IoT based Industrial Management

SREEJITH PAMBALATH

PG-Scholar, Department of ECE

Excel College of Engineering and Technology

Komarapalayam

R.PUSHPAVATHI M.E.,

Associate Professor

Department of ECE

Excel College of Engineering and Technology

Komarapalayam

Abstract—**Internet of Things (IoT) is rapidly increasing Technology. IoT is the network of physical objects or things embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. The project that are developing a system which will automatically monitor the industrial applications and generate Alerts/Alarms or take intelligent decisions using concept of IoT. An extra feature that enhances the facet of protection from fireplace accidents is its capability of sleuthing the smoke in order that within the event of any fireplace, associates an alerting message and an image is sent to Smartphone. The server will be interfaced with relay hardware circuits that control the appliances running at industry. The communication with server allows the user to select the appropriate device. The communication with server permits the user to pick out the acceptable device. The server communicates with the corresponding relays. If the web affiliation is down or the server isn't up, the embedded system board still will manage and operate the appliances domestically. The system provide a climbable and price effective Industrial Automation system. IoT has given a promising way to build powerful industrial systems and applications by using wireless devices, Android, and sensors. A main contribution of this paper is that it summarizes uses of IoT in industries with AVR controller that monitors and control the Industry.**

Key words: Internet of things, Artificial intelligence, Real time operating system, Wire less sensor Network sensor.

I. INTRODUCTION

In recent years a wide range of industrial IoT applications have been developed and deployed. Evolution of this starts from RFID technology, which allows microchips to transmit the identification, information to a reader through wireless communication. By using RFID readers, people can identify, track, and monitor any objects attached with RFID tags automatically. Another technology is the wireless sensor networks (WSNs), which mainly use interconnected intelligent sensors to sense and monitoring. Its applications include environmental monitoring, industrial monitoring, traffic monitoring. Both RFID and WSN are used to develop IoT. Then upcoming technology is IoT with Artificial Intelligent. In previous year, Industry was monitored manually, but this project introduces Artificial Intelligent to monitor as well as control the Industry Autonomously without human intervention.

II.INTERNET OF THINGS

The Internet of things (IoT) can be defined as connecting the various types of objects like smart phones, personal computer and Tablets to internet, which brings in very new-fangled type of communication between things and people and also between things. With the introduction of IoTs, the research and development of home automation are becoming popular in the recent days. Many of the devices are controlled and monitored for helps the human being. Additionally various wireless technologies help in connecting from remote places to improve the intelligence of home environment. An advanced network of IoT is being formed when a human being is in need of connecting with other things. IoTs technology is used to come in with innovative idea and great growth for smart homes to improve the living standards of life
.

III. IOT ARCHITECTURE

The IoT-based architecture provides high-level flexibility at the communication and information. It is an approach which is relevant in many different environments such as patient monitoring system, security, traffic signal control or controlling various applications. The IoT project aims to bring out the various opportunities of using IPv6 and other related standards to overcome the disadvantages using of the Internet of Things The IoT projects proves a dominant and thorough study of all

sensible functionalities, mechanisms and various protocols that can be used for building IoT architectures however interconnections may occur between all totally different IoT Applications as in the networking field, where several solutions emerged at his infancy to leave place to a common model, the TCP/IP protocol suite, the emergence of a common reference model for the IoT domain and the identification of reference architectures can lead to a faster, more focused development and an exponential increase of IoT-related solutions. These solutions can provide a strategic advantage to mature economies, as new business models can leverage those technological solutions providing room for economic development. Mobile phone can overcome the disadvantages of sending message to E-mail such as possibilities of the attachment may contain virus, due to many spam messages the emergency mail could not be viewed and user has to login with email id and password which causes a time delay. [9] discussed about a project, in this project an automatic meter reading system is designed using GSM Technology. The embedded micro controller is interfaced with the GSM Module. This setup is fitted in home. The energy meter is attached to the micro controller. This controller reads the data from the meter output and transfers that data to GSM Module through the serial port. The embedded micro controller has the knowledge of sending message to the system through the GSM module. Another system is placed in EB office, which is the authority office. When they send "unit request" to the microcontroller which is placed in home. Then the unit value is sent to the EB office PC through GSM module. According to the readings, the authority officer will send the information about the bill to the customer. If the customer doesn't pay bill on-time, the power supply to the corresponding home power unit is cut, by sending the command through to the microcontroller. Once the payment of bill is done the power supply is given to the customer. Power management concept is introduced, in which during the restriction mode only limited amount of power supply can be used by the customer.

