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IOT based Industrial Module For SafteyMeasures

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Abstract—This Paper Represents The Design And Implementation Of Intelligent Systems In The Industries For Monitoring The Temperature, Gas And Humidity In The Environment Of Any Type Of Industrial Areas. This Project Can Be Implemented By Using The IOT Module And A Peripheral Interface Controller (PIC) Microcontroller. Here the wireless sensor devices will sense the area's environment and transmits that information to the cloud AMAZON WEB SERVICES (AWS) to store that information for further analysis and immediately sends an alert to the Industry for the purpose of protecting themselves from unexpected disaster. We can see that stored data in cloud from any place of the world.

Keywords—IOT, PIC, AWS.

I. Introduction

The Internet of Things is the network of things which are connected to a common network to a path to communicate with each other and exchange their data. The network path can be intra connected with either embedded software or any other sensors data. It is wherer the more and more data can be collected from the different sensing devices and send to the cloud for monitoring the data.

Nowadays, there is a growing demand of automation and intelligent systems so that it leaves us with less human intervention and smart decision making devices. With the growing demand, comes the growing competition which has forced the competitors to come out with more intelligent, efficient as well as user friendly models. This has made our lives easier from making our intelligent travel arrangements to our personal medical care. With a tap of your finger you can control your lights, with a single tap you can book your flight tickets, monitor traffic and weather and so on. It will refine our work flows, prioritizing tasks and projects based on on going assessments in real time of what is happening throughout our organization. The Internet of Things will maintain our appliances and vehicles, determining when they are next due for service, cleaning, or – in the case of our refrigerators –restocking (and making appropriate arrangements, such as repair appointments and grocery orders). It will enable our cars to communicate with other cars on the road as they self-drive us to and fro. It will regulate our lights, heat, AC, and other home appliances and devices, turning them on and off as we enter and exit rooms and as they "learn" our schedule. And that's not all.

In the present scenario is a immense growing of automations and intelligent systems , So that it leaves more amount of the data into the cloud from the systems. In the below table represents the how much amount of data can be generated by the intelligent systems.

Category	2013	2014	2015	2020
Automotive	96.0	189.6	372.3	3,511.1
Consumer	1,842.1	2,244.5	2.874.9	13,172.5
Generic Business	395.2	479.4	623.9	5,158.6
Vertical Business	698.7	836.5	1,009.4	3,164.4
Grand Total	3,032.0	3,750.0	4,880.6	25,006.6

Table.1: Internet of Things Units Installed Base by Category

Save money on energy use, while keeping your office or building comfortable. The cost of simply forgetting to turn off your classroom lights and electric appliances can really add up over time ,like this we can also take the safety measures in industries if anything goes wrong then this module priorly intimate to reduce the damage cost and loss of human power if thing go Controlling temperature and lighting based on time of day or occupancy can really reduce energy costs.

II. HARDWARE IMPLEMENTATION

[1]This chapter briefly explains about the Hardware Implementation of the project. It discusses the design and working of the design with the help of block diagram and circuit diagram and explanation of circuit diagram in detail. It explains the features, timer programming, serial communication, interrupts of PIC microcontroller. It also explains the various modules used in this project.

Project Design

The implementation of the project design can be divided in two parts.

- Hardware implementation

- Firmware implementation

Hardware implementation deals in drawing the schematic on the plane paper according to the application, testing the schematic design over the bread board using the various IC'S to find if the design meets the objective, carrying out the PCB layout of the schematic tested on breadboard, finally preparing the board and testing the design hardware.

The firmware part deals in programming the microcontroller so that it can control the operation of the IC's used in the implementation. In the present work, we have used the PROTEOUS design software for PCB circuit design, the MPLAB IDE software development tool to write and compile the source code each has been written in the c language.

The project design and principles are explained in this chapter using the block diagram and circuit diagram. The block diagram discusses about the required components of working condition is explained using circuit diagram and system writing diagram.

Block Diagram of the Project: The block diagram of the design is as shown in Fig. the transmitter consists of power supply unit, PIC microcontroller, Gas Sensor, Temperature Sensor, Humidity Sensor, IOT Module and MAX232.

