

# Using IOT, Monitor and Control Systems in Industry

Mrs. Snehal Y. Kulkarni

Assistant Professor  
Department of Computer Engineering  
SKNCOE, Savitribai Phule Pune University,

**Abstract:** In today's world automation plays a very important role. Automation is method of controlling appliances, their status can be changed according to our desire. In this project an automated way of controlling industry appliances through self-control of the system itself as well as through human interaction is provided. In manual mode user can control industry appliances automatically using PC or Wi-Fi enabled mobile phone in same local area network in automated mode the system controls the appliances itself depending on some sensor reading. Another feature is security mode, through this mode user will be alerted. Live video-streaming through Wi-Fi is also possible. In this paper, Internet of Things (IoT) is effectively used for monitoring regular domestic conditions by using low cost ubiquitous sensing system. For measurement of parameters, an integrated network architecture and interconnecting mechanism is used by means of smart sensors and transmission of data via internet. The proposed system can be reinstalled in any other location by only minor changes in its core.

**Index Terms:** Internet of Things (IoT), Industrial automation, Android application, smart phone, Wi-Fi, Camera, sensor data acquisition.

## I. INTRODUCTION

Technology has advanced so much in the last few years that it has made life better and comfortable. To save time and efforts, devices are controlled from particular location. Such systems have become imperative. This thought arises a need to do so in systematic manner which have tried to implement with the system [1]. The system proposed is an extended approach for controlling system automatically.

There have been multiple automation systems already been implemented and being used now a days, which use either a dedicated remote control device, such as in 'Remote Control Home Automation System via Bluetooth home Network or ordinary mobile phones for communication, such as proposed by 'design and prototype implementation of SMS Based Home Automation System.

This system has some weaknesses, (i) as a separate remote control is devoted for automation, then user had to carry that specific device with him and such a practice is not appreciated by the user, (ii) if the ordinary mobile phones are used for communication, then the user had to text an SMS every time for communication with appliances, the users are again unenthusiastic to use such systems. Keeping these drawbacks in consideration, we are introducing the same concept using an Android [2].

Industrial Automation using microcontroller implements the emerging applications of the Wi-Fi technology. Using Wi-Fi networks, a control system has been proposed which is embedded system, can monitor and control machines and other devices locally using built-in input and output peripheral devices [3]. Remotely the system allows the user to effectively monitor and control the appliances and equipment in office via the mobile phone set by sending commands in the form of mail and receiving the appliances status. The main concept behind the system is; receiving the mails and processing it as required for performing several operations. The type of the operation to be performed depends on the nature of the mail. Industry automation is a method of controlling the industry machines using any communication system from any location within the globe [3]. The system has always attracted the people since it provides people an ease of controlling their industries remotely.

Previously the same communication was done using the remote control or SMS is now done through an application installed in smart phone. All of this automation provides more and more comfort because of fewer efforts by human being. Large amount of electronic devices at a time working in industry hence their monitoring is necessary part to find fault and defects along with repairing these defective electronic appliances as soon as possible.

## II. MOTIVATION:

The new age of technology has redefined communication. Most people have access to mobile phones and thus the world indeed has become a global village. At any given moment, a particular individual can be contacted with the help of mobile phone. But the application of mobile phone cannot just be restricted to sending SMS or calling. New innovations and ideas can be generated from it which can enhance its capabilities. Technologies such as Infra-red, Bluetooth, NFC etc. which has developed in recent years goes to show the very fact that improvements are possible and these improvements have eased our life and the way we live. As many office appliances and machinery providing control for remote management, automation of machinery in intelligent way is a subject of growing interest.

## III. PROBLEM IDENTIFICATION:

Technology has advanced so much in the last few years that it has made life better and comfortable. To save time and efforts, devices are controlled from particular location. Such systems have become imperative. This thought arises a need to do so in systematic manner which have tried to implement with the system. The system proposed is an extended approach for controlling system automatically.

