IOT Based Industrial Automation

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Abstract: *Using internet of things (IoT) to connect things, service, and people for intelligent operations has been discussed and deployed in many industry domains such as smart city, smart energy, healthcare, food and water tracking, logistics and retail, and transportation. It not only provides a convenient method to upload and display a required set of parameters but is even flexible to the changes taking place according to the parameters using the internet. In our project we are taking four parameters for the industry i.e. temperature, humidity, gas detection and counting of the goods with the help of various sensors. Finally these parameters are displayed using internet by webhost.com which is a platform provided by hostinger.*

Keywords: IR Module,DHT-22,MQ135,ESP8266,ARDUINO(UNO)

1. Introduction

The Internet of Things (IOT) is a self-configuring and adaptive system consisting of networks of sensors and smart objects whose purpose is to interconnect all things, including every day and industrial objects, in such a way as to make them intelligent, programmable and more capable of interacting with humans[1]. All different applications involving IOT whether industrial, home etc. are governed and monitored over certain parameters which are implemented and executed by the user. Hence, their implementation and execution differs with the sets of parameters for execution which is specified or wanted by the user

2. System Overview

2.1 Literature Survey

In this modern era of automation and advanced computing using IoT with Artificial Intelligence offer promising solutions towards the automation of Industry. In order to understand the development of IoT in industries, this project reviews the current research of IoT, key enabling technologies, major IoT applications in industries, and identifies research trends and challenges[2]. Sensors (Temperature sensor, Pressure sensor, Humidity sensor, Vibration sensor, Intrusion sensor) are used to percept the environment and object condition.

We here come up with the four necessary and essential parameters required in an industry. These are temperature, humidity, counting of the goods and finally the detection of the gases in the surrounding atmosphere.

A cost effective industry along with the required important parameters are implemented with the help of sensors which we have used in our project after which the parameters which is getting simulated in the real time are processed and finally uploaded with the help of webhost where these parameters are displayed along with their increase or decrease in the values.

2.2 IOT By Hostinger

Hostinger: It provides hosting service gives you the best free web hosting with PHP[8], MySQL, html files and BW 100GB, unlimited cheap hosting and a free domain[7]. This helps in easy and faster uploading of files over the internet.

3. Hardware Implementation
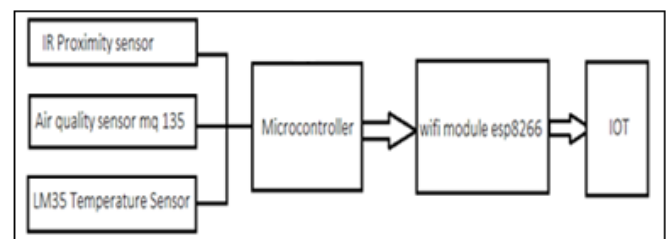
3.1 Block Diagram

Figure 1: Block diagram of System

The above shown is a block diagram of the system. It comprises of 3 sensors which are together capable of giving out 4 parameters by which the standard parameter of industry we are measuring. These are then interfaced to the microcontroller i.e. the Arduino, by which the values of the parameters are displayed using the serial monitor. We then have IOT implementation taking place with the help of ESP8266 which is then allowing us to upload the parameters which are displayed using webhost which is a platform of hostinger.

3.2 Selection of Components
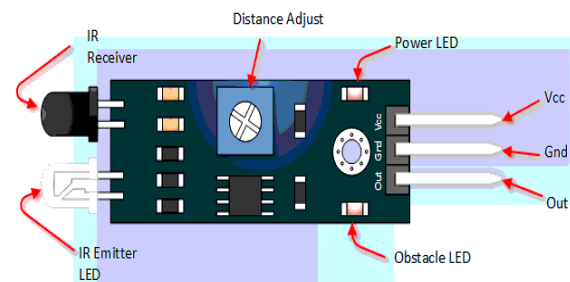### A. Infrared Module (IR)

Figure 2: Infrared Module

IR sensor used here is responsible for the detection of the goods and helps in counting of it i.e. the no of goods loaded. IR sensor work on the principal in which IR LED emits IR radiation and Photodiode sense that IR radiation. Photodiode resistance changes according to the amount of IR radiation falling on it, hence the voltage drop across it also changes and by using the voltage comparator [4](like LM358) we can sense the voltage change and generate the output accordingly. The placing of IR LED and Photodiode can be done in two ways: Direct and Indirect. In Direct incidence, IR LED and photodiode are kept in front of one another, so that IR radiation can directly falls on photodiode.

The IR module was used in the detection of the goods which are getting loaded in the industry. Besides we also come to know the number of the goods being loaded

B.DHT-22

Figure 3: DHT-22 (Temperature Sensor)

The DHT22 is a sensor for measuring both the temperature and humidity. It is a basic, low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed). It's fairly simple to use, but requires careful timing to grab data.

Every sensor of this model is temperature compensated and calibrated in accurate calibration chamber and the calibration-coefficient is saved in type of programme in OTP memory [6], when the sensor is detecting, it will cite coefficient from memory. Small size & low consumption & long transmission distance (20m) enable DHT22 to be suited in all kinds of harsh application occasions. Single-row packaged with four pins, making the connection very convenient.