The IOT Module can be inserted a SIM that SIM can transmits the analyzed data of the Gas Sensor, Temperature Sensor, Humidity Sensor data to the cloud environment, then we can check and access from any point of the world, as per the user requirement.

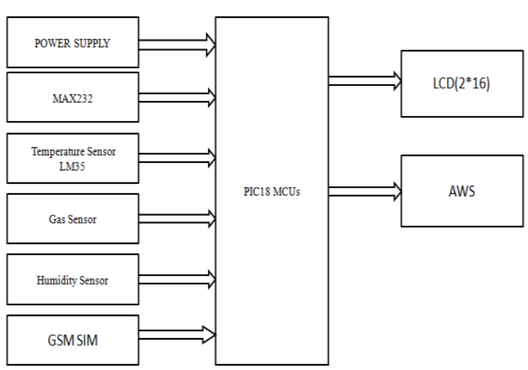

Fig 1: Block Diagram

In the broadest definition, a **sensor** is an electronic component, module, or subsystem whose purpose is to detect events or changes in its environment and send the information to other electronics, frequently a computer processor. A sensor is always used with other electronics, whether as simple as a light or as complex as a computer.

Sensors are used in everyday objects such as touch-sensitive elevator buttons (tactile sensor) and lamps which dim or brighten by touching the base, besides innumerable applications of which most people are never aware. With advances in micro machinery and easy-to-use microcontroller platforms, the uses of sensors have expanded beyond the traditional fields of temperature, pressure or flow measurement, for example into MARG sensors. Moreover, analog sensors such as potentiometers and force-sensing resistors are still widely used. Applications include manufacturing and machinery, airplanes and aerospace, cars, medicine, robotics and many other aspects of our day-to-day life.

A good sensor obeys the following rules:

- It is sensitive to the measured property
- It is insensitive to any other property likely to be encountered in its application, and
- It does not influence the measured property.

TEMPERATURE SENSOR- **[2]** The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 device does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full −55°C to 150°C temperature range.

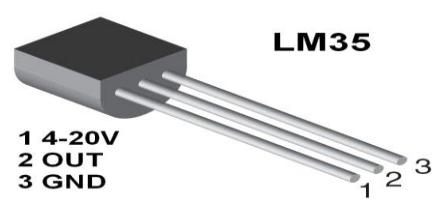

Fig 1.1 Temperature Sensor

GAS SENSOR: MQ-2 Semiconductor Sensor for Combustible Gas Sensitive material of MQ-2 gas sensor is SnO_2, which with lower conductivity in clean air. When the target combustible gas exist, The sensor's conductivity is more higher along with the gas concentration rising. Please use simple electro circuit, Convert change of conductivity to correspond output signal of gas concentration.

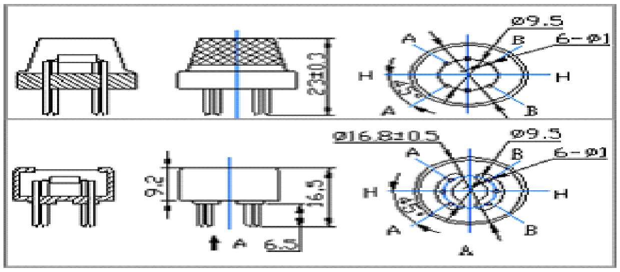

Fig 1.2 Gas Sensor

HUMIDITY SENSOR- [3]DHT22 capacitive humidity sensing digital temperature and humidity module is one that contains the compound has been calibrated digital signal output of the temperature and humidity sensors. Application of a dedicated digital modules collection technology and the temperature and humidity sensing technology, to ensure that the product has high reliability and excellent long-term stability.\

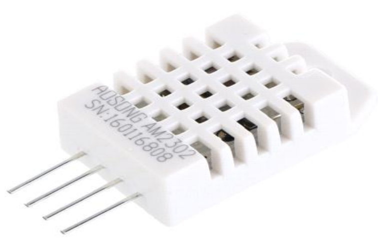

Fig 1.3 Humidity Sensor

III. FIRMWARE IMPLEMENTATION

[4]Microchip has a large suite of software and hardware development tools integrated within one software package called MPLAB Integrated Development Environment (IDE). MPLAB IDE is a free, integrated toolset for the development of embedded applications on Microchip's PIC and ds PIC microcontrollers. It is called an Integrated Development Environment, or IDE, because it provides a single integrated environment to develop code for embedded microcontrollers.

