Internet of Things for Industrial Monitoring and Control Applications

Peyyala Sruthi[1], Ch. Suneel Kumar[2] & Shaik. Rahamtula[3]

[1]P.G Scholar, QIS Institute of Technology

[2,3]Asistant Professor, QIS Institute of Technology and Asistant Professor, QIS Institute of Technology

Abstract:

Smart enterprise is an observing, controlling and investigating carrier which incorporates wireless transmission generation and electronic sensor innovation. It permits the client to get the overall scope of services, the opportunity for continuous monitoring and automated controlling of industrial environment. This paper was advanced to provide internet based totally smoke and temperature and security tracking. This device is allowed to track the facts every time& everywhere from the internet once we login into web site. This paper also concludes that person can set restriction for above parameters & if these parameters cross beyond that cost, it's going to activate the devices. As a part of its alarm gadget, it'll play the recorded sounds: "intruder" or "smoke detected" when there may be a detection. The credit score card size Raspberry Pi (RPI) with Open source pc vision (OpenCV) software program handles the photo processing, control algorithms for the alarms and sends captured snap shots to consumer's e mail through wireless. In this project Raspberry Pi3B+ is used.

Keywords

IoT, Sensor node, Raspberry pi, USB cameras, Relay.

1. Introduction

The Wireless network for industrial packages is standardized these days. Intelligent and low-fee automation of business techniques are advanced hastily with a view to enhance procedure accuracy of the system. Commercial automation systems include numerous area gadgets and technology working in synchronization. Those gadgets are responsible for a variety of capabilities related to instrumentation, control, supervision and operational control.Monitoring is employed in various programs, such as temperature, pressure, drift rate, capacity, acceleration, and so on. According to the quantities, distribution and detected frequency o f the monitored items, there are different tracking strategies to gather the measurements. Several issues commonly occur at some stage in the monitoring technique of the temperature in a room. Management has chosen either to place a person to monitor to reveal the temperature or to keep on human capital by using developing a device that can reveal the temperature from different places at any given time. So that you can remedy the problem, the internet-primarily based temperature and gasoline tracking system that can be get admission to anywhere and anytime via the internet is constructing. With this system a user can remotely monitor the room temperature and gasoline from anywhere which could keep the human expenses. Web-Based Temperature and gas Monitoring is one type of recorder that monitors these parameters in a room and stores the data into a database and display the current status on the website through a web server. The system will continuously monitor the temperature and gas condition of the room in digital and graphical format and the data can be monitored at anytime and anywhere from the Internet. This monitoring is widely used in various processes like in automotive industries, air conditioning, power plant and other industries that need the data to be saved and analyzed. Proposed design is to have the data acquisition system to measure some parameters. The main purpose of this system model is to make it easy for the user to view the current temperature and gas. The paper includes complete implementation of an HTTP Web Server in

Raspberry Pi.Speech synthesized Sensors are connected to raspberry pi. Raspberry Pi based web server has fast execution capability & Ethernet standard can provide internet access with reasonable speed. It is also suitable for enhancing security in industrial condition by remotely monitoring various industrial applications. For security purpose login are provided for employer who will monitor the plant when client type IP add on web browser & logged in he/she will get webpage that contain parameters. This can also implemented as smart surveillance machine through using PIR sensor and with USB digital camera. The tool we formulated is highly powerful in safety functions. it is less expensive and can be maintained easily than any other safety device when inside the wireless security location, the complete sensors may be activated and the voice output tool connected with the microcontroller will supply a verbal message and the purpose for the insecurity might be displayed inside the display unit connected to the microcontroller. And the alert can be dispatched as SMS and mail to the specified security room and also to the consumer on the time of insecurity, fire accident, and unwanted movement of men and women, which is sensed by way of the respective sensor. On this mode, the electrical equipment in the safety region will mechanically change to the automated mode depends upon sensor condition.

1.1 OBJECTIVE:

Our essential objective is to make a budget smart commercial automation device that can provide safety from nearly each attitude. And which may be available remotely. the primary objectives of the system are as follow:

> It gives protection from any form of intrusion

> Gives safety from threats that may be triggered because of leakage of gasoline or

increasing of temperature in case of fireplace.

> It provides remote access of enterprise's circumstance.

> The information can be saved in database for similarly references.

2. PROPOSED SYSTEM:

We are working on anindustrial automation with speech synthesized sensors as a solution of these certain problems. Our objective is to make speech synthesizedindustrial automation, which keeps the industries and its assets secure from thefts, and other miss happenings. It monitors various industrial affecting environmental parameters like intrusions, fire, leakage of LPG and other smokes and sends a real time information via email and SMS to the owner in case of any threat. In this system we are using the "way 2 SMS" instead of GSM technology for sending the alert messages for each and every sensor when they are sense any information.

