Abstract-The main objective behind this paper is to propose a system which provides a safe environment for people in the industry using IoT and a locomotive robotic rover. Sensors are made to move around industry by deploying it in the robotic rover having the capability of autonomously move around the industry. The sensors placed in the rover will sense the parameters and telemetry to a static IP address. When the temperature breaches the threshold mark or if the vibration from machineries intensity level exceeds critical value a warning message will be sent through the IP address. The IP address also contains the record of the variation in the parameters with time. In this paper we are introducing the Internet of Things (IoT) transmitter and receiver technology as internet is spread across the world instead of using other means of communication.

Keywords: Internet of things, robot, IP address transmission, microcontroller.

I. INTRODUCTION

With today’s development in technology collateral damage has reduced to a greater extent. Based on machine-to-machine (M2M) concept making the sensor mobile around the industry will decrease the probability of accidents and the cost for industrial safety measurement will be reduced providing greater accuracy in industrial parameter measurement. Additional attention is also paid, how to make the rover more autonomous, with a view of eventually allowing them to operate under any situation. The 21st century sees robotics in everyday use. The automotive industry is full of robots that complete specific tasks often, which may be difficult for humans to accomplish. The idea is to control the robots through Internet of Things (IoT) concept. Through this concept a robotic rover can be controlled from anywhere across the globe. Integration with the Internet implies that devices will use an IP address as a unique identifier. Simultaneously a IP camera will capture the real time happening in the industry and relay streaming through the same IP address. The Dynamic Host Configuration Protocol (DHCP) address reservation will add security to the network. Aim of this system is to:

1. To control the industrial accidents.
2. To reduce the cost of sensors deployed to measure the various industrial parameters.

II. HARDWARE DESIGN

The hardware unit differentiated into two parts one of the unit for rover manipulation which consists of ATMEGA328P microcontroller, HC-SR 04 module, L293d (motor driver IC) and servo motor. The other unit is IoT part which consists of network router and a Ethernet shield interface for microcontroller, through Ethernet interface microcontroller gains bidirectional internet access. Multiple sensors are integrated in the rover who can sense various industrial parameters and these values are uploaded in the dynamic IP address which can be viewed in the browser. When the sensor value exceeds a critical value, the microcontroller will trigger the alarm. The sensors are used to determine various parameters such as radiation, vibration, temperature, methane gas emission etc. The sensors are not restricted in number and can vary depending on the industry.

III. BLOCK DIAGRAM

Any electronic device which has a feature to access internet can be used as a controller here. Even though the device has an internet access, we need a web browser for ease of access. A web browser (commonly referred to as a browser) is a software application for retrieving, presenting, and traversing information resources on the World Wide Web. An information resource is identified by
a Uniform Resource Identifier (URI/URL). Here, we send all the necessary details through the URL. We have an Ethernet shield interfaced with the microcontroller which provides us a valid IP address (Static). This IP address is used in the browser to access the microcontroller. In this model we have assigned different functions for each pathname. In reference to the command in the URL box, the microcontroller performs the assigned operation. The Ethernet shield is connected with the microcontroller to which all other sensors are connected. Hence we can get the parameters of all the sensors and make it to get uploaded at the internet. Then the web browser routes to the exact location where the IP address present. Thus the microcontroller accesses the internet through the Ethernet shield. Various sensors can be interfaced with the microcontroller, the output of all the microcontrollers can be sent via the internet. The values of the sensors are encrypted and sent via the router. These parameters are displayed in the respective electronic device, from where the IP address is accessed. The microcontroller uses the internet for bidirectional communication, where it receives the instructions from the browser through the internet. Likewise, the result can be sent.

