

Internet of things for industrial monitoring and control applications

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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 source of the internet whenever we login into internet. 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 sensor network plays an important role for industrial packages now a day. 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 work with synchronize. Observing is established in different programs, such as heat, pressure, drift and so on. According to the volume of data, partition and identified frequency of the observed items, there are various tracking strategies to gather the values. Some issues commonly happen at some stage in the observing technique of the heat in a room. Management has chosen to allot a person to observe to intimate the heat 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 systems they can be get admission to any place and irrespective of time via the net is constructing. By this system introduction the room heat and lines of gas can be observe from some distance by observer. Speech synthesized Sensors are connected to raspberry pi. Raspberry Pi based web server has high speed execution capability. 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.

2. 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.

3. Proposed system

We are working on an industrial automation with speech synthesized sensors as a solution of these certain problems. Our objective is to make speech synthesized industrial 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.

Architecture of proposed system

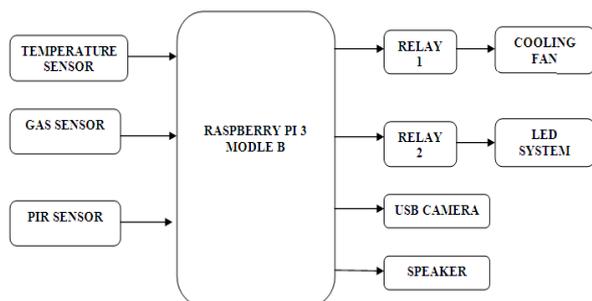


Fig. 1: Architecture of industrial automation system

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 SMS using WI-FI module and same copy of data will be stored on database so that it can be used for further investigations.

System design

Basically the design section has two types they are

- Hardware design
- Software design

Hardware design

Hardware Design contains Raspberry Pi 3 B model, heat, GAS & PIR sensors and USB camera.

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 with the help of Raspberry Pi, the Pi 3 features a BCM 2837 which are 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.

Temperature sensor

The LM35 [9] 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.

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.

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 [9].

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.

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.

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.

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.

4. Result and analysis

All the modules are tested on by one and all the modules are fitted in particular order to form a required setup. The complete project kit is shown in fig 3. The processing online web page is opened by requesting the online web page. The user can communicate the module via these embedded module web pages through its own browser. The sensors which are located at the system sense

parameters and send to the monitoring station. The sensor values are representing with the help of internet web page and stored in internet web server. Whenever the temperature exceeds the threshold, the user will alert through mail. The fig 4 shows the monitoring page. Following figures show the developed system results.

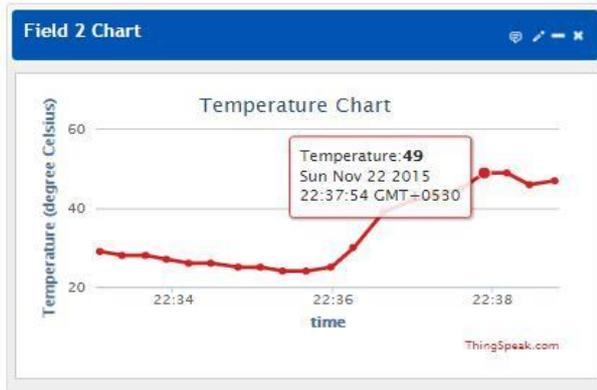


Fig. 2: Thing speak analysis



Fig. 3: Our hardware implemented system

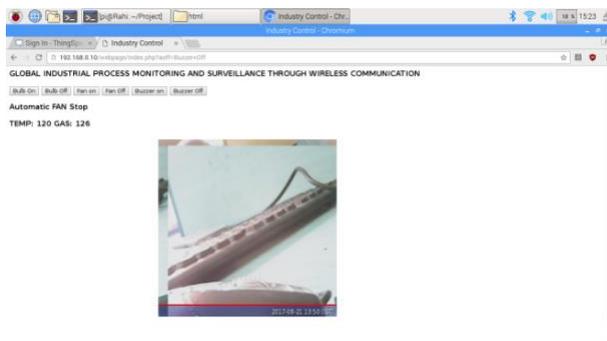


Fig. 4: webpage results

5. Conclusion

The conclusion of this paper is that the implemented design is applicable for Raspberry pi 3 to observe industrial plant environment smartly at real time. It supports to monitor and control within Local Area Network in web. This process is excellent and low-cost. 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.

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