2.1 Architecture of proposed system:

This can also implemented as smart surveillance machine through using PIR sensor and with USB digital camera. The tool we formulated is highly powerful in safety functions. it is less expensive and can be maintained easily than any other safety device when inside the wireless security location, the complete sensors may be activated and the voice output tool connected with the microcontroller will supply a verbal message and the purpose for the insecurity might be displayed inside the display unit connected to the microcontroller. And the alert can be dispatched as SMS and mail to the specified security room and also to the consumer on the time of insecurity, fire accident, and unwanted movement of men and women, which is sensed by way of the respective sensor.
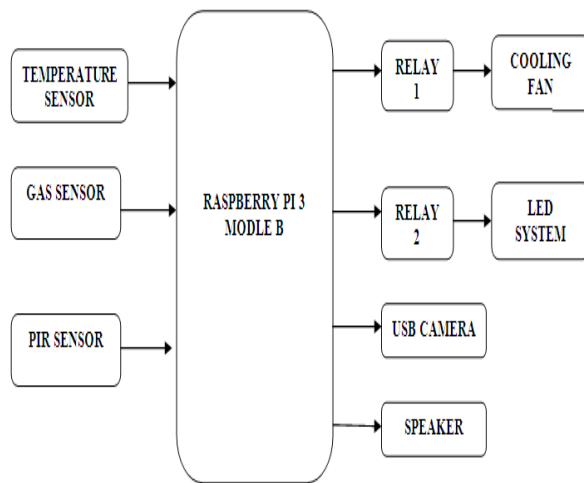
Fig: 1Architecture of industrial automation system

The project is divided in to two parts that is IOT application and speech synthesized sensors are connected to SOC. where hardware part sends the data to web server using WIFI and application fetches the data from it.

In this Block diagram, The microcontroller unit plays a central role, where all the speech synthesized sensors are connected to it like PIR sensor which detects the motion about its sensing range of distance, gas (MQ2) and temperature (LM35) sensors are to detect its atmospheric conditions and notifies the user via a verbal message about the intrusions and other abnormal environmental parameters by sending an auto-generated mail and SMSusing WI-FI module and same copy of data will be stored on database so that it can be used for further investigations. User can also set limit range of parameter (sensor values) and if parameter goes beyond that value then it will give control signal to hardware in plant and it will turn on/off device according to that. An embedded web server is designed which will display all the sensor values in real time through web page. Thus a successful communication is achieved between a server and client side by using this type of system. Therefore the status of different sensors installed at working place is monitored at anywhere. Thus

personal computer and a Raspberry Pi Camera will continuously monitor all the data from remote processing unit. In thus reporting of this real-time data corresponding to the process plants can therefore be of great use for future analysis.

3. SYSTEM DESIGN

The designing part includes basically two sections as follows.

> ➢ Hardware design
> ➢ Software design

4. HARDWARE DESIGN

Hardware Design It includes Raspberry Pi 3 B model, Temperature sensor, GAS sensor & PIR sensor and USB camera

4.1 Raspberry Pi:

The core module of the system is realized using a Raspberry Pi 3 board; it's a $ 35 bare-bones computer designed and developed by the Raspberry Pi Foundation, the Pi 3 features a BCM 2837 System-on-Chip which includes a Quad-Core 64-Bit ARM Cortex A7 CPU clocked at 1.2GHz paired with 1 GB of RAM. It also has Video Core IV GPU for graphical processing applications, it also includes four USB ports for peripherals and 40 Pin General Purpose Input Output (GPIO) pins for interfacing the Pi with external electronic circuits, these GPIO pins are used to interface the Pi to the module. The Raspberry Pi is designed to run various Linux based operating systems and has Raspbian as its official operating system and Python as its official programming language.

4.2 Temperature Sensor:

The LM35 [10] can be added honestly within the same method as alternative micro circuit temperature sensors. It may be stuck or hooked up to a floor and its temperature can be inside around the range of zero.01˚C of the floor temperature. This presumes that the close air temperature is clearly

approximately similar to the surface temperature; if the air temperatures has been precise better or lower than the floor temperature, the particular temperature of the LM35 die is probably at an intermediate temperature between the surface temperature and the air temperature. The temperature sensors have trendy packages in environmental and manner manipulate and additionally in test, measurement and communications.

4.3 Gas Sensor:

Ideal detector to be used to discover the presence of a dangerous LPG leak in your automobile or in an exceedingly station, tank atmosphere. This unit will be simply incorporated into associate alarm unit, or provides a visual indication of the LPG concentration. The detector has glorious sensitivity combined with a fast latency. The detector also can sense iso-butane, propane, LNG and roll of tobacco smoke.

4.4 PIR Sensor:

Passive Infrareds sensors (PIRs) are digital devices this is hired in some protection alarm structures to sight movement of an infrared emitting deliver, commonly a person frame. The pyroelectric detector is manufactured from a crystalline cloth that generates a surface electrical phenomenon as soon as uncovered to heat inside the sort of infrared emission. Once the amount of radiation placing the crystal changes, the amount of price additionally changes and can then be measured with a sensitive FET tool engineered into the detector. This radiation (electricity) is invisible to the human eye but is detected by means of digital devices designed for this kind of motive [10].

4.5 USB Camera:

USB Camera captures the image and sends it to the USB port of the Raspberry Pi board. The camera model used here is USB Camera model 2.0.

