

Raspberry pi based global industrial process monitoring and controlling through iot

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Abstract- In this project the main theme is to control the industrial parameters such as temperature, pressure, boiler control. Here Raspberry Pi a special board inbuilt with all components plays a vital role. Its use reduces the space required and also it acts as a computer itself. The sensor values are received through PIC microcontroller and processed in Raspberry pi. The Wi-Fi module of raspberry pi helps in controlling the parameters through internet from anywhere. IOT acts as a server in controlling side. The control process is maintained through Internet Protocol. Hence the operation is very fast. The process is controlled in wireless manner. The simulation result is obtained through PROTEUS 8.5 software.

Keywords-raspberry; wireless; industrial; PCP; IOT; PROTEOUS.

1. INTRODUCTION

The main objective is to monitoring and controlling an industrial parameters and fan, motor light, drives to control manually and automatically in

anywhere in the world. Here we are using Raspberry Pi to monitoring the necessary parameters. Raspberry Pi3 model B 1GB RAM Quad Core 1.2GHz CPU Starter Kit processor. It is a minimized size of active computer. It have a lot of interfacing unit will be available. It cannot directly communicate with the sensors, actuators and motor drives. We need an interfacing communication protocol. Using SPI to communicate and measuring the sensors value. That can be transmitted through Raspberry pi. That measured parameters can be transmitted through PIC microcontroller for automatic control option. That measure parameters are transmitted through IOT using BCM Chip That the IOT has been send the measured data to two place one is LCD display to displaying the actual content and another one is controlling area. The IOT has been sending the data with the help of internet gateway. All data's are uploaded with internet gateway with secured authentication. The PIC microcontroller taking that data with actual key to access the value and responding very quickly with the help of internet. Internet Protocol plays vital role in control and hence the time

required for the transmission of sensor values and the control signal is extremely faster than any other services.

2. EXISTING SYSTEM

The entire system is designed with the double layer SMD based embedded board with different sensors and a raspberry pi that can compile and communicate the data received from the sensors. The raspberry pi when operated on the Linux operating system can perform multi-tasking [20]. The design of the embed board includes the interfacing of different sensors to two slave boars and connecting those slave to a master board through RF transmission. The master and slave boards use PIC 18F4550 Microcontroller, Encoder and Decoder ICs (HD12E & HD12D), LM35 & LDR Sensors, Water level sensor(IC CD4066) and RF Transceivers.

In existing system we can only monitoring through RF module. If it not possible to transmit a data for overlong distance. In existing system measuring minimum level of parameter. Because using RF module we can connect one or two sensors only. In this system don't have any graphical waveform representations

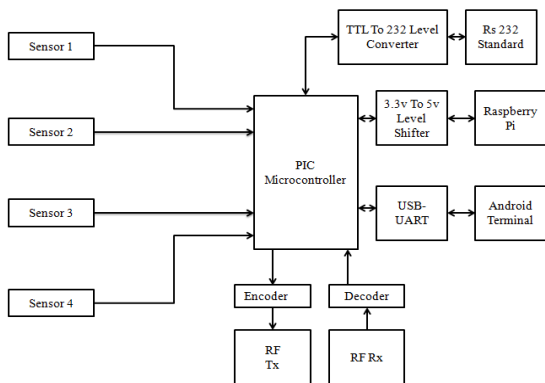
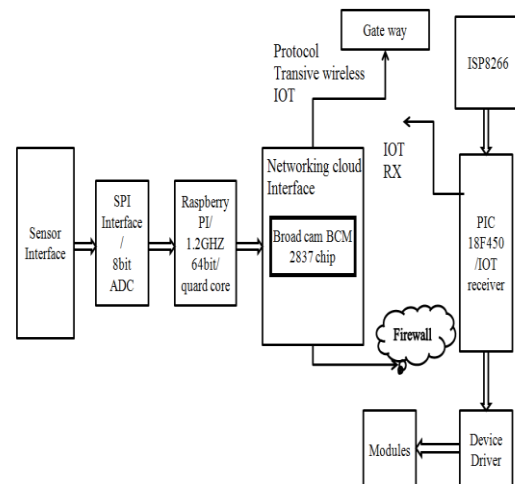


