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Analysis of Report Generation of Daily Production in Manufacturing Industry using IoT

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***Abstract*—** Immediately IoT or Internet of things is a technology that deals with bringing control of physical devices over the Internet. Here I propose an efficient industry automation system that allows the user to efficiently fetch data from physical machines over the Internet. My system will analyze that particular data and determine the exact loss or profit of the company. For a demonstration of this system, I'm using 2 loads (temperature and count) as industrial appliances like temperature and counter. My main system takes the information and passes it to the Internet for further processing. The sensors and a microcontroller will be used for sending data from machine to system. Also, it displays the system state on an LCD display. Thus, we can automate the entire industry using online GUI for easy industry automation.

***Keywords*—**IOT, Temperature Sensor, IR Sensor, LCD Display

I. INTRODUCTION

The "Internet of things" (IoT) is becoming an increasingly growing topic overall. It has attracted strong interest from both academia and the industry. It is a concept that not only has the potential to impact human life but also work. But what exactly is the "Internet of Things? What impact is it going to have?" There are a lot of complexities around the "Internet of Things" in simple words, Things around the world start to think. Basically, IoT is a concept of connecting any device with an on and off switch to the Internet and/or to each other. This includes everything from cell phones, coffee makers, washing machines, headphones, lamps, wearable devices to almost anything else that we can think of. This also applies to components of machines, for example, a jet engine of an airplane or the drill of an oil rig. In future there is going to be a new rule, "Anything that can be connected will be connected."

Information moves online and has become digitalized, resulting in an increasing amount and varied types of data being collected. We are now even talking about big data. This has made data more important, but without integrity and security, data is not of much use. There is no getting away from the fact that data comes from everywhere these days. Just as a few examples, we have mobile devices, loyalty cards, customer relationship management (CRM) systems, social media sites, GPS location data, and complex market research tools. Protecting the integrity and security of the data is the most important criteria in any communication system. Without security measures in place, private or confidential information or messages can be viewed, intercepted and even stolen. Depending on the intent of the intrusion, this can range from seemingly innocuous, like market research, to more devastating, like identity theft or other fraud. Governments and companies with sensitive information are also at risk as their own information is often valuable, and they also maintain private information on individuals such as customers or employees. Thus, security is of this data is of paramount importance and hence there's a need for adequate security measures.

The Industrial Internet of Things originally described the IoT (Internet of Things) as it is used across several industries such as manufacturing, logistics, oil and gas, transportation, energy/utilities, mining and metals, aviation and other industrial sectors and in use cases which are typical to these industries.

The term industrial Internet of things (IIoT) is often encountered in the manufacturing industries, referring to the industrial subset of the IoT. IIoT in manufacturing could generate so much business value that it will eventually lead to the fourth industrial revolution, so the so-called Industry 4.0. It is estimated that in the future, successful companies will be able to increase their revenue through the Internet of things by creating new business models and improve

productivity, exploit analytics for innovation, and transform workforce.

IOT or Internet of things is a technology that deals with bringing control of physical devices over the Internet. Here I propose an efficient industry automation system that allows a user to efficiently fetch data from physical machines over the Internet. My system will analyze that particular data and determine the exact loss or profit of the company. For a demonstration of this system, I used 2 loads as industrial appliances like temperature and counter.

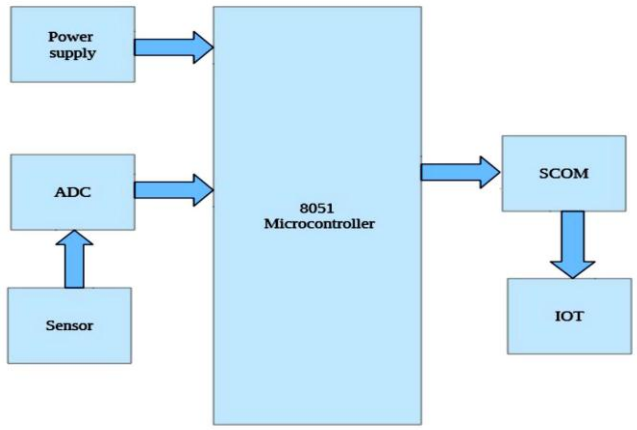

Figure 1. Block diagram of the system

My main system takes the information and passes it to the Internet for further processing. The microcontroller will be used for sending data from machine to system. Also, it displays the system state on an LCD display. Thus, we can automate the entire industry using online GUI for easy industrial automation.

