

IOT BASED SMART SAFETY HELMET

Pratibha Joshi¹, Sakshi Itagi², Khan Zobia Samin³, Rohit Desai⁴,

Priyadarshan Nadar⁵



1joshi.pratibha@siesgst.ac.in
2sakshi.itagi@siesgst.ac.in,
3zobia.khan216@siesgst.ac.in,
4rohit.desai216@siesgst.ac.in,
5nadar.priyadarshan217@siesgst.ac.in

¹Professor, Dept. of Electronics and Telecommunication Engineering,
SIES Graduate School of Technology, NaviMumbai, India.

^{2,3,4,5}Students, Dept. of Electronics and Telecommunication Engineering,
SIES Graduate School of Technology, NaviMumbai, India.

ABSTRACT

The proposed application aims to prevent accidents in various industries. It is designed to provide Intelligent Helmet for workers and electrical engineers with safety monitoring. It is a type of protective headgear used to reduce the impact of various accidents which could lead to deaths or lifelong injuries which will ruin the workers life in the long run. The project is implemented by using various sensors which would sense and monitor various parameters like temperature and humidity, vibration and gaseous substances. If the measured values go beyond a certain threshold, then it would notify the higher authorities immediately to take the necessary action.

Keywords— ESP8266, IOT, IFTTT.

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I. INTRODUCTION

According to a survey, there were 487 million workers in our country in 2012. The laborer's scene is already in a big demise due to most reasons like illiteracy, low wages, job and life insecurity etc. Around 5,147 workers lose their lives due to various injuries and fatalities. In order to overcome the various difficulties faced by these workers, the project mainly aims to prevent various accidents that occur in various industries and to also reduce the impact that is caused by these accidents. They are the only bread earners in so it affects them as well as their whole family, so it is very important to protect them. So, instead of just making them wear simple headgears, we are incorporating some sensors in it so that once various parameters exceed the threshold value, the concerned authorities are informed to take the preventive measures as soon as possible.

II. Aims and Objectives

Many simple headgears are available in the market for the workers but most of them simply protect the head which are not enough to help them from issues they face. The project aims to fulfill the following objectives:

1. It will ensure wearing of helmet.
2. It will enable safety monitoring of the environment.
3. It will provide wireless network security.
4. It will prevent various kinds of injuries and fatalities.

III. Problem Statement

The workers face a lot of difficulties like they get injured badly and there is no help provided to them and which affects them in the long term and sometimes they even lose their lives. The following system is being designed to solve their problems with the help of various sensors which will measure the various parameters continuously to prevent if any sudden or un-anticipated event.

IV. LITERATURE SURVEY

Following is the research done based on the project requirements in order to understand the concepts of the project more clearly. According to our observation there were various other authors who proposed their systems and various other technologies.

“A Smart and Secured Helmet for Mining Workers” is proposed in [1]. This system real time monitoring of harmful gasses is done. And if anything happens to the worker his location can be traced through RFID technology and IR sensors will be used to detect/monitor if they are wearing the helmet or not. This system uses Zigbee technology for transmission of the data to the base station. But this system fails due to the range of the Zigbee and the Microcontroller used.

“Zigbee Based Intelligent Helmet for Coal Miners Safety Purpose” is proposed in [2]. This system real time monitoring of harmful gasses, temperature and humidity detected. And the data is transmitted through Zigbee. And added feature is it has a buzzer and the board used is Arduino. This system fails because due to the loud decibels of buzzer the vibration gets created and the near by are can fall a part and create more destruction.

“An Intelligent Helmet for Miners with Air Quality and Destructive Event Detection Using Zigbee” is proposed in [3]. This system is like the system proposed in [2]. However, the range of RF technology is used for long distance monitoring. This system fails due to its complex circuitry and it does not fit into the basic helmet.

“IOT Based Smart Helmet for Unsafe Events Detection for Mining Industry” is proposed in [4]. In this system the monitoring is made little simpler by using Arduino on the helmet as transmitter section and for the receiver section Raspberry pi is used along with the IOT and with the mailing facility. The only disadvantage of this system is its cost due to the use of two different boards and again Zigbee is used for the transmission and reception of the system.