4.6 Relay:

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches.

5. SOFTWARE IMPLEMENTATION

Software implementation of this work uses Raspberry Pi and Python programming language. The total programming is developed in Python which includes some python packages.The program includes capturing the image when motion detects, saving the image and send it to the user and also sending the data to web page. The Python packages include Raspbian OS, configuring GPIO, smtplib and embedded web server and Python language.

5.1 EMBEDDED WEB SERVER

Embedded Web Server technology is the combination of embedded device and internet technology, which provides a flexible remote device monitoring and controlling function based on internet browser. Raspberry Pi collecting data form sensors and send to the centralized server .The server collects the data and stores it in database. The web pages create using HTML. Using IP address open the web page simple log in page all the data available on page. IP address is two type static IP address and Dynamic IP address. From distance location controlling simply using smart phone internet connection is available in phone using IP address log in page controlling all device from that location all the data available on page to monitoring and controlling.

5.2 HTML:

HTML is a particular sort of all complete language utilized for adorning a website page. HTML remains for Hypertext Markup Language. Hypertext is the content that has been spent with additional determinations, for example, arranging,

and image processing and so on. Markup is a procedure of including the additional images. HTML has its own protocols. HTML is an universal language to communicate with different web pages.

6. SYSTEM RESULTS

The individual testing of different modules are done and the final setup is made by arranging all the devices in proper order. The whole tested system is as shown in figure 3. After requesting the web pages by the client, the online processing web page for client is opened. Client can interact with the system through its own browser via these embedded web pages. The internet web page representing the sensor values are maintained with the aid of the embedded web server and if Temperature exceeds than threshold, then consumer will receive mail. System monitoring page is shown in figure 4. Following figures show the developed system results.

Fig:2. Thingspeak Analysis

Fig.3.Our hardware implemented system
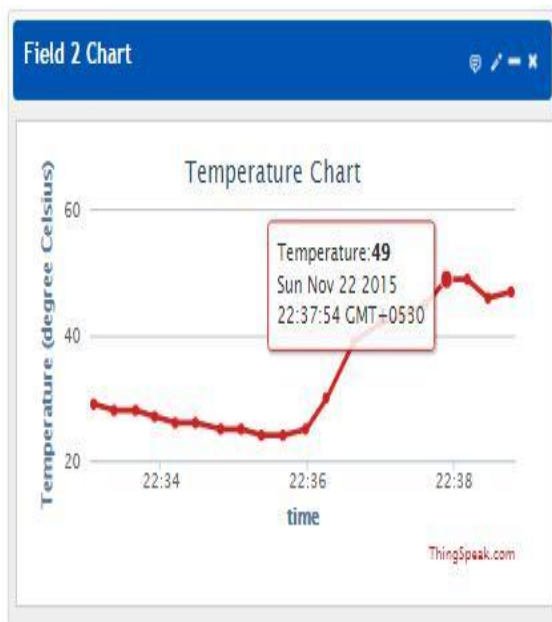

Fig: 4 webpage results

7. CONCLUSION:

Implantation of this assignment utilizing Raspberry Pi for smart monitoring is a new procedure to observe an environment of industrial plant which designed right here for the real time implementation. It supports on-line supervision and control no longer best within private community (LAN) but additionally in Public community (web).The whole process has inexpensive, excellent openness and portability, and is effortless to keep

and upgrade. It is viable to interface special type of Sensors with these modules and make quite a lot of applications. So it may reveal embedded approach operation state by way of internet, reaching community monitoring purposes.

8. REFERENCES

[1]GSM based domestic Automation machine using App-Inventor for Android cell telephone by MaheshN. Jivani.

[2] Bluetooth far off Industry Automation device the usage of Android application ", by R.A.Ramlee, M.H.Leong and R.S.S.Singh

[3] Design and implementation of home automation machine using raspberry pi by Bruhathireddy, Dr.G.N.Kodandaramaiah, M.Lakshm-ipathy.

[4] home Automation machine using android and Wi-Fi byR.S.Surya-vanshi, KunalKhivensara, Gulam- Hussain, Nitish Bansal, VikashKumar.

[5] Android primarily based domestic automation using Raspberry Pi, by ShaijuPaul, AshlinAntony and Aswathy.B

[6] Raspberry PI and wireless primarily based home-Automation by P.Bhagyalakshmi,G.Divya, L.Aravinda.

Using App-Inventor for Android Mobile Phone by MaheshN.Jivani.

[8] Get entry to control of door and home protection by way of Raspberry Pi through internet by Md. Nasimuzzaman Chowdhury, Md.ShibleeNooman, SrijonSarker.

[9] Layout and improvement of Activation and Controlling Of home Automation device through SMS thru Microcontroller by Ch. NagaKotiKumar, Y.V.RaghuBabu, A.Gamya, P.Jainath, M.Vijay. InternationalJournal of Engineering Research and Applications

[10] Home Automation machine (HAS) using Android for mobile phone by SharonPanth, MaheshJivani.

[11]National Semiconductor, National Semiconductor Corporation, November 2000.