IOT Based Industrial Automation

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Abstract: *Internet of Things (IoT) in industries has created a new revolution in industries. IoT in industry has given rise to the term "INDUSTRY 4.0" where systems are connected to each other over the internet and can communicate with each other to take necessary decisions (also called as M2M communication) through artificial intelligence. In this paper, we shall design a system which will automatically control and monitor the industrial applications and also allow the user to control the application from anywhere in the world. Having control over the applications over the internet is one of the best ways to deal with the industrial applications.*
Keywords: *Artificial intelligence, Industry 4.0, M2M communication*

I.   Introduction

Industrial Internet of Things (IoT) is the best way of connecting industrial machineries and sensors, to each other, over the internet, allowing the authorized user of the industry to use information from these connected devices to process the obtained data in a useful way. IoT-connected applications typically support data acquisition, aggregation, analysis, and visualization. The IoT architecture includes latest technologies such as computers, intelligent devices, wired and wireless communication and cloud computing [1].

Previously Bluetooth and RF (Radio Frequency) technologies were used to control and monitor the industrial applications but were limited to short distance. The operator had to be in the range of the Bluetooth connectivity or in the Radio Frequency area [2].

Solution to the short distance communication is the IoT based industry automation. Here we can have controlling as well as monitoring from anywhere in the world. The following Fig 1 illustrates IoT based Industrial Automation [3].

Figure 1: industrial automation

II.   History

First time automation in industries was done through the use of steam and water power.

As the advancement took place, electricity was introduced and was used in industries for mass production. Fig 2 shows the use of steam power in industries in olden days. This machine was used in the first safe and successful steam power plant introduced by Thomas Newcomen in 1712.
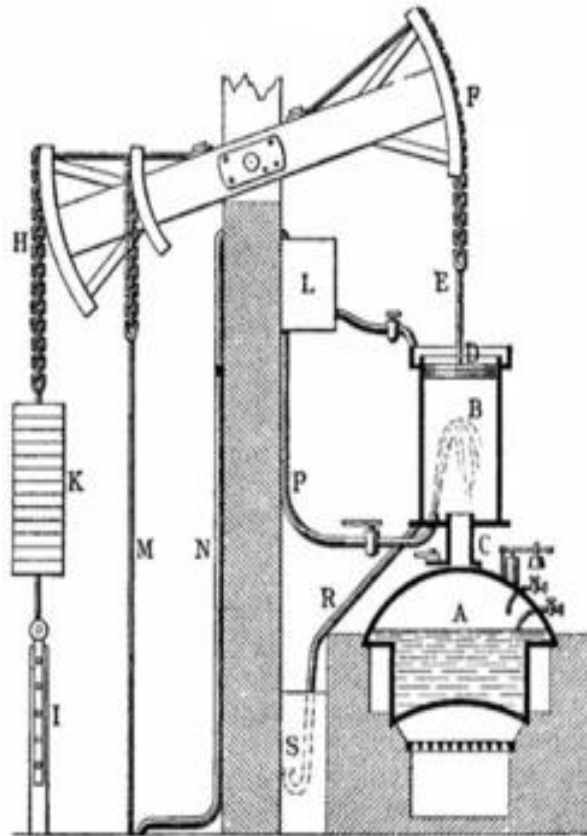
Figure 2: Newcomen's atmospheric steam engines

III. Present

When computers were invented, it was designed to perform multiple functions. As time went on, computers became cheaper and then almost all industries started using it for automation because it reduced a major work load experienced by the humans and still it is considered as the best option to control and monitor a application**.**

Automation is done through the technologies such as Bluetooth and radio frequency which can be employed for short distance communication [4][5].

Figure 3: RFID based automation in manufacturing industry

IV. Future

Automation through IoT can help to get rid of the short distance communication. Thus, introducing internet in industries can help to have control over the application from anywhere in the world [6]. The following Fig 4 illustrates how IoT can help to ease the life in industries as well as in other fields.
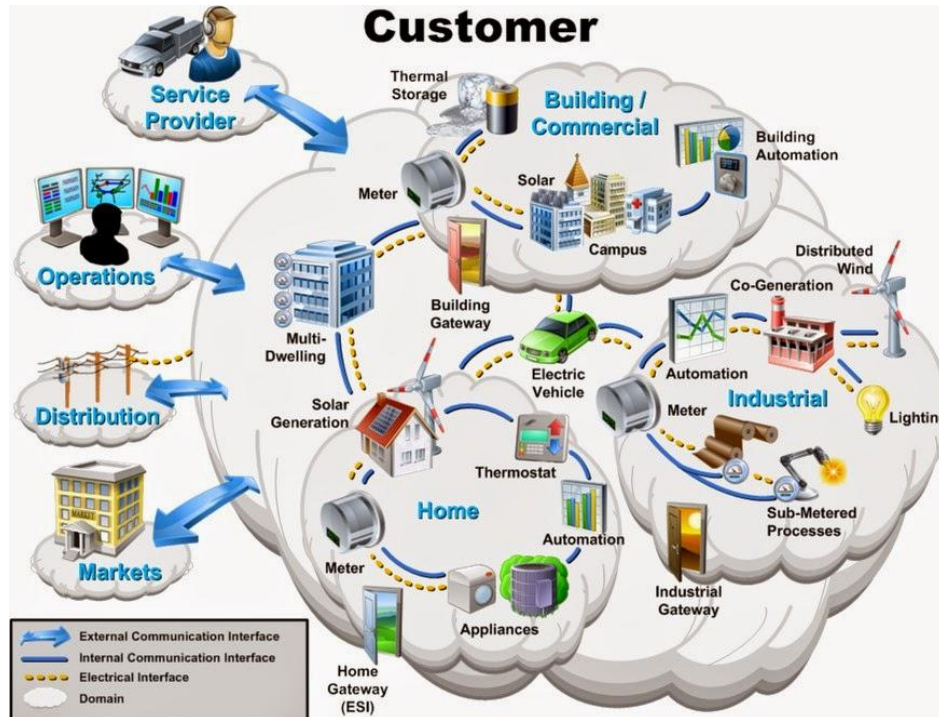

