

IOT Based Industrial Automation & Data Logging Using GPRS

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Abstract— Automation is the need in industries to reduces the human efforts, achieve the accuracy and speed of work. We will also controls the industry machinery without human resource and also enquire about their operational status from remote place. Raspberry pi works as a controller which controls the appliances industry and also work as a server. Raspberry pi support to Python language. HTML Language is used to design webpage which is front end design and for backend PHP, Java script coding is used for webpage designing. We will take the data from various sensor which are connected to raspberry pi. GPRS is connected to raspberry pi which is always gives on connectivity. Raspberry pi send data through GPRS to webpage with the help of TCP/IP protocol. The data is accessible to industry operator for monitoring and controlling purpose. When the machinery ON/OFF all these data stored in the form of pdf to keep record.

Keywords— IOT, Embedded web server, Raspberry pi , Sensors, GPRS

I. INTRODUCTION

IOT is a Internet of Things. It is basically the use of engineering and manufacturing technology to make manufacturing production line faster, simpler and more efficient. Internet of thing can be human to human, human to machine, machine to machine. It is kind of virtual internet connection where the network can link with any of the device. One of the important feature of IOT is that it requires no human to machine connection to form a network. It can be rather establish link with the help of series of physical objects. IOT is usually based on wireless protocols, well connected sensors, effective processors. IOTDL (IOT based data logger) collects the information by all kind of sensors. Now the information collected is

transmitted to database server using GSM module with GPRS capability.[8]

IOT is used for data transmission from raspberry pi to web page for that we make use of python code that transmit an AT commands to GSM. TCP/IP protocol is used for distinctive operating system to communicate with each other.[5]. For controlling the machine Raspberry pi is used because it is small computer/processor and it works on open source operating system which is cost effective[5].

IOT controls the embedded web and embedded module. After every few minutes the industry operator reads the data from web server[7]. All the sensors continuously sends the data to the RPI in the form of analog signal. we will be set the threshold values for all sensors. If the sensor value goes above threshold value then it will controlled by Rpi.[5] But the general purpose I/O of Rpi accepts only the digital input. To convert the analog data into digital MCP3008 analog to digital converter is used. It is connected to Rpi using SPI serial connection. Raspberry pi transmits the data through GSM to web. GSM is also used as GPRS. GPRS is a packet oriented mobile data service on 2G and 3G cellular communication system. GPRS command and verify its ok or not. GPRS sms speed is more than ordinary sms. The web page is accessible only for industry operator. The control action also taken by sending the command through web.[7]

A. OBJECTIVE OF THIS PROJECT

To make the industrial automation through new embedded technology. To improve the efficiency of system by controlling machineries automatically. Also to make the control of machineries by one admin through internet.

B. EXISTING SYSTEM

In industries the machines are handle through human resource. Particular operator needs to observe and control the machineries. The operator should have its pc to observe all these parameter. And the connection between operator

and sensor may or may not the wired connection. In wireless the range of coverage is limited.

C. NEED OF SYSTEM

As the coverage area is limited in existing system, we make the use of world wide network i.e. internet. Internet has no limits so by using the concept of IoT and raspberry pi we develop the system which can control the any device connected to it. The operator access the machine status from anywhere through internet.