Fig., 1 Existing Block Diagram

3. PROPOSED SYSTEM

In proposed system we can implement both monitoring and controlling global industrial parameters. Controlling is made by using Internet Of Things (IOT). In this system having wireless sensor module, internet gateway module and PIC microcontroller. In this system graphical output is taken by using PROTEOUS 8.5. wireless sensor interfacing have humidity sensor, pressure sensor, temperature sensor light intensity water level are to used. Internet gate way is used to sending and data as a packet. it have an SPI interfacing has been used to interface with raspberry pi module.

BCM 2837 WIFI module has been used to send a data to the PIC microcontroller. Here PIC microcontroller is act as a client module of the system. That the BCM send a measured data as a packet of data. Inreceiver side ESP8266 IP receiver is interfaced with PIC microcontroller. PIC microcontroller has been used to measuring and controlling an FAN, motor, alternator, and lights. These are all controlled by using Internet Of Things. We can use ESP8266 receiver can receiving a data from the BCM 2837 chip. BCM is a wireless module it can sending a data from measure by controller. It can be send



through IOT transmitter.

Fig., 2 Proposed Block diagram

It all happens under the internet communication. 64bit quad core Raspberry Pi is used to control the entire system. Raspberry Pi is used to communicate with IOT by interfacing SPI bus Serial Peripheral Interfacing is used to monitoring an 8 bit channel. In proposed system blocks can be classified into two different operations that are all following below

1. Raspberry pi sensor interfacing shown in Figure 3 and 4
2. Internet of things Protocol communications shown in Figure 5 and 6

Raspberry pi sensor interfacing has adding two or more number of nodes to be connected to measuring various parameters. Here we can use four different sensors to measuring the real time value in Industries.

- DHT11 humidity sensor
- BMP 180 pressure sensor
- DS18B20 Dallas 1-wire
- Temperature sensor
- TSL2561 LUX sensor

To measuring light value These all sensors are connected to TL074 low noise sensor device. It is used to reducing measured parameters from sensors That measured output is analog signal but every electronics device has been taking input as a digital signal. So we can use SPI MCP 8066 8 bit ADC to converting an input signal into digital signal. That digital signal has been send through the raspberry pi by using 8bit SPI interface. If it send a bit by bit data to the controller. If all the values are uploaded internet through IOT.

Why because we want to control this parameters also by using IOT. The measured value will be displayed by using HDMI to VGA and finally connected through monitor. The raspberry pi is used to run the wheely kernel OS with the help of APACHE server Application.

Server to client communication has been depending on both IOT and PIC microcontroller. Initially server giving an data to the client. Client reply about the acknowledgment to the server. If the client is free the server send a data to the client and it will operate. Also client will operating on Priority based value. The client cannot be sending a data to the server. Here BCM chip act as a server module. Measured parameters are transmitted through IOT via BCM chip also that the PIC controller is working on client based module. If that data transmitted in 8bit data packet. If it is transfer by using TCP/IP protocol. It can be sending a data bit into set of packet data.

3. SIMULATION CIRCUITS

In simulation has been into two types to getting an output. That is all following