Figure 4: IoT in different fields

V. Overview

Here we are using a microcontroller(Atmega) to make the necessary commands. We are monitoring 3 parameters – Voltage, Temperature and oil level check. Respective sensors for the different parameters are used to obtain their values. Voltage sensor, Temperature sensor(LM35) and Oil level check (Monostable multivibrator).

Once the values are obtained, it is given to the microcontroller. The microcontroller compares the obtained values with the predefined safe values so that it does not exceeds the safe values. If the obtained value exceeds the safe value, the application (for example a motor) is turned off (in case if voltage exceeds the safe value) or the application (for example a cooling fan) is turned on (if temperature exceeds the safe values). Thus, controlling is done automatically. We are also using a Wi-Fi module(ESP8266) which transmits the data periodically to the cloud from which user can extract the data. The below block diagram (Fig 5) represents the block diagram for IoT based industrial automation.
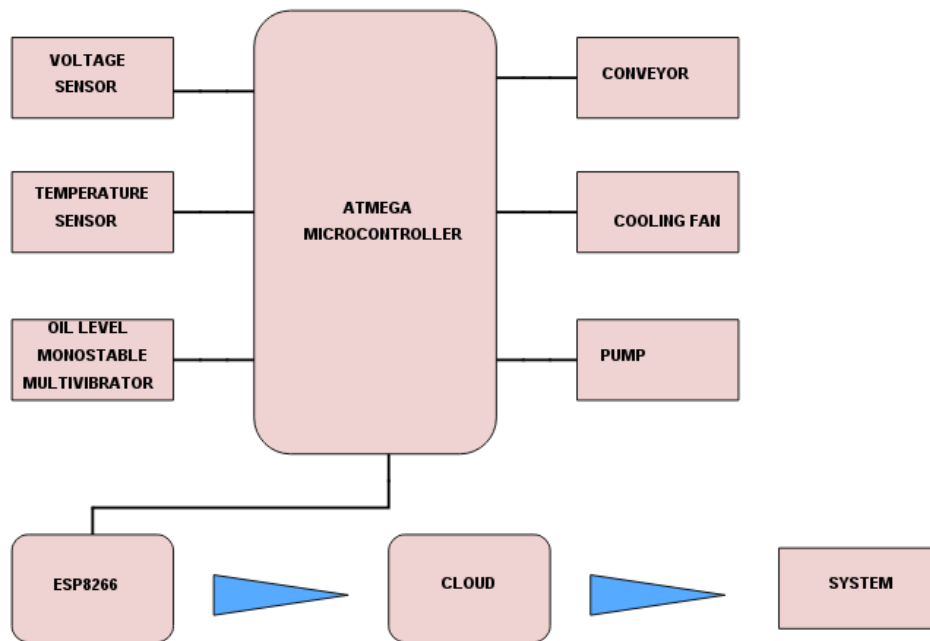
Figure 5: block diagram of IoT based industrial automation

Hurdles

Internet connection is not strong in all areas and fluctuates which is a major problem that must be tried to solve. Also, security of the data on the cloud is a major issue. [6][7]

Advantages
- Long distance controlling and monitoring is possible.
- Faster production and cheaper labour cost.
- Can perform the task beyond the human capability.

Applications
- Home applications: we can monitor and control the home things like fans, TV, fridge etc. by artificial intelligence [8][9].
- Industries and offices: monitoring and controlling the machines and instruments using the IoT technique
- Hospitals and labs: doctor can check the current status of the patient's body using his android phone by placing the sensors on patient's body using the artificial intelligence and IoT [10] [11].

VI. Conclusion

Earlier we used to monitor the things by using RFID system where it was only used for short distance communication. To reduce the manual overhead, the thing which we are introducing is automation of industries using internet of things which can overcome the RFID shorter distance problem. Using IOT in industries we can monitor and control the industrial machineries more easily.

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