Looking at all these proposals we devised our project overcoming all these drawbacks. The main aim of the project is sense various parameters in the workplace in order to prevent various unfortunate incidents which usually result in damage or injury. The sensed data would be saved on cloud which will then be transmitted to the concerned authorities. They will eventually alert the workers about the incident which is about to occur to prevent fatalities. The problem that we are facing in its implementation is communicating with the workers due to various factors. Here we will be sensing the various parameters like vibration caused due to many factors, emission of harmful gases, temperature and humidity. If any of these values exceed a certain threshold, then the sensed data would be sent to the authorities with the help of email.

V. PROPOSED SYSTEM

The project mainly consists of two parts, where one is the transmitter section whereas the other is the receiver section. NodeMCU is a low cost, WIFI module that helps us to connect to the internet.

TRANSMITTER:

We have interfaced various sensors like Gas sensor, vibration sensor, IR sensor, and Temperature and humidity sensor at the transmitter side. The Gas sensor will sense if any harmful gases are released out to avoid various respiratory diseases. The vibration sensor will sense if there is a chance of rocks falling inside their work place so as to avoid any type of injuries. The IR sensor would tell whether the person is wearing a helmet or not. Finally, the temperature and humidity sensor would monitor the surrounding temperature and the humidity levels as it becomes difficult to work in an environment with extreme temperature.

RECEIVER:

At the receiver section, we have interfaced the ultrasonic sensor which is used to compute the distances of access area obstructed by any hurdle. It is mainly used to ensure that the entry and exit points are free from any hurdles. We have not interfaced this sensor at the transmitter side as NodeMCU has only one analog pin. Now all the sensed data is saved at the cloud and is then sent through email in case of emergency. The e-mail process is done via a different platform known as If This Then That (IFTTT).

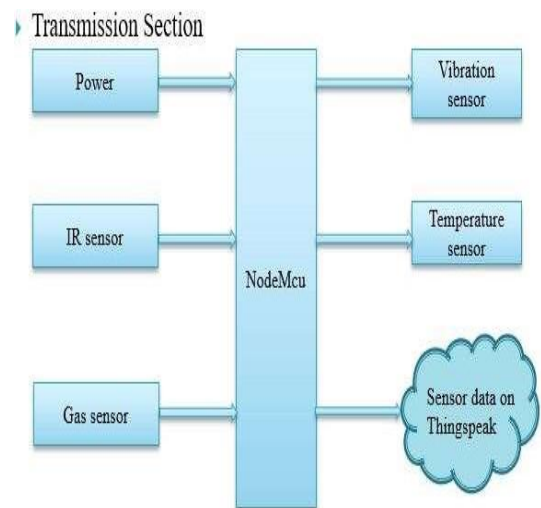


fig 1

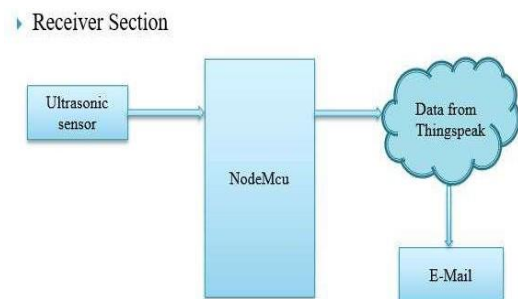


fig 2

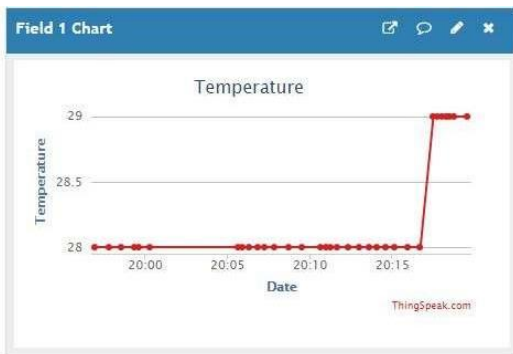
VI. METHODOLOGY

The methodology used is Object Oriented Methodology. Here firstly we have to interface the above mentioned sensors at the first NodeMCU. Then we have to interface the ultrasonic sensor with the second NodeMCU. Then the sensed data is transferred on Thingspeak. The transmission of data takes place via inbuilt NodeMCU WIFI. We have replaced the Zigbee module as its coverage is very less

VII.RESULTS

After interfacing the transmitter and receiver section, we observed the necessary output on the Thing Speak platform, and the E-mail was sent via IFTTT platform. We have build a proto-type of the project it can be implemented with more number of helmets which will be easier to monitor different workers at the same time.