IV. ARTIFICIAL INTELLIGENCE

The theory and development of computer system able to perform task normally requiring human intelligence such as visual perception speech recognition decision making, and translation between language. Artificial intelligence (AI) is the intelligence exhibited by machines or software. It is an academic field of study which generally studies the goal of emulating human-like intelligence
.
V. RELATION BETWEEN IoT AND AI

The Internet of Things (IoT) is very closely related to Artificial Intelligence (AI). In fact, IoT would not be very powerful without AI. Iot will connect devices from the high end, like computers, to the low end like sensors. Instead we will place a value on predictability give each device limited AI. In an IoT solution, AI can help to review and analyze the data you've collected to find patterns or similarities that can be learned from, so that better decision can be made. The data has to be analyzed in terms of what's normal and what's not. Similarities, correlations and abnormalities need to be quickly identified based on the 8
real-time streams of data. The data collected, combined with AI, makes life easier with intelligent automation, predictive analytics and proactive intervention
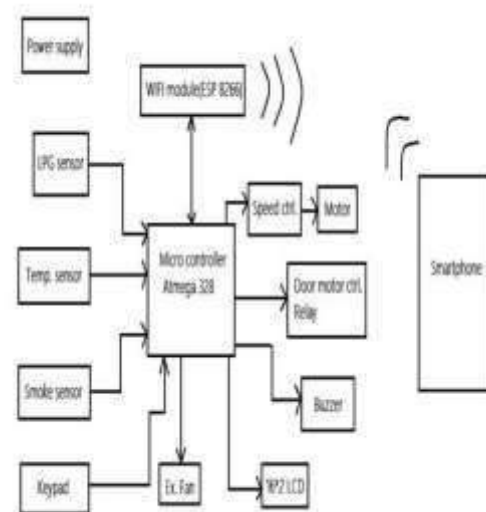
VI. BLOCK DIAGRAM EXPLANATION

Figure 1 block diagram

The proposed work is divided into two parts. First part consists of collection of data from different sensors like LM35 temperature sensor, smoke sensor and IR sensor etc. These sensors are mounted at different desired location in the plant to measures the parameters like temperature, metal detected, non-metallic abject detected, production achieved etc. in real-time and gives this data to AVR controller. In Second section microcontroller collects the all the sensor values and compare it with predefined values in the program. If the sensor values exceeds than predefined then it takes the necessary action to control the parameters by switching the relays i.e. ON/OFF. At the same time controller send the SMS to alert the user who is at remote location. LCD is used to display the parameter details according to priority assigned to the task using uC/OS-II RTOS.

MICRO-CONTROLLER ATMEGA 328

The Atmel AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in a single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers.

The ATmega328/P provides the following features: 32Kbytes of In-System Programmable Flash with Read-While-Write capabilities, 1Kbytes EEPROM, 2Kbytes SRAM, 23 general purpose I/O lines, 32 general purpose working registers, Real Time Counter (RTC), three flexible Timer/Counters with compare modes and PWM, 1 serial programmable USARTs , 1 byte-oriented 2-wire Serial Interface (I2C), a 6- channel 10-bit ADC (8 channels in TQFP and QFN/MLF packages) , a programmable Watchdog Timer with internal Oscillator, an SPI serial port, and six software selectable 17 power saving modes. The Idle mode stops the CPU while allowing the SRAM, Timer/Counters, SPI port, and interrupt system to continue functioning. The Power-down mode saves the register contents but freezes the Oscillator, disabling all other chip functions until the next interrupt or hardware reset. In Power-save mode, the asynchronous timer continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping. The ADC Noise Reduction mode stops the CPU and all I/O modules except asynchronous timer and ADC to minimize switching noise during ADC conversions. In Standby mode, therystal/resonator oscillator is running while the rest of the device is sleeping. This allows very fast start-up combined with low power consumption. In Extended Standby mode, both the main oscillator and the asynchronous timer continue to run.