MPLAB IDE runs as a 32-bit application on MS Windows, is easy to use and includes a host of free software components for fast application development and super-charged debugging. MPLAB IDE also serves as a single, unified graphical user interface for additional Microchip and third party software and hardware development tools. Moving between tools is a snap, and upgrading from the free software simulator to hardware debug and programming tools is done in a flash because MPLAB IDE has the same user interface for all tools.

IV. PROTEOUS DESIGN OF HARDWARE

[5] The first version of what is now the Proteus Design Suite was called PC-B and was written by the company chairman, John Jameson, for **DOS** in 1988. Schematic Capture support followed in 1990, with a port to the Windows environment shortly thereafter. Mixed mode **SPICE Simulation** was first integrated into Proteus in 1996 and microcontroller simulation then arrived in Proteus in 1998. Shape based auto routing was added in 2002 and 2006 saw another major product update with 3D Board Visualization. More recently, a dedicated IDE for simulation was added in 2011 and MCAD import/export was included in 2015. Feature led product releases are typically biannual, while maintenance based service packs are released as required.

It is a software suite containing **schematic**, **simulation** as well as PCB designing.

- **ISIS** is the software used to draw schematics and simulate the circuits in real time. The simulation allows human access during run time, thus providing real time simulation.

- **ARES** is used for PCB designing. It has feature of viewing output in 3D view of the designed PCB along with components.

- The designer can also develop 2D drawings for the product.

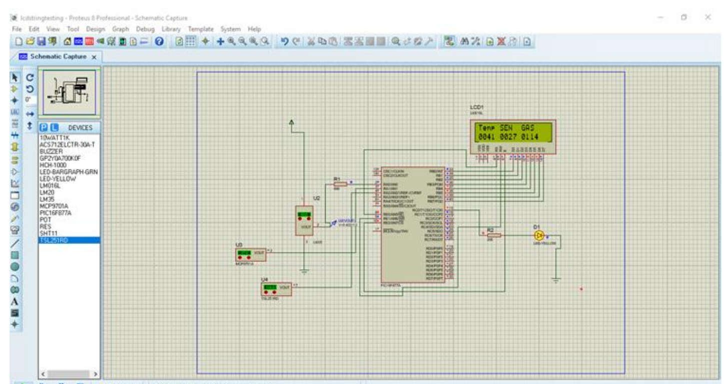

Fig 2 Proteus Design

V. REAL TIME IMPLEMENTATION OF THE PROJECT

In this below figure indicates the hardware implementation of the project, In this hardware we can indentifies the sensors, PIC microcontroller and IOT module which are interconnected together to become a complete IOT project.

CLOUD CONNECTIVITY

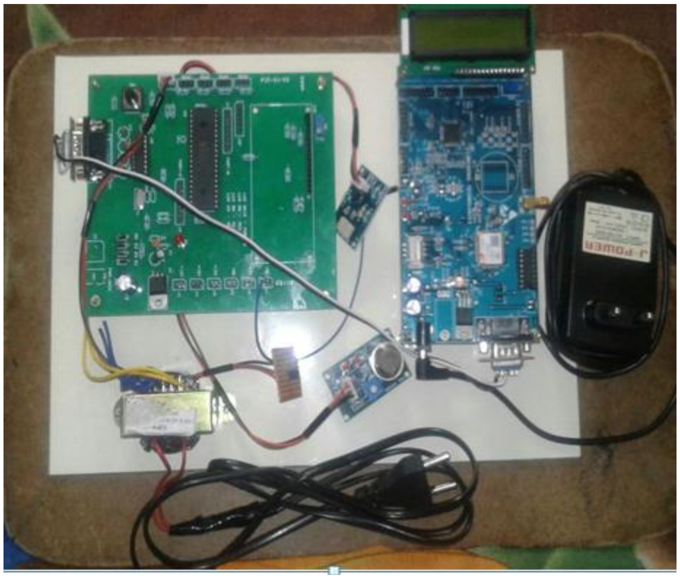

Fig 3 Cloud Connectivity with IOT Devices

AWS IOT

AWS IOT [6] provides secure, bi-directional communication between Internet-connected things (such as sensors, actuators, embedded devices, or smart appliances) and the AWS cloud. This enables you to collect telemetry data from multiple devices and store and analyze the data. You can also create applications that enable your users to control these devices from their phones or tablets.