The results obtained are given below.



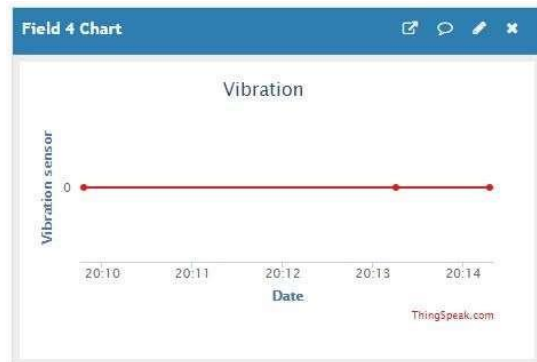
Result No.1



Result No.2



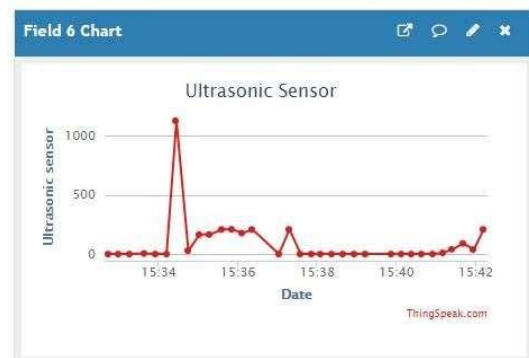
Result No.3



Result No.4



Result No.5



Result No.6

IFTTT Webhooks via IFTTT <action@ifttt.com> to me
What: Helmet_Emergency
When: January 25, 2020 at 02:33PM
Workers are in danger. HELP !

If Maker Event "Helmet_Emergency", then Send me an email at zobiasaminkhan@gmail.com

Result No.7



Figno.3 HardwarePrototype1



Figno.4 HardwarePrototype2



Figno.5 HardwarePrototype3

VIII. CONCLUSION

A prototype of smart safety helmet has been designed to address various problems faced by the workers. It is an all-purpose helmet which can be used in different working conditions to prevent any sudden and unfortunate events with the help of various sensors and transmitting the various sensed data through cloud via email services. It would alert the concerned authorities in case of an emergency to act as soon as possible. The proposed project can do wonders and brings significant changes in the workers' life. Even the most basic thing like helmet can bring life-changing impacts by increasing one's life span and providing the necessary safety.

The only limitation is when too many products are in use the repetition of program and channel increases which can be vast to monitor.

REFERENCES

[1] "A SMART AND SECURED HELMET FOR MINING WORKERS" by Bolla Sravani and K.RamBabu. <https://ijartet.com/2860/v4i3/journal>

[2] "Zigbee Based Intelligent Helmet for Coal and Miners Safety" by K.Harshita, K.Sreeja, N.Manusha, E.Harika and P.V.KrishnaRao. <http://ijitech.org/uploads/561243IJIT16978-74.pdf>

[3] "An Intelligent Helmet for Miners with Air Quality and Destructive Event Detection using Zigbee" by Dr. B. Paulchamy, Dr. C. Natarajan, A. Abdul Wahith, P. V. Madhu Sharan and R. Hari Vignesh. <https://pdfs.semanticscholar.org/9e35/87c8e50e467ef12f463c86d9ce0622eeeba2.pdf>

[4] "IOT based Smart Helmet for Unsafe Event Detection for Mining Industry" by M. Naveen raj, P. Ashwin Kumar, R. Vignesh, K.Iniyan and M. Sri KrishnaPrasath. <https://acadpubl.eu/jsi/2018-118-20/articles/20a/70.pdf>