D. BLOCK DIAGRAM

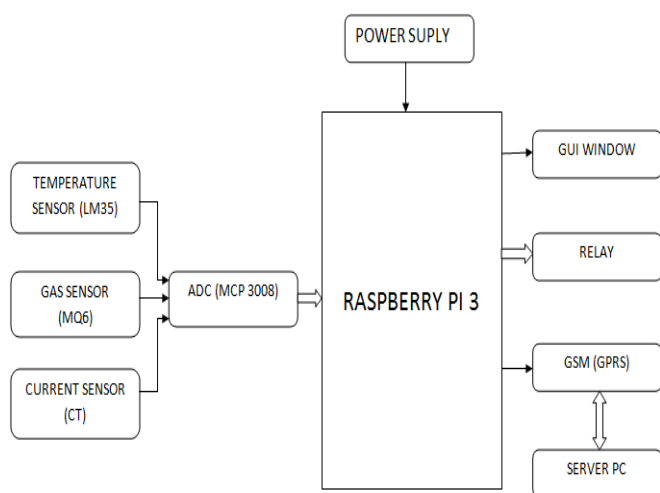


Fig. Block Diagram

E. SYSTEM DESIGN

A) Hardware design

B) Software design

A)Hardware design –

1] Raspberry pi3:

The Raspberry Pi is itself a processor. It is a small computer but it is not like our normal computer. The normal computer have its own hard drive but raspberry pi does not have a hard drive, instead it has SD card slot available on module for the starting up and storing of information. SD card work as a hard drive for the Raspberry pi. We download the operating system, programs and the data needed to run the Raspberry Pi on the SD card. Raspberry pi module is based on 1.2GHz, Quad-Core ARM Cortex-A53 and its memory size is 1GB. Paspberry pi requires power Micro USB socket 5V, 2.5A.

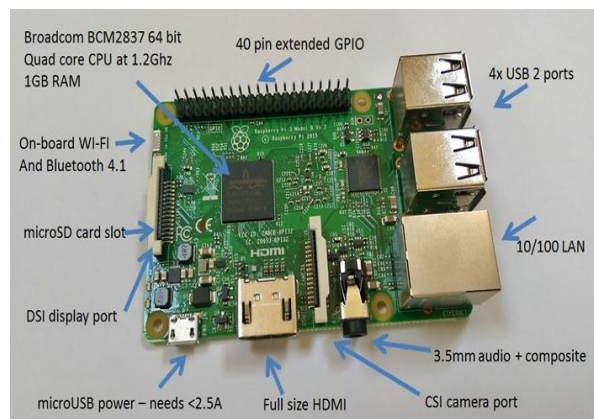


Fig. Raspberry pi-3

2] GSM Module

GSM is digital mobile telephony system. SIM800 operates on 850MHz, 1800MHz and 1900MHz frequency band. GSM is a communication device used for transmission and reception of SMS from Raspberry to web or vice versa. For connecting to internet it can be operated in GPRS mode and can perform many applications for data logging and controlling. Using AT commands the modem can be tested and operated. The GSM modem communicates with any MCU through its serial port. Here GSM used for send a SMS (status of machine or current, temperature or any gas leakage) to admin.

3] Sensors:

Temperature sensor-LM35:

LM35 is a analog temperature sensor which senses temperature and its output is in the form of analog in nature. Output of these sensor is 10mv per degree celsius. Temperature sensor is a thermocouple which is used to measure the temperature from specific environment. The single power supply is used for temperature sensor and it may be plus or minus. Sensitivity of LM 35 is 10mv/c. Operating voltage of LM 35 is from -55 c to +150 c. The accuracy of LM35 is more than that of thermistor.

Gas Sensor –MQ6:

The LPG gas supply is require in the industry for various purpose like heating ovens, etc. Here we choose MQ-6 sensor as it is more sensitive to LPG gas and it has fast response time than other sensors and easy to use. It is use to measure LPG concentration in air. The sensor also sense iso-butane, propane.

Current sensor:

Sometime there will be high variation in power supply. Due to these the chances of damaging the equipments are more. Current sensor is used as a current measuring device, which is attach to the current flowing through wire. It will measures current flowing device. The

drop across wire gives current passing through the wire. Cost is very low and measurement accuracy is high. Here, we used a current sensor Tanotis HMCT103C if current goes above the set threshold value then machine will automatically off and send a SMS to admin through GSM.

4] Relay:

Relay is basically electrically operated switch. Many relay works on principal of electromagnetic induction. A magnetic field has been created by the current flowing through the coil. This magnetic field attracts a lever of the relay which changes the switch contacts. In this project relay automatically off the machine if values of sensor(temperature ,current)goes above the threshold value.