Nowadays, marketing demands are increasing continuously. If you can't satisfy demand then you will knock out of the race. There is no time limit for work. So, in modern industry, it needs to give alignment without going on the field. Our project satisfies this need by using a data analysis by making use of high-end technology.

The proposed design is to provide industrial automation that is useful for monitoring the devices from any distance. A microcontroller is used which monitors the components according to the given message, with the sensed information sent from the sensors. As automation is microcontroller based, it automatically regulates the temperature changes.

Most of the times the CEO or head of the company won't know the exact floor production detail, that why a company can suffer a huge amount of loss due to machine problem or raw data problem. This project will be helpful to take a quick decision at the high-level management. This project is helpful to maintain production smoothly as well as to save a lot of wastage of money on the production floor.

II. RELATED WORK

1. Industrial Automation using Machine Learning

In the modern world with growing digitization the industrial sector is also getting advanced but the improvement of line of production is not developed so our project is basically focusing on the line of production where the efficiency of the product matters and identification that at which section of the industry the efficiency is reduced can be calculated using this project. Hence this project mainly focuses on the automation of the industrial sector using machine learning technology.

2. Internet-Based Remote Monitoring and Control System

With the growing popularity of the internet and development of embedded technology, Web technology has been extended to the development and application of an embedded system. It is the end of the network era which takes PC equipment as the basic network node. Besides PC equipment, the network nodes include various types of embedded devices. How to remotely monitor, control, diagnosis, manage and maintain operations of embedded devices from different subnets and physical areas, is the problem needed to be solved. Web-based remote monitoring and a controlling system should directly connect the equipment to the network as node using the clients do not need to install special software and may monitor and control the current condition of equipment through web browsers. It greatly decreases the system building cost. With the development of industrial Ethernet technology, the real-time performance of the system is improved further.

3. Embedded Technology for Remote Data Logging, Monitoring and Controlling Using GSM/GPR

In the world of Embedded System monitoring and control of data or different appliances from a remote location in a smarter way, with the least manpower is always a prominent area for research. In this paper, modified, simple and cost-effective remote data logging controlling and monitoring system using an embedded web server are proposed. Use of the mobile phone gave the novelty of distance communication at a remote location. The system is very practical in the area served by cell phone data services. With the help of proposed module process automation in industry or home, appliances become easy because of the power of taking runtime decisions as per the need in the system. Data uploaded on a webpage can be accessed from anywhere through the internet. Thus, the proposed system is suggested for secure remote data logging, controlling and monitoring using web technology.

4. Industrial Parameter Monitoring and Controlling Using Gsm and Web Server

Remote Monitoring and Control is one of the most important and necessary criteria for increasing production and process plant availability. There is a lot of development in industry and the requirement for the industrial monitoring system is getting higher. A system should be able to acquire, save, analyze, and process real-time data. It is also required controlling particular machines, to change related environmental factors and monitoring in a long distance so that it realizes modern, intelligent, and accurate control. We can achieve these advantages by the substitution of an embedded ARM processor to realize data acquisition and control (DACS). This DACS system measures the remote signals and controls the remote devices through reliable protocols and communication network as a web server. In addition to that, a GSM Mobile Communication will help to provide information about a related parameter to the system when the web server is not available to the client.

III. PROPOSED SYSTEM

Microcontroller 89s52 will acquire data from the sensor nodes, the data from LM 35 (Temperature sensor) is converted into digital format for the precise control of the environment that needs to be monitored and from IR sensor, digital data form is directly given to controller. The threshold levels defined for the temperature sensor (LM 35), varies according to the environment in which they are used.

The proposed system will help to improve the privacy preservation of data generated in IoT devices. Microcontroller 89s52 will acquire data from the sensor nodes, the data from LM 35 (Temperature sensor) is converted into digital format for the precise control of the environment that needs to be monitored and from IR sensor, digital data form is directly given to controller. The threshold levels defined for the temperature sensor (LM 35), varies according to the environment in which they are used.

In this project, the analog and digital parameter planned for monitoring and control are Temperature sensor for temperature and IR sensor for product count. The heart of the hardware is the microcontroller. The signal is picked by the sensor (LM35). The sensed signal is fed to the analog to digital (A/D) converter inbuilt in the microcontroller. The A/D converter converts the analog input signal into a digital signal and supplies to the processor. The ATmega16 based chipset controls the A/D collections and data transmission. The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range.

Infrared Obstacle Sensor Module has a built-in IR transmitter and IR receiver that sends out IR energy and looks for reflected IR energy to detect the presence of any obstacle in front of the sensor module. The module has an onboard potentiometer that lets the user adjust the detection range. The sensor has a very good and stable response even in ambient light or in complete darkness.