IV. SYSTEM HARDWARE DESIGN

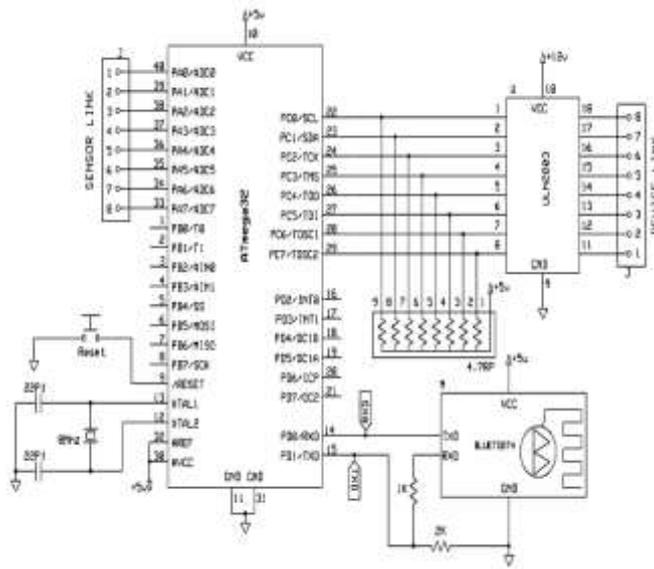


Fig 1. Atmega32 microcontroller

In this system Atmega32 microcontroller is the heart of hardware circuitry. Sensor link used as input port where sensors are connected through sensor pins. Each sensor connected pins in one to one connection. Five pins are used for sensor because five sensors are going to use in the system. Crystal circuit is used for filtering sensed data as well as removing noise whereas reset is used to reset whole system.

Two pins are using, one for receiving data other is for transmitting data to devices. At output pins pull up register is used to take output from sensor. Sensor values send to android phone via Bluetooth. Those values displayed on App and the live feeds forwarded towards server through WiFi. All data will be store in database for a while and it would be changing continuously. ULN 2803 is connected to device driver which provides high voltage output.

V. SYSTEM ARCHITECTURE:

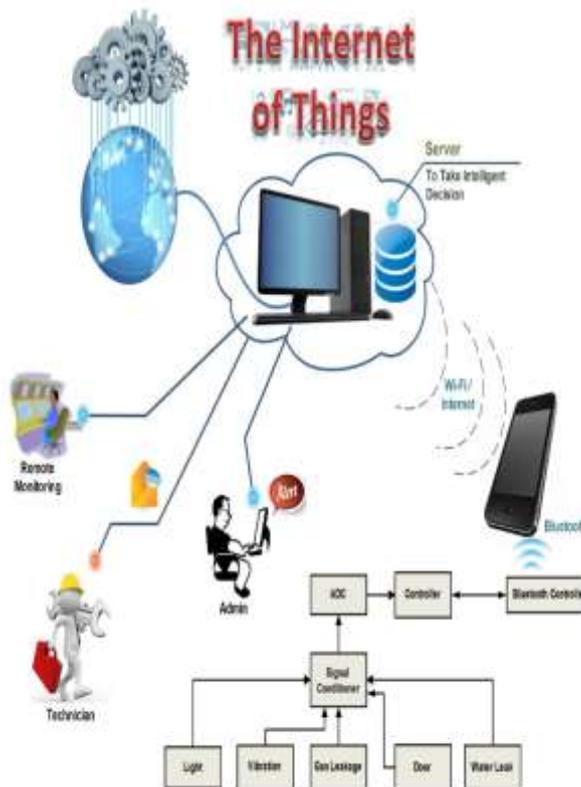


Fig 2: System Architecture

Implications of the system in future are very great considering the amount of time and resources it saves. The system can be used as a reference or as a base for realizing a scheme to be implemented in other systems of greater level such as temperature updates, device synchronization, etc. The system can be modified to achieve a full Industry Automation System which will then create a platform for the user to interface between human and his industrial appliances.