B] Software design:

1] Web server:

The embedded web server is a combination of embedded device and internet technology which provides flexible remote device controlling and monitoring through Internet browser. We can connect any electronic device to web server and can obtain the real-time status information and control devices remotely. The data of different sensors with their time & data of arrival is stored in database. User can interact with controlling unit through web page[4].

2] Raspbian OS

Raspbian is a Deben based Linux operating system. Linux is support most of the architecture(embedded, Raspberry pi). Raspbian OS is download into the microSD card which is freely available on internet. We can also generate the OS which is nothing but set of basic programs. OS is run on the Raspberry pi. It contains tools for browsing python programming and GUI window. Linux has a set of editing, debugging, a powerful network supporting and rich applications.[4]

3] Python

Python is a high level, object oriented programming language. It is general purpose programming language. Python interpreters are available for many operating system. Python is freely available in raspberry pi module and it is used for web designing. In python the syntax are very simple and easy to understand. Because of simplicity we use the python as a scripting language. Code length is very short than other scripting languages.

4] HTML

HTML is a hypertext markup language. It is used to create a webpage in web designing. Using HTML we will create html document which describe the structure of web page. This document is received by web server or from local storage. It creates only static webpage. HTML code can write in any scripting language most probably used to write html

code is java script. HTML document are ASCII text files that contain the text to be displayed and the markup tags which tell how to display them.[12]

5] TCP/IP

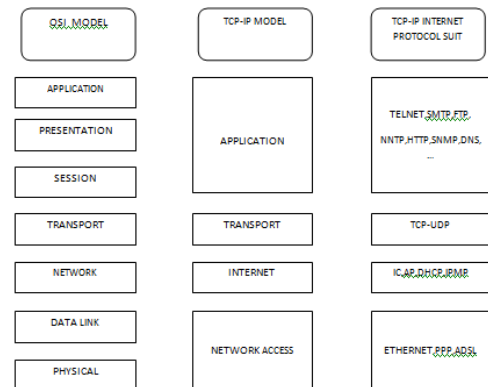


Fig. TCP/IP

SOFTWARE IMPLEMENTATION

a. Downloading an Image

The Raspbian operating system is downloaded from the Internet system that will be installed onto the SD card. This will be a zip file that then extracts to a file of type .img an image file. Whatever image file downloaded, the actual installation process is the same.

b. Choose your Operating System

To install Linux, Distribution is needed. Being an Open Source operating system, anyone can take one of the existing distributions and add things to it or configure it in a certain way before packaging it up as another distribution option for anyone to use. This is how the most common Raspberry Pi distribution 'Raspbian' came into existence

V. ALGORITHM

1. Power ON
2. Peripheral initialization
3. Sensor initialization
4. Sensor Read
5. Control system converts A to D value
6. Set point check
7. If value is more than the set value - Send SMS to operator mobile. - Required control action will be taken. - Upload sensor reading on URL - Download Relay Status - Go to step 4, 5
8. If value is less than the set value - Check any SMS or action on webpage is received from operator. - If not go to step 4, 5 - If received, read data from GSM modem -

