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Industrial Automation Monitor and Control using IoT

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Abstract - *The industrial automation monitor and control is an important now a day. Automation is a self moving that means operating the system without the human interaction and get the performance compare manual operation. The control is a group of technique controlling the system by giving necessary input signal. This paper develops the system that will automatically monitoring, controlling the industrial electrical appliances and gives the alerts to authorized person by using the concepts of IoT, wireless devices, smart phones, and sensor IoT are build.*

This paper is focused on the development of the cloud server based on Raspberry pi3 in industrial automation monitoring, controlling the electrical appliances. Environmental parameters such as temperature, gas, vibration, sensors are sensed and also the motion sensor used to detect the motion of the living thing or object are transmitted to the mobile phone or PC for monitoring the status. If any harm occurs will sent alert to the register mobile number. The aim of this paper is to monitor and control the electrical appliances in the industries without human actions. This leads to the faster communications, latency, saving time, conserving energy and cost saving, gives efficiency and accuracy, optimum utilization of the energy saves the money.
The cloud servers are high security, more stable, faster, and more efficient economically.

***Key Words*: Raspberry Pi3 Model , Server, ThingSpeak app, tethering, sensors.**

1. INTRODUCTION

System of an embedded is a computer other than the personal computer in order to perform a dedicated purpose. Embedded systems are the admixtures of the components of the intrinsic, chemical, exhilarating undisturbed along with computer. Based on their operational and interpretation stipulations, embedded are classified into four division. Real time embedded that includes both hard and soft embedded system.

As we know that IOT is not a new concept, even though it is a new one in the deligence. This concept was not difficulty but the thing is coercive. IOT explains the system, in the system where agenda it sensual world and all the sensors devices are affiliated to these incidental, these sensors are affiliated to the internet. The communication between the sensors to destination or devices or controlling unit or vice versa either through the wireless communication The LAN connections may be the WIFI, Bluetooth, Zigbee etc. sensors are worked with the connection such as GPRS, GSM, 2G, and 3G etc in future nay be for Volte also. The internet of things will do the connection between both the insensate or unfeeling things.

[1] On the implementation of the Industrial automation systems based on the PLC. The author in this paper is implemented industrial automations monitor, and control the systems, the proposed concept is sequential function sequential function chart the programming language with a comprehensive manner for organizing the output and inputs of the FB, an object oriented approach and supervisory control for the implementation. As the use of PLC to implement industrial automation system, it requires a lot of time for debugging, the cost also very high efficiency is less that is depends on Umbworld. [2] A low cost environment monitoring system using Raspberry pi arduino with zigbee this paper presents the Technology Zigbee is the collect the information with the personal Area Network and Wireless networks, local level the information given by monitoring system about the environmental conditions. It works with operating frequency of 900-929MHz. and channel bandwidth upto 1MHz.and having the range 11-30meter which is restricted to the WPAN. The speed of the data transfer is 250kbps as it is having a standard IEEE-804-15-4. [3] Mobile Based SCADA for Industrial Automation. This paper presents the Mobile phones that are used as a client to peruse the position of the crane, to display in the SCADA Applications.

In this paper, we proposed IoT based System industrial automation monitor and control with Raspberry pi3 and cloud server as it is high secure data transmission, more stable, and faster and can see real time video and analyze the data in the Mat lab analysis in thing speak app.

2. SYSTEM DESIGN OVERVIEW

Fig1: It Show the block diagram of the proposed system. The system contains the cloud server, Raspberry pi3, sensors those are temperature sensor LM35, Gas sensor MQ-6, IR

sensor, and accelerometer sensor used in this developed module. These sensors are required 5v power supply. The loads are fan, and bulb or LED that are used in the system. The relay required 12V hence voltage regulator are used and can regulate upto 12v.