Main aspect of this system is to control industrial equipment remotely through android application. So, here one android application will be generated and installed on smartphone which will be connected to hardware circuitry via Bluetooth. In hardware circuitry there will be one microcontroller (atMega 32) of 8-bit be used as a heart of this system. Sensors connected to devices and devices will be connected to microcontroller through device drivers. Smart phone will connected to the Server (Glass Fish server) via Wi-Fi and this Server will be act as an intelligent server who will take decisions by its own and whenever required then will inform to admin.

This system uses different sensors to check status of appliances in industry. Different sensors used are Light sensor, Vibration sensor, Door sensor, Water leakage sensor, Temperature sensor.

Microcontroller is used to control all the sensors, device drivers and also Bluetooth controller is connected to it. Signal controlling unit used to accept all sensor signals which are converted from analog to digital form. Door sensor is used for automatic opening and closing of door.

Water leakage sensor used to detect leakage of water in industry once it detect somewhere water leakage is occurred then it sends signal to the microcontroller and it will take further action over it like it will send that signal to android app through Bluetooth then android app send it to server. Then server will take an intelligent decision he will send email or SMS to plumber.

Temperature sensor used to measure temperature in room if it is higher that particular threshold then it will send warning signal to server and server will automatically switch on A/C or fan available in the room.

Vibration sensor used to provide security to industry if someone is breaking into your office and he is hammering on the door then it's get measured and if count becomes more than predefined threshold then emergency signal send to server through microcontroller and server will call security guard.

Light sensor used to turn ON/OFF lights in office room. It will happen either manually or dynamically.

Bluetooth controller is act as an interface in between android phone and microcontroller. Android phone and server communicate via Wi-Fi. On android app there is a facility provided to capture continuous snapshots of office room or to take a video and it will continuously send it to server. As server receives live feeds it stores it into database and take further action over any event when occurred. And when server is saving live feed into database at the same time he will send it to the Admin and when required any event occurred which is not handled by server then admin will take appropriate action over it manually.

In this way industrial equipment's will be monitored and controlled using android app and an intelligent server.

## VI. WORKING PRINCIPLE

- **HARDWARE DESIGN:**

In this system uses different sensors to check status of appliances in industry. Different sensors used are Light sensor (LDR), Vibration sensor, Water leakage sensor, Temperature sensor (TDR). Microcontroller is used to control all the sensors, device drivers and also Bluetooth controller is connected to it. Signal controlling unit used to accept all sensor signals which are converted from analog to digital form.

Water leakage sensor used to detect leakage of water in industry once it detect somewhere water leakage is occurred then it sends signal to the microcontroller and it will take further action over it like it will send that signal to android app through Bluetooth then android app send it to server. Then server will take an intelligent decision he will send email or SMS to plumber. Temperature sensor used to measure temperature in room if it is higher that particular threshold then it will send warning signal to server and server will automatically switch on A/C or fan available in the room.

Vibration sensor used to provide security to industry if someone is breaking into your office and he is hammering on the door then it gets measured and if count becomes more than predefined threshold then emergency signal send to server through microcontroller and server will call security guard. Light sensor used to turn ON/OFF lights in office room. It will happen either manually or dynamically. Bluetooth controller is act as an interface in between android app and microcontroller.

- **ANDROID APP:**

Android app will be installed on smartphone which will be used as n hardware tester. App will continuously receive sensor values via WiFi and pass it to server for further process.

- **INTELLIGENT SERVER:**

After receiving sensor values from android app server send it to admin. After receiving further signal from admin server will either pass it to android app or take an intelligent decision. Like when for a long time server is not receiving updated values for any sensor then it will be considered as that particular device has some problem and hence server will send Email or SMS to Technical person to fix that problem.

When everything is going well and good but sensor values are higher/lower than pre-fixed threshold of sensor then server will send instruction to android app to switch ON/OFF that device.

Every time server saves live feeds which has accepted from android app in the database but it will be changing continuously.