Decode the data. - Perform required control action - Go to step4,

VI. FLOWCHART

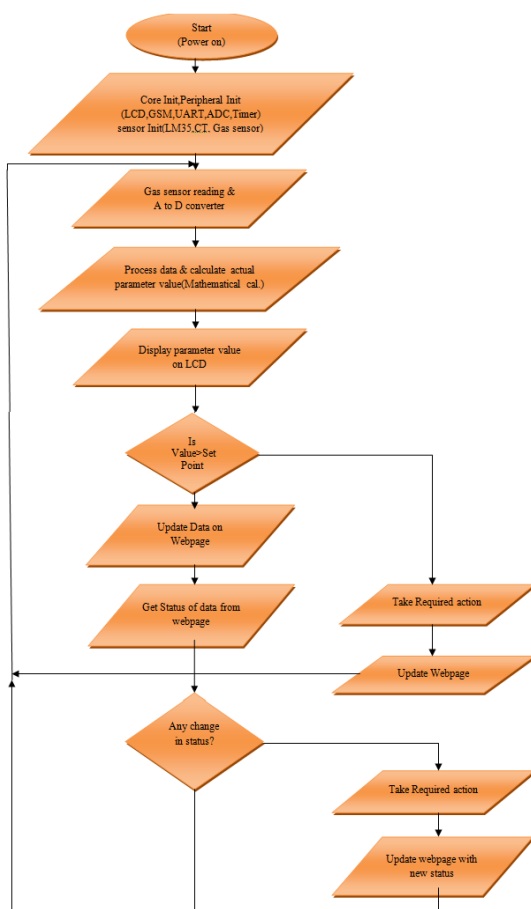
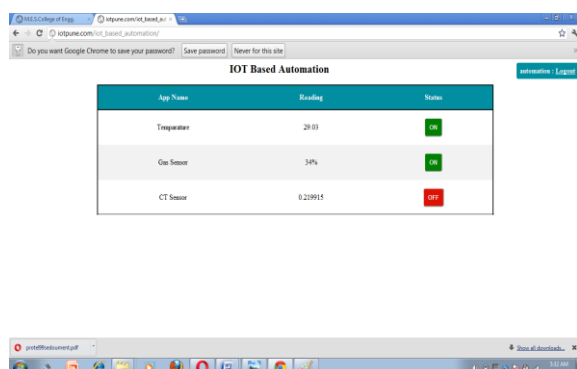


Fig. Flowchart

VII. RESULT



VIII. ADVANTAGES

- 1) IoT improves the quality, productivity and reduce downtime and waste increase efficiency and safety.
- 2) This will enable operation managers and factory heads to remotely manage the factory units.
- 3) The use of IoT sensors in manufacturing equipment enables condition-based maintenance alerts. There are many critical machine tools that are designed to function within certain temperature and vibration ranges. IoT Sensors can actively monitor machines and send an alert when the equipment deviates from its prescribed parameters.
- 4) This complete monitoring of the process in (near) real-time provides scope to recommend adjustments in operations for better management of operational cost.
- 5) In dangerous environments such as fire, under the water, in high temperature environment human can't work. Instead of human the sensors are used for monitoring.

IX. APPLICATION

- 1) There are various application of IOT. Making the use of IOT and sensors we can measure and monitor the parameter like temperature, humidity, etc which are helpful for the farmers.
- 2) In home, the appliances are also notify to the information about the quantity of the supply, on/off status of any device and also the problems are also overcome by its own using the relay circuit.
- 3) In hospital and healthcare center, instead of going to the hospitals, using the sensors and IOT concept doctor can monitor the patient checking the status of on web or android phone and also he will take the necessary decision and suggest medicines to patient.
- 4) Making use of IOT the cities also become the smart city. It will provide the smart energy management system, transportation becomes automated, environment monitoring.

X. CONCLUSION

Thus we implement the system which monitor the industrial machine status as well as control the industrial machineries through the internet using the web server and embedded hardware. In our project raspberry pi as well as industry operator both are works as a controller. Industry operator monitor online real time status of machineries trough internet. The system has good portability, low cost and it is also easy for maintenance. We can interface various types of sensors to raspberry pi modules and make different applications. IOT has ability to communicate the vast number of connected industrial systems which are shares the data among themselves as well as the industry operator and take appropriate action according to programming. And also

we conclude that there is no range limitations because the internet is a world wide network.

XI. FUTURE SCOPE

- 1) The various Future applications may be used by controlling various household devices of house with internet.
- 2) In the future work, the person other than the residents will also be considered.
- 3) Improvement of security problems.

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