**A. ETHERNET SHIELD**

The Microcontroller Ethernet Shield allows an Arduino board to connect to the internet. It is based on the Wiznet W5100 ethernet chip (datasheet). The Wiznet W5100 provides a network (IP) stack capable of both TCP and UDP. It supports up to four simultaneous socket connections. Use the Ethernet library to write sketches which connect to the internet using the shield. The Ethernet shield connects to an Arduino board using long wire-wrap headers which extend through the shield. This keeps the pin layout intact and allows another shield to be stacked on top. The Ethernet Shield has a standard RJ-45 connection, with an integrated line transformer and Power over Ethernet enabled. There is an on-board micro-SD card slot, which can be used to store files for serving over the network. The on-board micro SD card reader is accessible through the SD Library. When working with this library, SS is on Pin 4. The original revision of the shield contained a full-size SD card slot; this is not supported. The shield also includes a reset controller, to ensure that the W5100 Ethernet module is properly reset on power-up. Previous revisions of the shield were not compatible with the Mega and need to be manually reset after power-up.

**B. LM-35 TEMPERATURE SENSOR**

The LM-35 is a precision integrated-circuit temperature device with an output voltage linearly proportional to the Centigrade temperature. The temperature levels can be measured and controlled by the microcontroller.

**C. HC-SR04 ULTRASONIC SENSOR**

The HC-SR04 ultrasonic sensor uses sonar to determine distance to an object like bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package. From 2cm to 400 cm or 1” to 13 feet. It operation is not affected by sunlight or black material like Sharp rangefinders are (although acoustically soft materials like cloth can be difficult to detect). It comes complete with ultrasonic transmitter and receiver module.
HC-SR04 Ultrasonic sensor

D. ATMEGA 328P MICROCONTROLLER ARDUINO

The Atmel 8-bit AVR RISC-based microcontroller has 32KB ISP flash memory with read-while-write capabilities, 1 KB EEPROM, 2 KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter, programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughputs approaching 1 MIPS. Arduino is an open-source prototyping platform based on easy-to-use hardware and software which uses Atmega 328p microcontroller.

IV. SOFTWARE DESCRIPTION

1. ATMEGA ARDUINO IDE- To load the program into microcontroller.
2. IDE serial monitor – To view the internal microcontroller execution.

V. WORKING

The various industrial parameter levels are measured by the sensors and given to the microcontroller for processing. The Microcontroller will process to digital values and upload to the reserved static IP address. These values can be viewed in browser by typing the same IP address in the address bar. The output is visualized and if the sensor value exceeds certain threshold the alarm is triggered. The sensor moves around the industry by placing in the robotic rover which has the ability to move autonomous and also receive command from the user regarding the locomotion of the rover, this will reduce the cost of surveillance and probability of occurring industrial accidents. wireless shield incorporates a 2.4 GHz radio processor, full TCP/IP stack, real-time clock and supports FTP client, DHCP, DNS and HTML client protocol. Secure Wi-Fi authentication with WEP, WPA-PSK and WPA2-PSK and configuration over ASCII codes via UART interface.

VI. SIMULATION RESULT

Here the value of the temperature sensor is displayed with the IP address 192.168.0.108/$t in the browser. The second output in which the graphical human-process interface will provide a more enjoyable user experience to the manufacturing processes by means of PCs, smart phones and tablets.

Present Industry Temperature

Output in browser

In this system there is also an option to control the movement of the robot through a dedicated IP address, say 192.168.0.108/$f. This IP address will reach the microcontroller through Ethernet shield and moves robot
forward. The received command is shown in microcontroller’s serial monitor.

Similarly, all other movement of the robot can also be controlled by the commands assigned to the microcontroller.

VII. CONCLUSION

This system provides safe environment for all the workers in industrial area and also alerts the people by providing necessary technical information about the present industrial condition. Sensors help in maintaining safe and healthy environment in the industry by continuous monitoring the industrial environment. The future of sensor is determined to a great extent by new detection principles, new or enhanced sensors, sophisticated evaluation algorithms and latest communication technologies. Equally, new demands arising from unconventional applications have stimulated new solutions, combining proven technologies in novel and innovative ways.

VIII. SCOPE AND FUTURE WORK

Recapitulating, the smart access control system is an efficient way in which existing problems faced by the industry can be overcome. Also, by proper selection of microcontrollers used, energy efficiency can be obtained.

In the recent years, products based on IoT(Internet of Things) like Google Glass, have been in the forefront of technological innovations and hence we can definitely hope that the best is yet to come. We can only imagine the manner in which the products based on the internet of things will revolutionize the world. The day is imminent when devices will be smarter and smart systems will be present.

REFERENCES