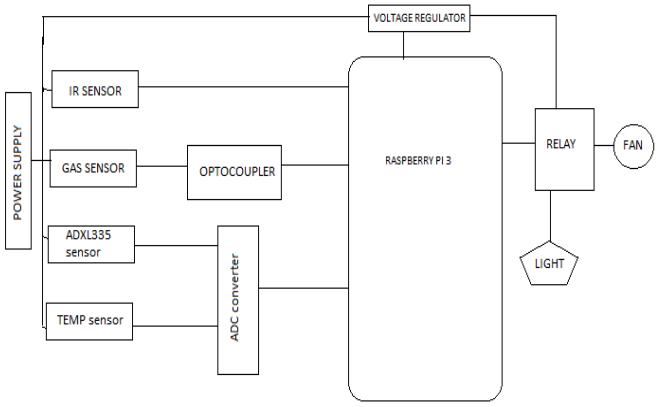

Fig1: hardware block diagram

Sensors is the circuitry connection type device which is used sense the environment changes that may happened due unfortunately or appropriately and send information to other computerized components. A relay is used to control the loads.

3. HARDWARE COMPONENTS

This chapter covers the hardware components that are used in the design of the system.

The hardware main parts are Raspberry pi3, sensors, relay, optocouplers, loads those are fan, LED, voltage regulator, Power supply.

3.1 Rasbperry Pi

Raspberry pi3 was originally created by foundation of the Raspberry pi. It is the one of the small debit card sized and Arm based microcontroller. It's designed like only one board that is the Single Circuit Board, on this board electronics components are mounted and circuits are intertwined on the Board.

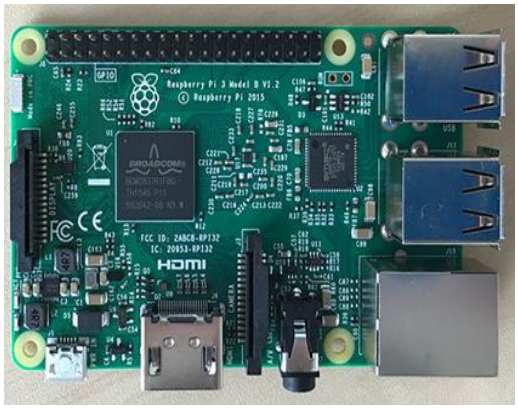

Fig2: Raspberry pi 3

It is the Advanced and Newly module which confine the capability like Quad-core ARM cortex A53 which is having a frequency 1.2GHz, Bluetooth of 4.0, and 802.11n WiFi. When it is compared with previous module such as Raspberry pi 2 it is more than 50% faster. The RAM is 1GB of LPDDR2-900 SDRAM and it is possible to make of providing adavanced graphical capabilities of 4-GPU video core and also enclose the wireless keyboard and wireless mice.

3.2 Sensors

The sensors that are used here is temperature LM35 sensor, Gas mq-6 gas sensor, IR sensor, ADXL335 accelerometer sensor. using four contiguity sensors there are MQ-6 sensor for gas perception, IR sensor for perceiving motion, LM-35 sensor for temperature realizing, ADXL sensor for notifying the accelerations.

The temperature sensor is component or a device which is used to estimate the temperature of an object or to ensure that the actions or operation are staying in some particular range and yielding the prudent to use for that applications.

Fig3: LM 35

IR sensor it is contraption used to detect the motion of the objects, living being or human being that means the behavior of the encompassing.

Fig4: IR sensor

An accelerometer is a kind of component that measures the rate of change of velocity and accelerometer is a modest, abated power, mild, indication provision low power voltage with the 3 axis velocimeter.

Fig5: accelerometer

This MQ-6 sensor is for gas detection basically for very lofty judicious to LPG, Butane, Propane, even natural gas and also methane. It is having able to recognize the gas concentration in the around atmosphere 200ppm to 10Kppm.

When contrast to other types of gas sensors is eminently cheap, good riposte time, lofty sensitive. The characteristics having that elongate life, very sheer circuit

3.3 Components

Circuitry that is used here is optocouplers in order to isolate between the two devices physically but internally connected to avoid damages either of the devices.