- Industrial parameters monitoring
- IOT protocol communication with control

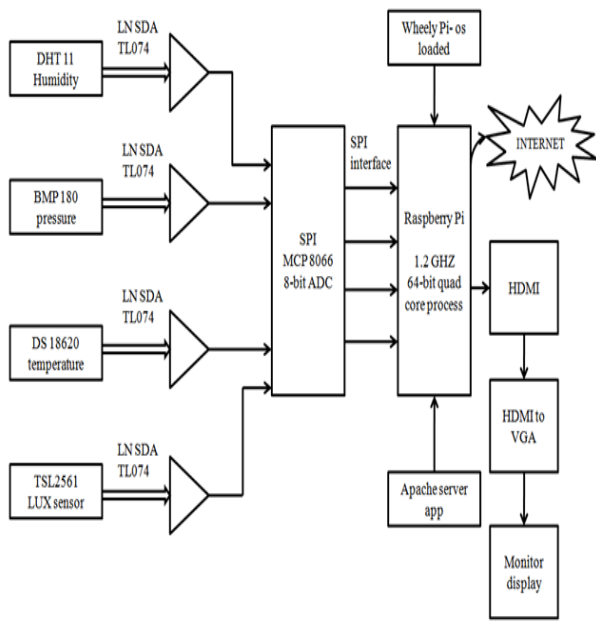


Fig., 3 Block diagram of sensor module

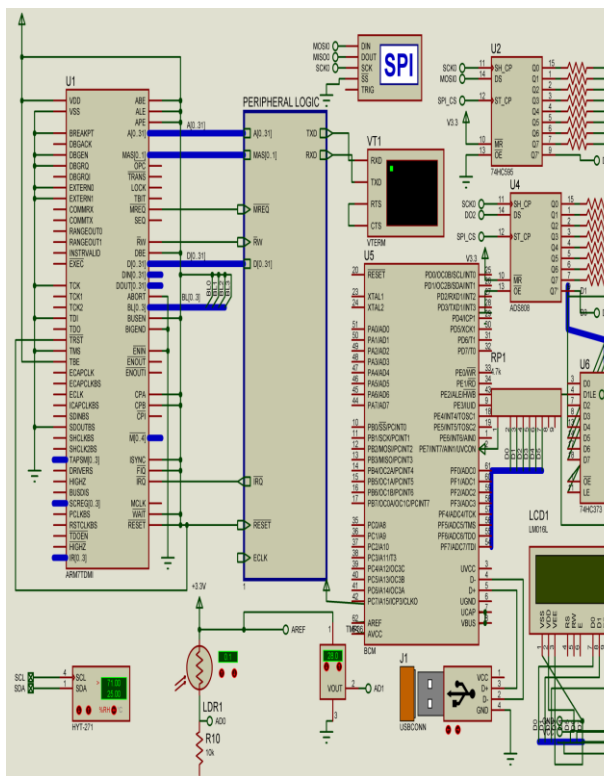


Fig., 4 Circuit diagram of sensor module

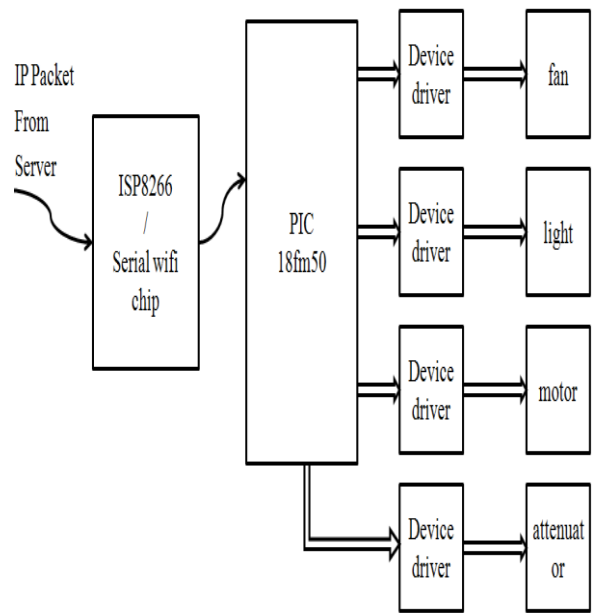


Fig., 5 Block diagram of Control interface

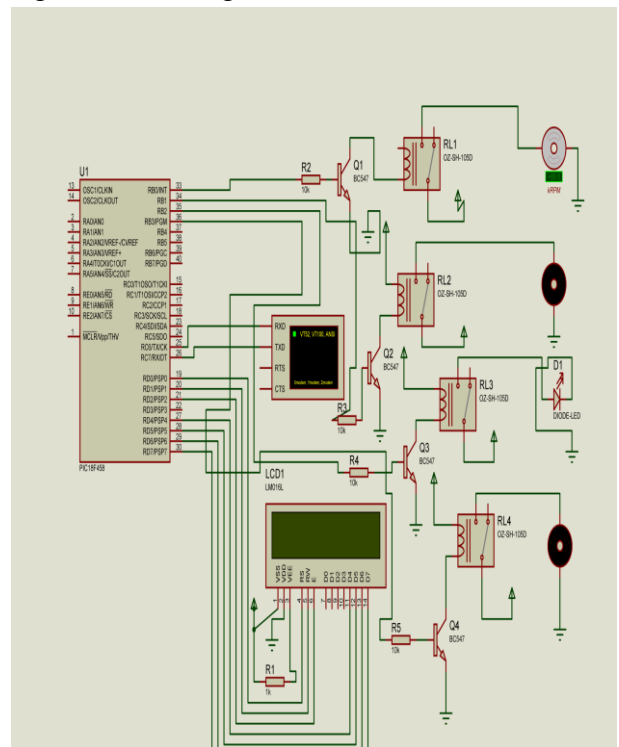


Fig., 6 Circuit diagram of control interface

That the simulation has been done by using PROTEOUS 8.5. The hardware model simulation circuit has been done with using ORCAD. That the circuit has been done with the following controller. Here ARM7 TCM processor, peripheral interfacing, SPI, Raspberry PI, USP port and sensor units. Peripheral logic unit is used to interfacing with Raspberry PI with the help of SPI. SPI has been 8bit data transmission. That peripheral interfacing has been connected to the parameter measurements. That the value will be transmitted using SPI bus. Raspberry PI receives the value and send to the LCD display unit. LCD display has been showing an output value of each sensor. That output has been monitored by using USB cable to computer system. and