INDUSTRIAL PROCESS TRACKING THROUGH WIRELESS COMMUNICATION

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Abstract—Present days everywhere we are using different types of embedded systems in daily life to reduce man power. In industries playing an important role to perform some functions. Here the main aim of the project is to track and control the different parameters of industry like fuel level, gas detection, light intensity, temperature and live monitoring. The total system can be developed on a single Raspberry pi board and it will be operated through wireless communication like IoT and WiFi linked with internet servers. Raspberry pi board interfacing with different sensors like temperature, LDR, fuel level, gas detect sensor and camera and it will collect the data from sensors. The values of parameters will be displayed on personal computers, mobiles through internet routers. Whenever exceeds the certain value of parameter automatically controls the necessary parameters both we can control manually and sending the warning message to authorized person mobile and mail.

Index Terms—Raspberry Pi, sensors, Wi-Fi, Internet

I. INTRODUCTION

Day by Day drastically increases the number of industries because human being are mostly depends. Now days most industries can be uses different types of technologies. Industries can run continuously without shutdown so we can observe continuously everything in industry like temperature, light intensity, fuel level and gas detection present in industry. Human being cannot watch this parameters at every second due to high temperature, dust, un harmful air will be releases. These reasons will causes many diseases and sometimes in dangerous situation like gas leakage or any other situations. If any parameter can be exceeds the normal value at that time can perform necessary action on time without absence. If anywhere gas will be leaked in industry we can detect the gas leakage and then split the H2O gas, time to time filled the fuel in tank by human being. Everything can be observed in the industry is not possible. Here monitoring is not important and control those parameters on time. On these reasons we designed a system to monitor the parameters like temperature, light intensity, gas leakage and fuel level by interfacing the different sensors LM35, LDR, MQ2 and Fuel level sensor respectively. All sensors connected to a single Raspberry pi board. The sensors will collect the data continuously and pass the data to Raspberry pi board.

The Internet of Things (IoT) is a network of networks in which a massive quantity of gadgets, sensors, or devices are linked together. The IoT connects humans and matters every time, wherever, with something and each person, ideally the use of any path or community and any service. The system will collect the data and transfers to authorized person though wireless communication like IoT or WiFi. Here the system board and personal computer or mobile will be linked each other though router. Values of parameters in industry will be displayed in personal computer or mobile and updated the values second to second by using internet. As declared above whenever exceeds those values automatically it can controls the values and performs necessary actions. At that time warning message will be sent to authorized mobile and mail.

This paper includes different parts as follows: Section II will explain about system design and implementation. Section III shows hardware description. Section IV explain about software description. Section V explain about experimental results and Section VI explain describes conclusion and future scope.
II. EXISTING METHODS

Previously we are using different methods to monitor and control parameters where more demerits will be present. In that methods using PLC’s interfacing with several types of sensors and actuators can measure parameters which include a lot of virtual machines connecting with slave PC’s, which requires a lot more hardware circuitry causes heavy cost. Next one based on GSM interfacing with the microcontroller that can measure and collect the data from sensors and sent to SMS using GSM. Where commands will send to the microcontroller through GSM modem. Now we are interfacing camera and easily monitored and controlled in PHP through IoT or WiFi.

III. SYSTEM DESIGN AND IMPLEMENTATION

The total design of the system will be implemented as shown in Fig1. Various types of sensors present in the design will be connected to GPIO pins of Raspberry pi board. A camera is also connected to the system to watch live monitoring of industry. Raspberry pi board takes the data from sensors of various parameters like temperature, light intensity, fuel level and gas leakage. By using WiFi the value can be sent to the certain person in industry.

The values of parameters can be shown on two ways. First one is displayed on raspberry pi system will be connected to monitor through wired or wireless in remote areas. Second one is web page that will be connected the raspberry pi board with same WiFi. This system will controls automatically and manually as per our necessity.

IV. SYSTEM HARDWARE

Raspberry pi module:

Raspberry Pi board is a one type of small size CPU like credit card. We are using Raspberry Pi computed module3 in this paper. This type of module contain a BCM 2837 processor, 1 Gbytes LPDDR2 RAM and 4Gbytes eMMC flash memory. BCM can be addressed more RAM and RAM CPU can be developed based on ARM 11 architecture and it has six separated supplies presented to perform low power consumption.