AWS IOT Components:

AWS IOT consists of the following components:

Device gateway

Enables devices to securely and efficiently communicate with AWS IOT.

Message broker

Provides a secure mechanism for things and AWS IOT applications to publish and receive messages from each other. You can use either the MQTT protocol directly or MQTT over Web Socket to publish and subscribe. You can use the HTTP REST interface to publish.

Rules Engine

Provides message processing and integration with other AWS services. You can use a SQL-based language to select data from message payloads, process and send the data to other services, such as Amazon S3, Amazon DynamoDB, and AWS Lambda. You can also use the message broker to republish messages to other subscribers.

Security and Identity service

Provides shared responsibility for security in the AWS cloud. Your things must keep their credentials safe in order to securely send data to the message broker. The message broker and rules engine use AWS security features to send data securely to devices or other AWS services.

Thing registry

Some times referred to as the *device registry*. Organizes the resources associated with each thing. You register your things and associate up to three custom attributes with each thing. You can also associate certificates and MQTT client IDs with each thing to improve your ability to manage and troubleshoot your things.

Thing Shadow

Some times referred to as a *device shadow*. A JSON document used to store and retrieve current state information for a thing (device, app, and so on).

Thing Shadows service

Provides persistent representations of your things in the AWS cloud. You can publish updated state information to a thing shadow, and your thing can synchronize its state when it connects. Your things can also publish their current state to a thing shadow for use by applications or devices.

VI. MONITORING SENSORS DATA IN AWS IOT CLOUD:

Website Link:

http://www.IOTclouddata.com/project/378/IOT16view.php

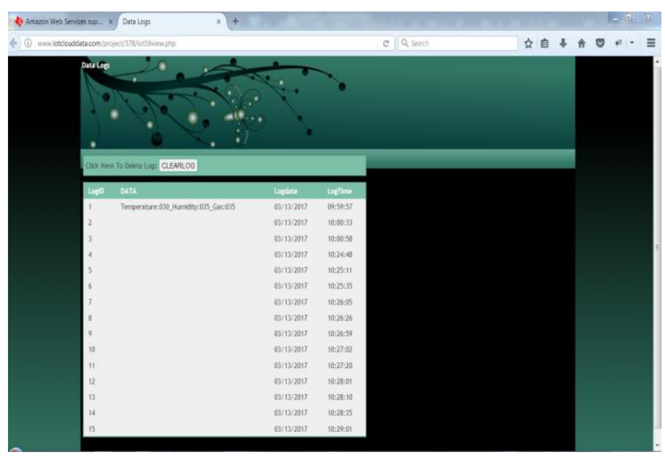

Fig 4 Sample Output

VII. CONCLUSION

Internet of Things (IOT) is somehow a leading path to the smart world with ubiquitous computing and networking to ease different tasks around users and provide other tasks, such as easy monitoring of different phenomena surrounding us. In the IOT, environmental and items from daily life, termed “things”, “objects”, or “machines” are enhanced with computing and communication technologies. They join the communication framework, meeting a variety of services based on person-to-person, person-to-machine, machine-to-person and machine-to-machine interactions using wired and wireless communication. These connected machines or objects/things will be the new Internet or network users and will generate data traffic of the emerging IOT.

VIII. FUTURE SCOPE

The proposed system performs well with the needs which are mentioned. There is a scope for improvement of this system environment which will be controlled automatically based on alerts comes from the AWS monitoring system. For example, when the humidity level exceeds the maximum value, the coolers will be switch on automatically to reduce the humidity level.

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