Atmel offers the QTouch library for embedding capacitive touch buttons, sliders and wheels functionality into AVR microcontrollers. The patented charge-transfer signal acquisition offers robust sensing and includes fully de bounced reporting of touch keys and includes Adjacent Key Suppression (AKS) technology for unambiguous detection of key events. The easy-to-use QTouch Suite tool chain allows user to explore, develop and debug Users own touch applications.

The device is manufactured using Atmel's high density non-volatile memory technology. The On-chip ISP Flash allows the program memory to be reprogrammed In-System through an SPI serial interface, by a conventional non-volatile memory programmer, or by an On-chip Boot program running on the AVR core. The Boot program can use any interface to download the application program in the Application Flash memory. Software in the Boot Flash section will continue to run while the Application Flash section is updated, providing true Read-While-Write operation. By combining an 8-bit RISC CPU with In-System Self-Programmable Flash on a monolithic chip, the Atmel ATmega328/P is a powerful microcontroller that provides a highly flexible and cost effective solution to many embedded control applications. 18
the atmega328/p is supported with a full suite of program and system development tools including: c compilers, macro assemblers, program debugger/simulators, in-circuit emulators, and evaluation kits

SMOKE SENSOR

A smoke sensor is a device that senses smoke, typically as an indicator of fire. Commercial and residential security devices issue a signal to a fire alarm control panel as part of a fire alarm system, while household detectors, known as smoke alarms, generally issue a local audible or visual alarm from the detector itself. the analog smoke/lpg/co gas sensor (mq2) module utilizes an mq-2 as the sensitive component and has a protection resistor and an adjustable resistor on board. the mq-2 gas sensor is sensitive to lpg, i-butane, propane, methane, alcohol, hydrogen and smoke. it could be used in gas leakage detecting equipments in family and industry. the resistance of the sensitive component changes as the concentration of the target gas changes.

LPG SENSOR

Sensitive material of MQ-6gas sensor is SnO2, which with lower conductivity in clean air. When the target flammable gas exist, the sensor's conductivity gets higher along with the gas concentration rising. Users can convert the change of conductivity to correspond output signal of gas concentrate on through a simple circuit. MQ-6gas sensor can detect kinds of flammable gases, especially has high sensitivity to LPG (propane). It is a kind of low-cost sensor for many applications.

TEMPERATURE SENSOR

These thermistor have a negative temperature coefficient. The device consists of a chip with two solid copper tin plated leads. It is grey lacquered and colour coded, but not insulated. Temperature measurement, sensing and control, temperature compensation in industrial and consumer

IR SENSOR

IR detectors are specially filtered for Infrared light; they are not good at detecting visible light. IR detectors are digital out - either they detect 38KHz IR signal and output low (0V) or they do not detect any

and output high (5V). When an object is close to the sensor, the light from the LED reflects off the object and into the light sensor. This results in a large jump in the intensity, and considered as object detected. When the object is far away from the sensor there is no reflection of back light hence it give high output.

LCD WORKING

The liquid-crystal display has the distinct advantage of having a low power consumption than the LED. It is typically of the order of microwatts for the display in comparison to the some order of mille watts for LEDs. Low power consumption requirement has made it compatible with MOS integrated logic circuit. Its other advantages are its low cost, and good contrast. The main drawbacks of LCDs are additional requirement of light source, a limited temperature range of operation (between 0 and 60° C), low reliability, short operating life, poor visibility in low ambient lighting, slow speed and the need for an ac drive. The main principle behind liquid crystal molecules is that when an electric current is applied to them, they tend to untwist. This causes a change in the light angle passing through them. This causes a change in the angle of the top polarizing filter with respect to it. So little light is allowed to pass through that particular area of LCD. Thus that area becomes darker comparing to others.

For making an LCD screen, a reflective mirror has to be setup in the back. An electrode plane made of indium-tin oxide is kept on top and a glass with a polarizing film is also added on the bottom side. The entire area of the LCD has to be covered by a common electrode and above it should be the liquid crystal substance. Next comes another piece of glass with an electrode in the shape of the rectangle on the bottom and, on top, another polarizing film. It must be noted that both of them are kept at right angles. When there is no current, the light passes through the front of the LCD it will be reflected by the mirror and bounced back. As the electrode is connected to a temporary battery the current from it will cause the liquid crystals between the common-plane electrode and the electrode shaped like a rectangle to untwist. Thus the light is blocked from passing through. Thus that particular rectangular area appears blank.