In this project, the transmitter section includes an IR sensor, which transmits continuous IR rays to be received by an IR receiver module. An IR output terminal of the receiver varies depending upon its receiving of IR rays. Since this variation cannot be analyzed as such, therefore this output can be fed to a comparator circuit. Here an op-amp (operational amplifier) of LM 358 is used as a comparator circuit. When the IR receiver does not receive a signal, the potential at the inverting input goes higher than that noninverting input of the comparator IC (LM358). Thus, the output of the comparator goes low, but the LED does not glow. When the IR receiver module receives a signal to the potential at the inverting input goes low. Thus, the output of the comparator (LM 358) goes high and the LED starts glowing. Resistor R1 (100), R2 (10k) and R3 (330) are used to ensure that minimum 10 mA current passes through the IR LED Devices like Photodiode and normal LEDs respectively. Resistor VR2 (pre-set=5k) is used to adjust the output terminals. Resistor VR1 (pre-set=10k) is used to set the sensitivity of the circuit Diagram.

IV. SYSTEM IMPLEMENTATION

Implementation of this system provides end to end integrity and security to the data generated by IoT. Each and every function has a specific meaning and reason for implementation. There are a few hardware and software requirements for this project. The hardware implementation of this system is as shown in the diagram below:

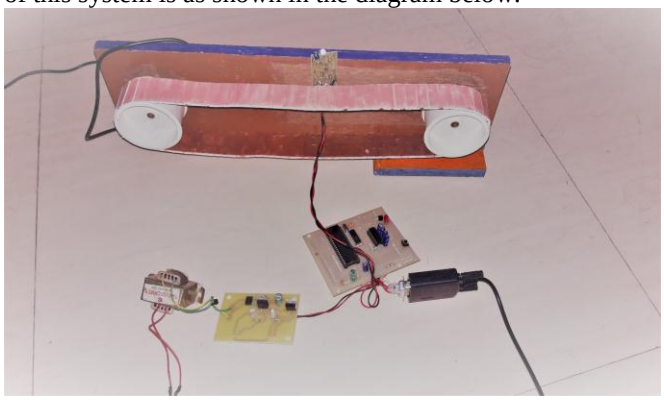

Figure 2. Hardware Implementation of the system

Hardware requirements for this system are as follows:

1. Micro-controller
2. Temperature Sensor

3. IR Sensor
4. Serial Communication
5. Analog to Digital Converter (ADC)

Software requirements for this system are as follows:

1. Python
2. MySQL
3. HTML
4. PHP
5. Django

V. RESULTS AND DISCUSSION

This section presents the results of the implemented system in the form of screenshots along with discussion of the results.

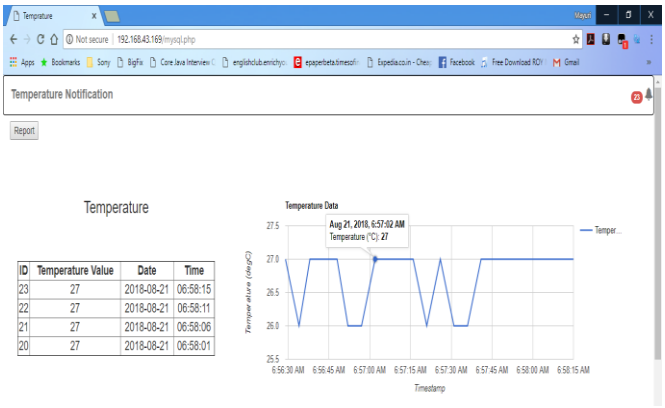

Figure 3. Temperature

The application is taken of the temperature of a machine, where it is needed to have a constant temperature. So, the required temperature is set to point. If the temperature is below-set point or above-set point, notification will be sent. Figure 5.1 shows the admin panel of the web on which the current temperature is displayed that is less than the set maximum temperature. We can upgrade the set point if needed with the administrative rights.

