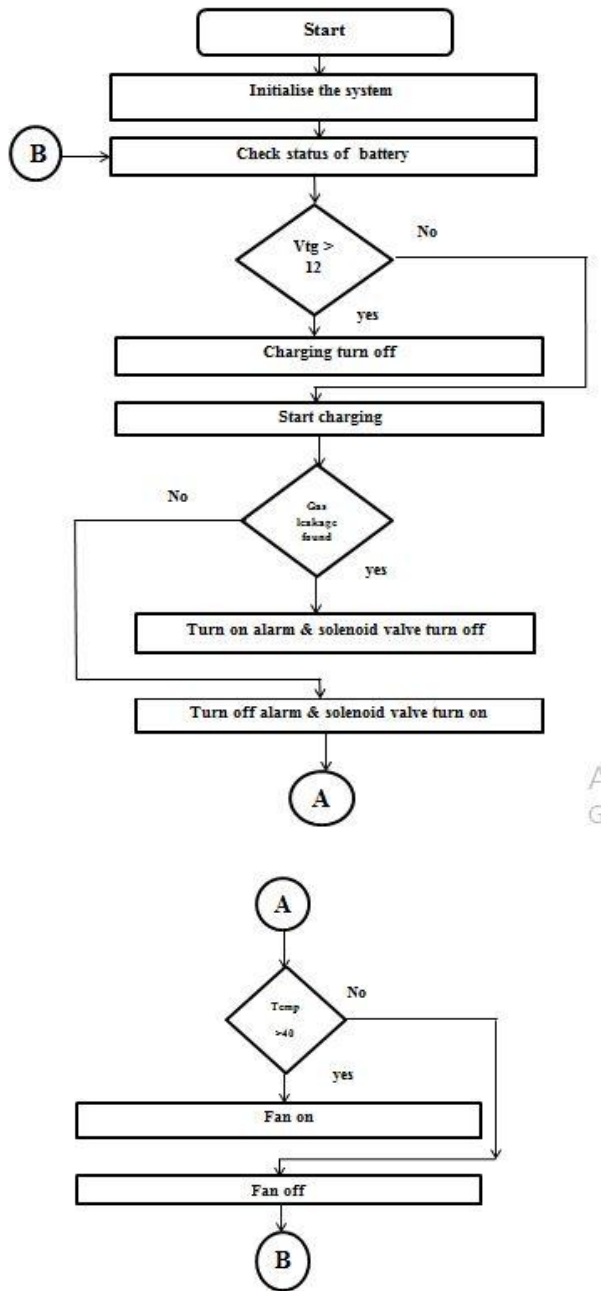　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**116**

Fig 2 : Flow chart of system

B. SYSTEM DESIGN

Fig 3. Depicts an experimental setup of the industrial automation. In this setup raspberry pi 3 is a main part of this system and whole system is depends of raspberry pi 3. Gas

sensor is used in this system for gas leakage in industry and temperature sensor is used for the temperature detect in the industry. And in this system solenoid valve is connected to the raspberry pi 3 and fans is also connected to the controlling the critical situation in the industry. When gas is detected in industries alarm will be on and when the temperature is greater than 40 that time fan will be on. Raspbian software is used in this system and camera is interfaced with the raspberry pi 3 for video streaming is sent to the laptop and alert to the people and video streaming is use full to aware about critical situation.
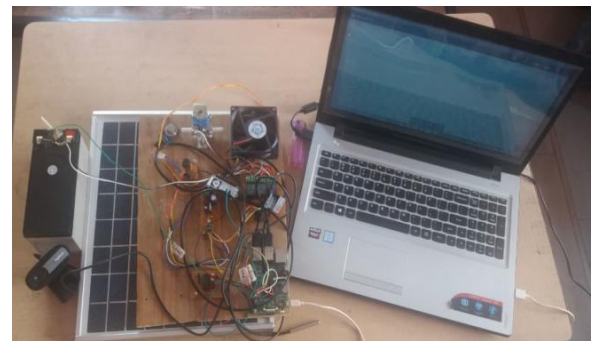