WI-FI MODULE

Espressif Systems' Smart Connectivity Platform (ESCP) is a set of high performance, high integration wireless SOCs, designed for space and power constrained mobile platform designers. It provide sensor passed ability to embed Wi-Fi capabilities within other systems, or to function as a standalone application, with the lowest cost, and minimal space requirement. ESP8266EX offers a complete and self-contained WiFi networking solution; it can be used to host the application or to offload WiFi networking functions from another

application processor When ESP8266EX hosts the application, it boots up directly from an external flash. In has integrated cache to improve the performance of the system in such applications Alternately, serving as a 22 WiFi adapter, wireless internet access can be added to any micro controller based design with simple connectivity (SPI/SDIO or I2C/UART interface).ESP8266EX is among the most integrated WiFi chip in the industry; it integrates the antenna switches, RF balun, power amplifier, low noise receive amplifier, filters, power management modules it requires minimal external circuitry, and the entire solution, including front-end module, is design to occupy minimal PCB area. ESP8266EX also integrates an enhanced version of Tensilica's L106 Diamond series 32-bit processor, with on-chip SRAM, besides the WiFi functionalities. ESP8266EX is often integrated with external sensors and other application specific devices through its GPIOs; sample codes for such application are provided in the software development kit (SDK).
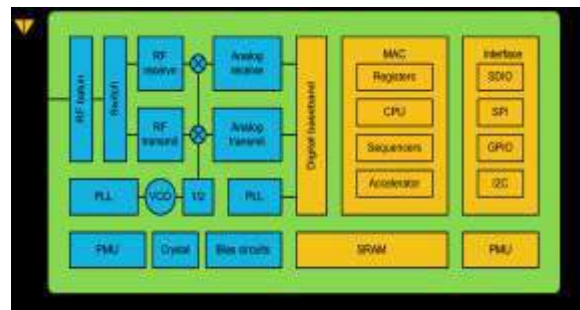

Fig 2. wi-fi Architecture

Espressif Systems' Smart Connectivity Platform (ESCP) demonstrates sophisticated system-level features include fast sleep/wake context switching for energy-efficient VoIP, adaptive radio biasing for low-power operation, advance signal processing, and spur cancellation and radio co-existence features for common cellular, Bluetooth, DDR, LVDS, LCD interference mitigation

RELAY WORKING

A relay is an electrical switch that uses an electromagnet to move the switch from the off to on position instead of a person moving the switch. It takes a Relatively small amount of power to turn on a relay but the relay can control something that draws much. Ex: A relay is used to control the air conditioner in your home. The AC unit probably runs off of 220VAC at around 30A. That is about 6600 Watts. The coil that controls the relay may only need a few watts to pull the contacts together..
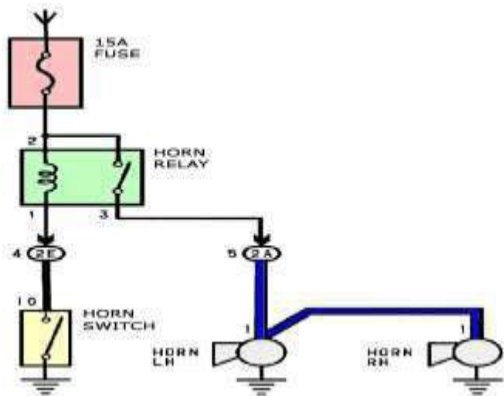
Fig 3 ..Relay operation

OP-AMP COMPARATOR

The comparator is an electronic decision making circuit that makes use of operational amplifiers very high gain in its open-loop state, that is, there is no feedback resistor. The **Op-amp comparator** compares one analogue voltage level with another analogue voltage level, or some preset reference voltage, VREF and produces an output signal based on this voltage comparison. In other words, the op-amp voltage comparator compares the magnitudes of two voltage inputs and determines which is the Largest of the two.