MQ2 sensor:

Gas leakage can be detected by using MQ2 sensor, it can be activated when connect to the Raspberry Pi board and easily detect the gas leakage in industry and automatically buzzer will be sounding when gas detected and release the
H2O gas to remove the gas in that place and avoid accidents. It is made up of sensitivity material of SnO2 and conductivity of sensor is high proportional to gas concentration. It has high sensitivity to detect LPG, propane, hydrogen and methane combustive gases.

Fig3: Gas Sensor

LM35 sensor:
LM35 can be performed as temperature measure purpose. Normally temperature present in industries is very high. Owing to high temperature damages will be occurred. So that will be prevented by adding LM35 sensor to measure the temperature ranges.

LM35 much better than compare to others sensors. It have high accuracy value is +/-0.5°C, functioning at 4 to 30 Volts, around it measures between -55°C to 150°C, consumes low current less than 60μAmps(Drain current) and cost is very cheap. It gives perfect output value in analog values that values can be converted by ADC converter.

Fig 4: LM35 sensor

LDR(Light Dependent Resistor):
LDR can be functioned as light intensity measurement. LDR can be operated based on the resistivity. It is a semiconductor material and works on principle of photoconductivity. Resistance will be less when light intensity is high and vice versa. A transistor will be connected as voltage divider to the LDR. Based on the circuit it can act as a switch. The light will be fallen on the LDR surface at that time the photons will move from valence bond to conduction bond makes a path cause low resistivity and vice versa.

Fig5: LDR

Fuel level sensor:
Previously fuel level can be measured by some IC sensors having LED’s. Based on LED’s the fuel level will indicated. Now we are using MCU (Micro Controller Unit) based fuel level sensor. It has a three pin sensor, simple and portable level indicator uses low power. Working voltage is 3-5 volts at the temperature range of 10-30°C. It gives the output in the form of Volts based on water level. When water level is increased voltage level increased based on presenting a series of parallel wires exposed traces measured droplets/fuel volume in order to determine the fuel level. Analog values can be easily converted when connected to microcontroller.

Fig5: Fuel level sensor

Camera:
Presently cameras can be used as security reason even small institutions. In this project camera be used to watch live monitoring of industry, whenever the parameter
range will be exceeded capture the pictures of industry. Here USB camera can be used. It can capture the video and photos of up to 5 MP.

MCP 3008(ADC): Raspberry Pi can take only digital values and not supported for analog values. It doesn’t have ADC inbuilt to convert analog results. Sensors will give the values in terms of analog at that time we want some ADC to convert the analog result. Here we are using MCP 3008 as ADC. MCP 3008 has 4 pseudo differential input pairs and 8 single ended channels to convert different analog values from different devices, 10 bit A/D converters, industrial temperature range of -45°C to +80°C, operating voltage of 2.7V to 5.5 V.

V. EXPERIMENTAL RESULTS

The prototype figure shown in below figure

Results can be monitored in two ways:

1) Raspberry Pi board directly connects to monitor and results will be displayed when code is executed in terminal window as shown in below figure.

In above figure shows the values of parameters and below fig will shows the exceeded parameter value and sent an message and mail to registered officer mobile and mail.

2) Values of different parameters will be shown in personal web page. In this web page we can operated the system in auto mode and manual mode. In manual mode we can activate the motors and lights.
Fig 10: Web view monitor

SMS and MAIL alert:
SMS and mail will be sent to mobile and E-mail when the parameter value exceeds in industry area as shown in below fig

VI. CONCLUSION

Here the proposed design will be measure the different variables like temperature, light intensity, fuel level and gas leakage detection. Whenever values of variables will be exceeded than normal values automatically it can run the respective electronic devices to control the variable within normal values and warning message will be sent to user mobile and mail. The total system can be operated wired or wireless. Values can be displayed in system connected display and personal webpage connected to internet router. We can also check the values in webpage on any device which connected to same router.

REFERENCES


Author Profile

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