- **REMOTE MONITORING:**

Here is the admin who is monitoring the whole system, he is the one who setting threshold value for every sensor according to environmental condition of industry. The technician details are viewed by administrator. Admin can add or removed technician details in intelligent server.

## VII. CONCLUSION

Due to, intelligent decision making capability of this system, make the system interesting. System can be implemented as statically and dynamically. Due to either network failure or hardware assembly fault, or both, system will not work properly.

From the convenience of a simple mobile phone, a user is able to control and monitor any electrical devices. This makes it possible for users to be assured that their belongings are secure and that the electrical appliances are not left running when they are not present, this are just list a few of the many uses of this system. The end product will be with simple design to make it easy for users who interact with product. This will be essential because of the wide range of technical knowledge that industries have.

## REFERENCES

- [1] Ahmed El Shafee and Karim Alaa Hamed “Design and Implementation of a WiFi Based Home Automation System”, World Academy of Science, Engineering and Technology, Vol. 6., (2012),
- [2] Bader M O Al-thobaiti, Iman I M Abosolaiman, Mahdi H M Alzahrani, Sami H A Almalki and Mohamed S Soliman , “Design and Implementation of Reliable Wireless Real-Time Home Automation System Based on Arduino uno Single Board Microcontroller”, International Journal of Control, Automation and Systems, 2014
- [3] Bharanialankar S R and Manikanda Babu C S (2014), “Intelligent Home Appliance Status Intimation Control and System Using GSM”, International Journal of Advanced Research in Computer Science and Software Engineering, Vol. 4, No. 4, 2014
- [4] Fatima Tariq, Mahnoor Rashid, Muhammad N. Khan, “Implementation of Smart Homes and Industrial Automation System with Secure Communication over GSM”, Universal Journal of Electrical and Electronic Engineering 3(4): 125-131, 2015
- [5] R. Roman, P. Najera, and J. Lopez, “Securing the internet of things,” Computer, vol. 44, no. 9, pp. 51–58, 2011.
- [6] L. Li, “Technology designed to combat fakes in the global supply chain,” Bus. Horizons, vol. 56, no. 2, pp. 167–177, 2013.
- [7] J. Clarke, R. Castro, A. Sharma, J. Lopez, and N. Suri, “Trust & security RTD in the internet of things: Opportunities for international cooperation,” in Proc. 1st Int. Conf. Security of Internet of Things, Kollam, India, 2012, pp. 172–178.
- [8] L. Xu, “Introduction: Systems science in industrial sectors,” Syst. Res. Behav. Sci., vol. 30, no. 3, pp. 211–213, 2013.
- [9] F. Li, C. Jin, Y. Jing, M. Wilamowska-Korsak, and Z. Bi, “A rough programming model based on the greatest compatible classes and synthesis effect,” Syst. Res. Behav. Sci., vol. 30, no. 3, pp. 229–243, 2013.
- [10] L.C. DeSilva, M. Chamin, M.P Iskandar, “State of the art of Smart Homes”, Engineering Applications of Artificial Intelligence, 2012, Vol. 25, pp.1313-1321.
- [11] R. Dafali, J. Diguët, and J. Creput, “Self-adaptive network-on-chip interface,” IEEE Embedded Syst. Lett., vol. 5, no. 4, pp. 73–76, Dec. 2013.
- [12] W. Viriyasitavat, L. Xu, and W. Viriyasitavat, “A new approach for compliance checking in service workflows,” IEEE Trans. Ind. Informat., vol. 10, no. 2, pp. 1452–1460, 2014
- [13] Aishverya Kumar Sharma<sup>1</sup>, Kushagra Kumar Choubey<sup>2</sup>, Mousam Sharma<sup>3</sup> <sup>1</sup>B.E. Scholar, <sup>3</sup>Assistant Professor, EEE Dept., BIT, Durg, (C.G.), India Proceedings of BITCON-2015 Innovations For National Development.