it also having BCM chip module to transmit a data through IOT communication to control the monitored parameters. That BCM has been converted the single bit data into group of packet data. That packet has been send through the controlling area. ESP8266 serial verify chip interfacing with PIC18 microcontroller. That PIC controller has been connected through FAN, light motor, attenuator. If that all device connected with some relay OZ-SH1060 circuit to protect the system. Monitoring simulation circuit has been show in figure 7.

4. Results and Graphs

The sensor measured values are send to the raspberry pi by converting into 8 bit packets to the server. The control signal is given to the device to be controlled instantly.

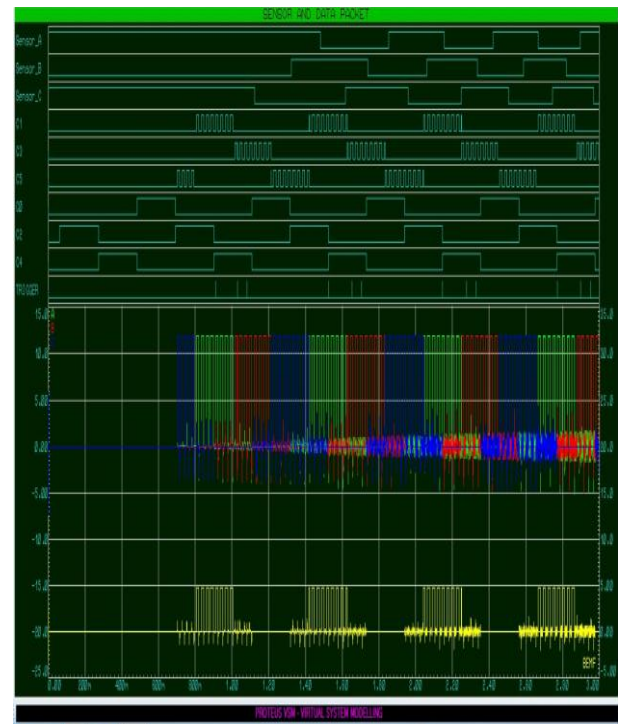


Fig., 7 Simulation results of data pocketing in control unit.

5. CONCLUSION

The parameter values are monitored through raspberry pi and they are controlled through IOT and visualized in android mobile phones. IP protocol helps in fast and accurate controlling of various essential parameters in industry without human presence.

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