It is defined as that transferring energy from one device to another in the form of light but there is no electrical connection between them. The circuit includes input isolation between input and output. Optoisolator is a energy passed only in one direction it can transmits dc or slow moving signals, it does not require matching input and output impedances, it gives protections.

Fig6: Optocoupler

Relay it is a switch, is two channel relay. when the power supply is on, the current flow through the coil, this will induced the magnetic fields; this will cause the arm contact with other one. The coil of the current will do on and off process

Fig7: relay

ADC is a electronics devices which is used to convert the signals from analog to digital signals. It is an input of analog and digital output. It is a black box analog input any electric signal and it takes analog input signals and digital outputs.

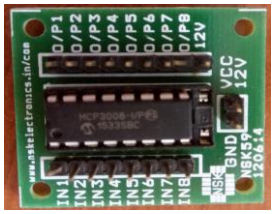

Fig8:ADC

Voltage regulation is used this power supply systems and these are realized from the devices of electronic and electrifying accepting. LM317 voltage regulators are used in the power system of this project. These voltage regulators are 3 terminal regulators is a adjustable.

Fig9: voltage regulator

Two loads are used one fan and another one is LED. The LED is two legs longer one and shorter one. LEDS are different size longer wire called +Ve terminals and shorter wire –Ve terminals. The positive terminal connected to the +ve voltage and negative terminals are connected to the –ve voltage. And 5v Dc fan are using for cooling purpose. The camera is connected to the board in order to view the live video stream.

4. SOFTWARE

In software part, Python code, Twilio app, Rasbian Jessie, Linux, ThingSpeak server and app.

4.1 Python

The python is high level programming language, open source general purpose language, object oriented, procedural, functional, and easy to interface with java. It is scripting language, can easily be readable, artificially, insincerely construction when compare to other dialect.

It is an interpreted means that during the runtime, and handled when the construe. It does not require compilation before the execution. The features are as like C programs it is having a keywords, structure is a very simple, pattern are designated evidently so that it is easy to learn. This code patently delineate and apparent to the eyesight. This is comfortable through defend. It is having extension library.

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The coding for all the sensors are don using the python coding.

4.2 Twilio

It is an application used for between the source to the destination or vice versa or from device to device. The twilio supports around 98 languages, able to use with the language like python, php, ruby, java, .NET, Perl.

This is one of the cloud platforms for the communication. The features of this application are accepting the information and MMS messages to phone number and broadcast the information SMS or MMS. Twilio REST API through this can able to send SMS. It is possible to follow the conversation.

When the device send short message services, this goes to the twilio and ping the application, this application connect into thus database information and this application send SMS via twilit api through twilio only.

4.3 Rasbian Jessie

The Rasbian jessie is used for Raspberry pi3 board. It is free operating system. It comes over more than 30000 packages approximately and in a simple format it is precompiled software bundled for the easy installation.

For installing the Raspberry pi there are so many step first need to expand the file, dependencies installation, source code downloading, creating the virtual environment, installation and compilation finally testing and installing the open CV. These are the main points of the Raspberry pi installation process.

Linux is one of the operating system, which is a group of program and used to move or run the program. Kernel is the core of the operating system. Presently the Linux kernel is used by the Debian system. In this paper are using Linux because it has some advantages like it is free, can be movable to any other platform of hardware, requires less for debug, secure and scalable.

4.4 ThingSpeak Server

The data of the sensors is in the form of numerical value or electrical signal.

ThingSpeak permit for those things, websites for sending data in the cloud, further in the cloud there are two channels one is the private channel, another is the public channel in the channel.

The permitted sensor the data are stored either of these two channels one is the private channel, another is the public channel in the channel.