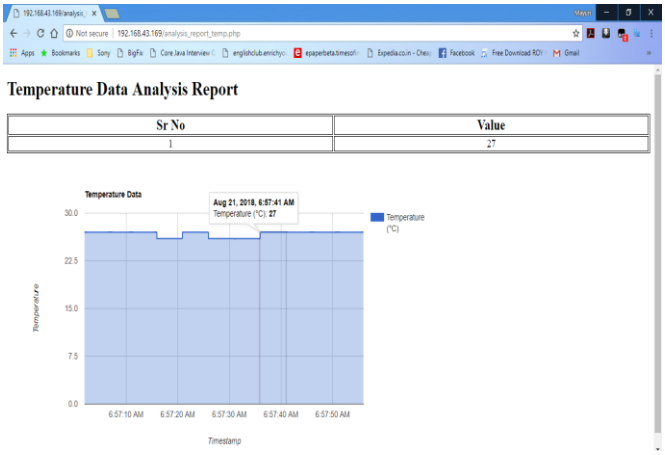

Figure 4. Temperature Analysis

We can also get a report from a specific time to a specific time. It will show the average value and the graph in the report sheet as shown in the figure above.

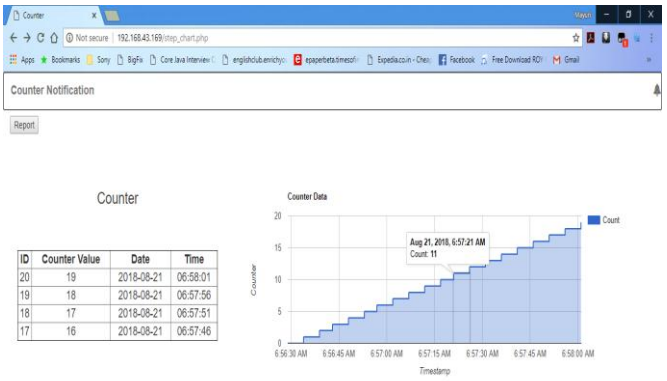

Figure 5. Counter

The application is taken of a counter of the products, where a predefined value of the counter is set. So, the required counter is set to point. As the counter reaches its predefined value, the notification would be sent on the website. Figure 5.3 shows the admin panel of the web on which the current counter value is displayed that is less than the set maximum counter. We can upgrade the set point if needed with the administrative rights.

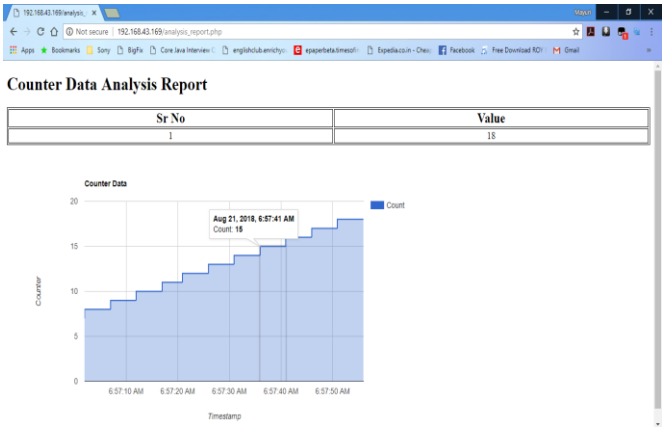

Figure 6: Counter Analysis

We can also get a report from a specific time to a specific time. It will show the average value and the graph in the report sheet as shown in the figure above.

VI. CONCLUSION AND FUTURE SCOPE

Nowadays we need everything computerized. Earlier we can only monitor the situations with the help of cameras. In industries to 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 fulfill our requirement. As sometimes it

will be late in this process and it will harm to property as well as life. For this purpose, we are developing a system for Industrial Automation using IoT with the help of Artificial Intelligence to make system automated which will make intelligent decisions. Time-based control will satisfy the requirements for high- performance applications in industrial automation. Industrial Automation cannot be ignored which have proven to be boon for the various industries. In this developing era, the technology of the Machine Learning would be very useful for the industrial purpose where the errors are solved by the machine itself. Hence the Machine Learning technology is one of the growing technologies which would be helpful for the Industry sector.

In this application, a low-cost, Internet-based control system has been designed and implemented. The application possibilities are virtually unlimited by attaching modules with appropriate interfaces, although the usage of the system is demonstrated with only a few sample devices. Compared with other applications, this system has advantages in terms of allowing direct bidirectional communication and reducing overhead, which can be vitally important for some real-time applications.

Future Scope

1. These types of automation system can be used in homes, industries, etc.
2. By using this automation design, we can reduce the usage of manpower, and the damage of devices can also be reduced.
3. By using transmission units, we can control the equipment from long distances.
4. Managers can keep an eye on the systems from a long distance also.
5. Privacy could always be maintained.
6. The system will always be secured.

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Ms. Mayuri Sewatkar pursued Bachelors of Engineering from University of Pune, Pune in 2016. She is currently pursuing a Masters of Engineering. She has 2 years of Research Experience and 7 months of Industrial Experience.

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