Fig 3: Experimental setup

IV.   RESULTS AND DISCUSSION

1. Gas leakage not found and Temperature is low:-

In this, three scenarios are considered; when gas leakage not found and the temperature is low, And the second is when gas leakage is found that time solenoid valve close and alarm on and the third is when the temperature increased above threshold level that time fan on.
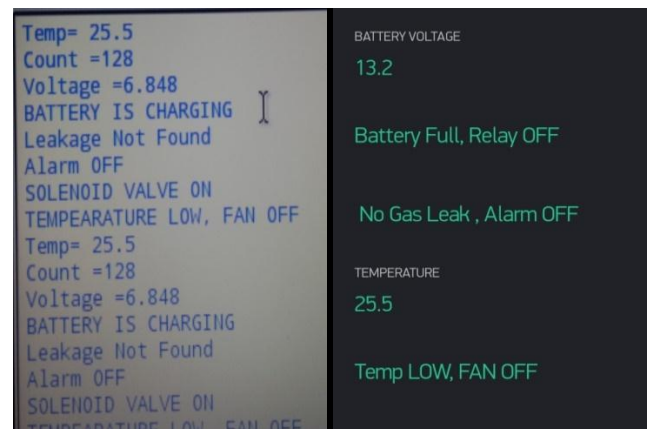

Fig 4: Gas leakage not found and Temperature is low

2. OUTPUT GAS LEAKAGE IS PRESENT :-

Fig 5 shows the output of the Gas leakage present. Solenoid valve off and alarm on.
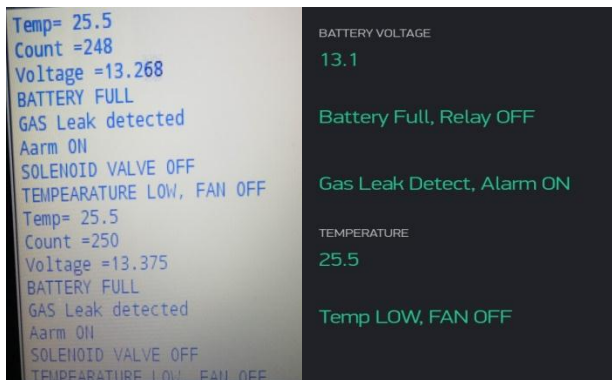

Fig 5: Output of Gas leakage is present

3.Temperature is high :-

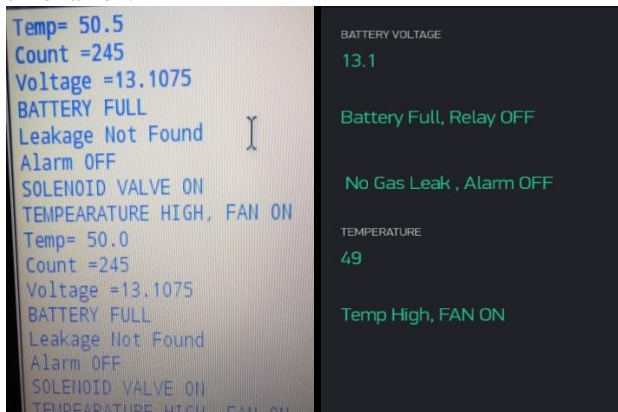Fig 6 shows the output of the when temperature high at that time fan on.

Fig 6: Temperature is high

V.   CONCLUSION

This system uses temperature and gas sensor for defining critical condition in industries. A system is used to control the industrial devices, managing the power utilities through solar panel. The system will activate the alarm in a critical situation and the whole system is interfaced with the raspberry pi. There are two sections in this system, one is control unit section and another one is video streaming section. This system is helpful in the industries where manually interface is not possible because of hazardous gases used or high temperatures.Using this approach, we can control situations remotely in industries.

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