C. MQ135

Figure 4: MQ135 (Gas Sensor)

MQ-135 Module sensor is used for the detection of the gases in the surrounding atmosphere. It has lower conductivity in clean air. When the target combustible gas exist, the sensors conductivity is higher along with the gas concentration rising.

Convert change of conductivity to correspond output signal of gas concentration[5]. MQ135 gas sensor has high sensitivity to Ammonia, Sulphide and Benzene steam, also sensitive to smoke and other harmful gases. It is with low cost and suitable for different applications such as harmful gases/smoke detection.

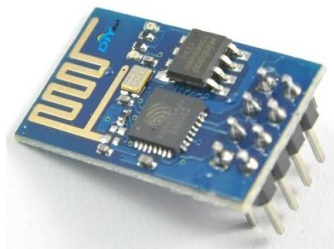## D. ESP8266 (Wi-Fi Module)

Figure 5: ESP8266 (Wi-Fi Module)

The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much Wi-Fi-ability as a Wi-Fi Shield offers (and that's just out of the box). The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices[3] through its GPIOs with minimal development up-front and minimal loading during runtime including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces, it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts.

E. Arduino (UNO)

Figure 6: Arduino (UNO) Board

It helps in the interfacing of all the components easily and also all the parameters of the industry are displayed in the serial monitor. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer[3], used to write and upload computer code to the physical

board. For programming the microcontrollers, the Arduino provides an integrated development environment (IDE) based on a programming language named Processing, which also supports the languages C and C++.

3.3 Software Implementation

The program is written in Arduino IDE (Integrated Development Environment) whose algorithm is as follows:
1. Start.
2. Initialise input pins for all sensors.
   a) D0=data pin (dht22)
   b) A1=data pin (MQ135)
   c) A3=output pin (IR sensor)
   d) A4=input (ESP8266)
3. Initialise the values of all sensors to zero.
4. Set baud rate of 115200 for ESP8266.
5. Read values from the sensors.
6. Display the values on serial monitor.
7. Convert the values in string.
8. Send the values on webpage.
9. Stop.

3.4 Advantages of System

1) A cost effective and ideal industrial system.
2) Convinient method for monitoring an entire industry which allows the person to access the system from anywhere.

3.5 Disadvantages of System

Hostinger provides a delay of 10s because of which not a precise variation in the parameters are sent to the person.
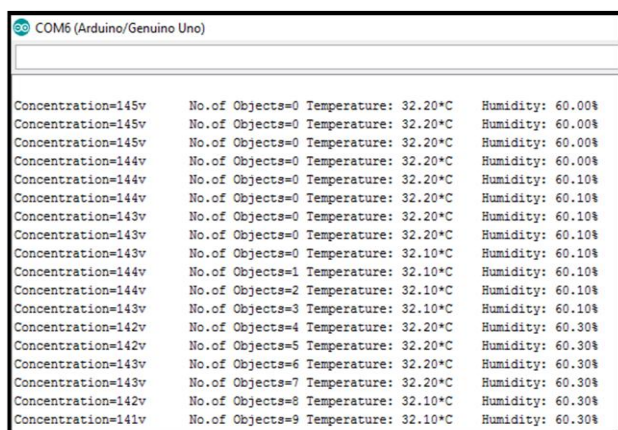
4. Results

Figure 7: Output of sensors on serial monitor

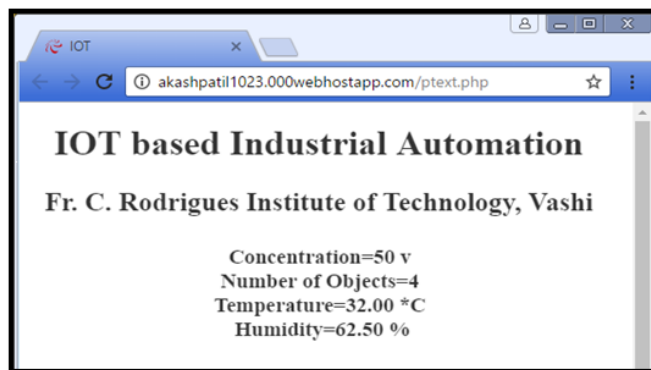Concentration, No. of objects, Temperature, Humidity procured by the sensor.

Figure 8: Sensor values displayed on the webpage

5. Summary and Conclusion

A. Summary
From the project that we have hereby made we can summarise the following points:
1) The parameters which we had taken were implemented using IOT at thingspeak.com with the help of ESP8266.
2) We have an IR module which helps us in detecting the goods which are loaded in the industry and also counting them.
3) We also have DHT-22 which helps us in determining the surrounding temperature as well as the humidity of the industry.
4) Last but not the least, we have MQ135 which helps in detecting the surrounding gases and the ppm values are displayed. These values help in knowing the presence of gases in the surrounding.

B. Conclusion
From the project that we have made we can conclude that our project "IOT Based Industrial Automation" covers all the necessary aspects required by an industrialist who wants to operate/monitor the entire industry conveniently and effectively. There is no factor to be changed as far as the safety of industry is concerned. This project would help a person to be notified about all the necessary actions that are important for him to be aware of and would not cause any harm to him in the industry or to the products which are manufactured.

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