5. EXPERIMENTAL RESULT

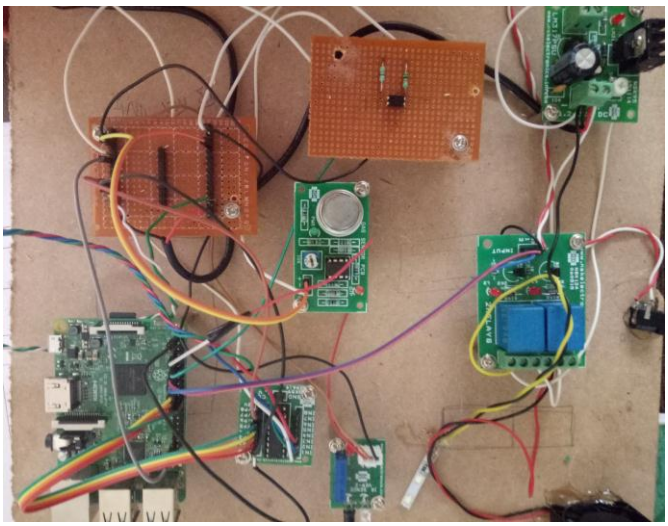

Fig10: Hardware setup

The above figure shows the connection of the hardware. Give the power supply to the raspberry pi board about 5v. The sensors are connected to the GPIO pins of the Raspberry pi 3. An USB camera is connected to the board for viewing live video. This will transmit the live video to the smart phone gives the information's of the industrial environment.

Mobile data is tethered with the pc by using username and password. Using the python code switched relay will work to control the loads.

The sensed data will go to the raspberry pi through IOT. If any variations occur will give the sms to the registered mobile number, the decision will take based on the code.

The result are shown in the Thingspeak app

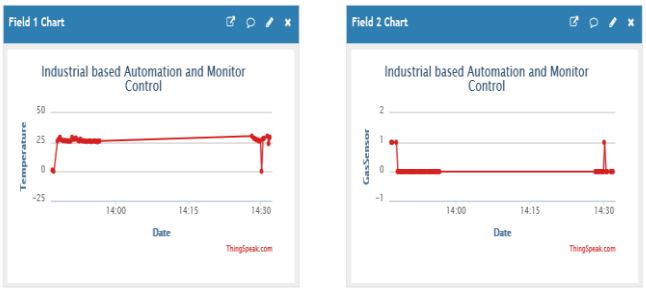

Figure: MATLAB analysis of temperature and gas sensor

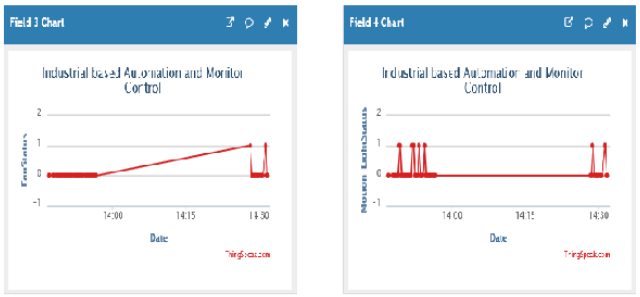

Fig11: Fan status and motion detection

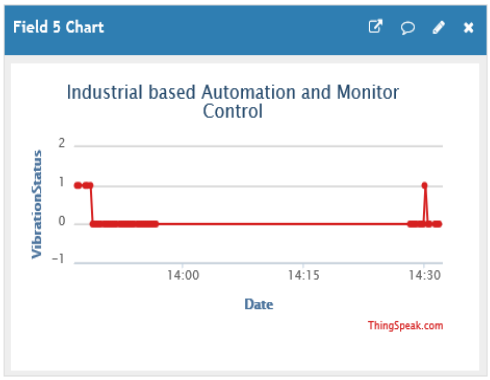

Fig12: Vibration detection

6. CONCLUSIONS

The project showed the implementation of the system by effectively by using the Raspberry pi 3 as main microcontroller. Today human life is dependent upon internet only. Life is like without internet cannot live like that. Most of the work will do through the internet only. So information can send internet only and this is available in cheapest rate so saves money and also as we all busy with work it saves time alsohere Conclusion content comes here Conclusion content comes here Conclusion content comes here Conclusion content comes here Conclusion content comes here . Conclusion content comes here

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