Fig. 4. op-amp comparator

VI.RESULT ANALYSIS

Fig 5. Interfacing of sensors with Atmega

Fig 6. IR and temperature sensor interfacing with Atmega

Fig7. Gas sensor interfacing with Atmega
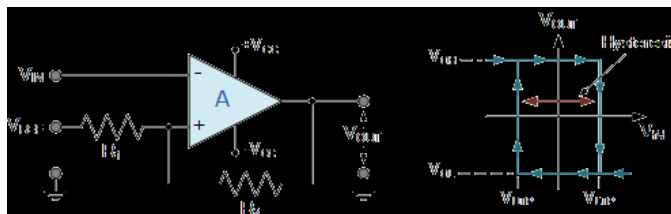
CONCLUSION

Nowadays the people need everything computerized. earlier the industry can only monitor situations with the help of cameras. in industries reduce manual overhead we have implemented internet of things (Iot) in industry to monitor as well as to inform the responsible person to take appropriate measures, but this will partially full fill users requirement. as sometimes it will be late in this process and it will harm to property as well as life. for this purpose the project are developing a system for industrial automation using Iot with the help of artificial intelligence to make system automated which will take intelligent decisions.

REFERENCES

[1] Iot Based Monitoring And Control System For Home Automation Pavithra.D.,Ranjith Balakrishnan Ieee 2015.
[2] Mobile Based Home Automation Using Internet Of Things(Iot)
Kumar Mandula, Ramuparupalli, Ch.A.S.Murty, E.Magesh, Rutul Lunagariya Centre For Development Of Advanced Computing(C-Dac)A Scientific Society Under Ministry Of

Communications And Information Technology, Government Of India

[3] Arm Microcontroller Based Wirelessindustrial Automation System .Nagisetty Sasidhar1, Monica P. Suresh2pg Student [Embedded Systems], Dept. Of Eee, Saveetha Engineering College, Chennai, Tamilnadu, India 1associate Professor, Dept. Of Eee, Saveetha Engineering College, Chennai, Tamilnadu, India 2

[4] 2016 Ijarcetindustrial Automation Using Internet Of Things (Iot). International Journal Of Advanced Research In Computer Engineering & Technology (Ijarcet) Volume 5 Issue 2, February 2016266issn: 2278 – 1323 All Rights Reserved

[5] "The Internet Of things: A Survey." Atzori, Luigi, Antonio Iera, And Giacomo Morabito. Computer Networks 54.15 (2010): 2787-2805. 27

[6] "Java-Based Homeautomation System." Al-Ali, Abdul-Rahman, And Mohammad Al-Rousan. Consumer Electronics, IEEE Transactions On 50.2(2004): 498-504.

[7] "Towards The Implementation Of Iot Forenvironmental Condition Monitoring In Homes." Kelly, Sean Dieter Tebje, Nagender Kumar Suryadevara, And Subhas Chandra Mukhopadhyay Sensors Journal,Ieee 13.10 (2013): 3846-3853.

[8] "Security Architecture Of The Internetof Things Oriented To Perceptual Layer." Zhang, Weizhe, And Baosheng Qu. International Journal On Computer 2 (2013): 2-13.

[9] Christo Ananth, Kanthimathi, Krishnammal, Jeyabala, Jothi Monika, Muthu Veni, "GSM Based Automatic Electricity Billing System", International Journal Of Advanced Research Trends In Engineering And Technology (IJARTET), Volume 2, Issue 7, July 2015, pp:16-21

[10] "Raspberry Pi Basedinteractive Home Automation System Through E-Mail." Zhao, Yanbo, And Zhaohui Ye. "A Low Cost Gsm/Gprs Based Wirelesshome Security System." Consumer Electronics, IEEE Transactionson 54.2 (2008): 567-572.

[11] "Sensor Based Home Automation And Security System." Assaf, Mansour H., Et Al. Instrumentation And Measurement Technology Conference(I2mtc), 2012 Ieee International.Ieee, 2012.

[12] "Access Control Of Door And Home Security By Raspberry Pi Through Internet." Chowdhury, Mdnasimuzzaman, Mdshiblee Nooman, And Srijon Sarker International Journal Of Scientific And Engineering Research 4 (2013).