

Iot Mining Tracking and Worker Safety Helmet

B.Yakub¹, Epuri Deepthi², Vivek Jain³, S.Vikram Singh⁴, R.Ravinder Singh⁵

^{1,2}Assistant Professor Electronics and communication, Hyderabad Institute of Technology and Management, Hyderabad 501401, Telangana, India

^{2,3,4}UG student Electronics and communication Engineering, Hyderabad Institute of Technology and Management, Hyderabad 501401, Telangana, India

Email:yakub.ece@hitam.org¹, epurideepthi.406@gmail.com², vivek.jain96@gmail.com³, saravendra.singh225@gmail.com⁴, ravinderkhamanth@gmail.com⁵

Abstract : Mining is major requirement to the creation of goods, infrastructure and services which helps the quality, secure and protection of their lives. Working under the earth is much danger for human health and also for life. Frequently the underground environment is much dangerous as lot of earth quakes and tsunamis occur which is very danger to the life. The mines that are deeper are more n more dangerous when ongoing job for mining employees. So here we propose a mining tracking system as well as safety system for the mining industry using microcontroller-based circuit on the worker helmet. There is location-based miners environment mapping using smart helmet. Moreover, each worker helmet circuit is integrated with a panic/emergency button. This button when pressed shows an emergency sign over the IOT web interface about the worker emergency. This can be used for any emergencies like – toxic gas inhalation, cave ins, physical injury etc. Thus, the system ensures mining worker safety using IOT.

Keywords – Mining Tracking, Smart helmet, IOT Interface.

1. INTRODUCTION

The idea of this project is to give information about the mishap in the underground mines to the ground team which monitors all the activity, so we chose IoT technology to give the information by the means of webserver. We are using Arduino ESP 8266 microcontroller as the heart of the project. Showing the stats alone can't help the ground team to locate the miner in case of any accident. So, we included GPS location in the website which we are displaying so that the help team will have perfect information. About where and when the accident may occur. For this we use GPS module to extract the location of the accident, the GPS data will contain the latitude and longitude values using which we can find the accurate position of the accident place. To run the GPS, we use Arduino ESP 8266 board which has Tensilica L106 32-bit RISC processor. The Arduino is a very user-friendly device which can be easily interfaced with any sensors or modules and is very compact in size. Now we are clear that the Arduino will send the alert the team using the IOT based website by keeping the GPS location on the screen which is obtained from the GPS module. But when should all this be done? When accident occurs, how will the Arduino detect the accident? We use a panic button which when pressed will alert the ground team and let them know that they are in need of help.

Keeping the extreme conditions of mine in mind we have also added temperature, humidity, air quality sensor and infrared sensor. Also, there is buzzer which will help indicate any extreme conditions to the miner thereby helping him take further steps.

IOT mining helmet is a very needed and very helpful for the underground miners, as well as for few other purposes. It can also be modified as biking helmet. This helmet can save many lives. There around 700 deaths in the past year due to the accidents in mines, this could be solved by using this smart IOT helmet.



Fig 1.1 Fire due to harmful gases leak in coal mine

2. METHODOLOGY

The Project Starts With The Need Of The Employees Going To Work Underground mining for that the project consists of Technical Process Of Microprocessor Unit And Also Characteristics Operations Of Microprocessor And Applications Of Microprocessor Industry Point Continuation To That We need to Establish The Hardware parts and Software need to install to complete the project Which Are Known As Esp 8266, Wi-Fi Key Features, Esp 8266 Pin Description, External Flash, Ir Sensor, Radiation Thermometers Gas Analysers (Mq 9), Temperature/Humidity Sensor (Dht 11), Communications Process: - Serial Interface (Single Wire Two Way), Gps Sensor (Neo 6m), Buzzer, Software Part We Use Python 3.6, Html & Css, Embedded C, Ajax, C++, Interfacing With Nodemcu, Setting Up Esp 8266 Node Mcu, Installation Of The Required Software, Installing Arduino Board In Arduino Ide, Installing Various Sensor Libraries, We Need The Following Libraries To Make Nodemcu Work With All The Sensors: Adafruit Unified Sensor by Adafruit, CMMC Wifi Connector by Nat Weerawan, DHT sensor library by Adafruit, IOTtweet by Isaranu Janthong, Adafruit BMP085 Library by Adafruit, Adafruit BMP085 Unified by

Adafruit. Adafruit BMP183 Library by AdafruitTinGPSplus library for Neo6M.

3. RESULT AND DISCUSSION

In result we have taken some tests practically to know the exact values of sensors , temperatures , air quality and humidity by that we can track the exact position and the status of person working in the mining field .

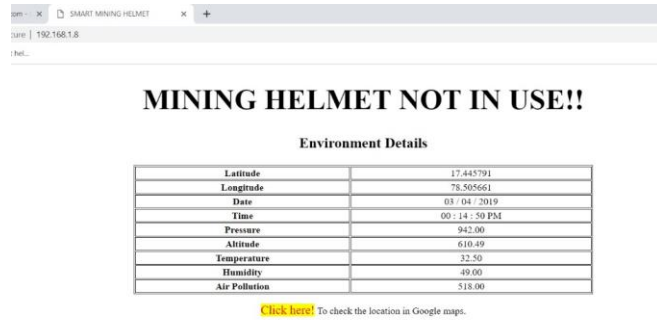


Fig 3.1 Helmet not in use

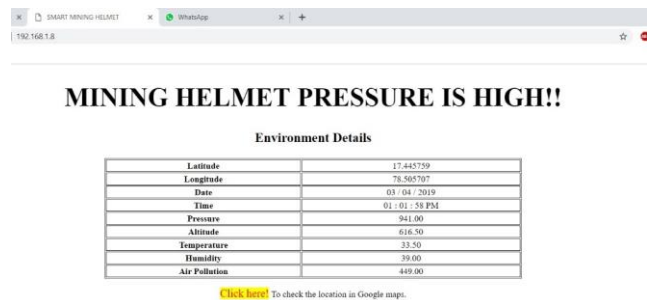


Fig 3.2 Pressure is high

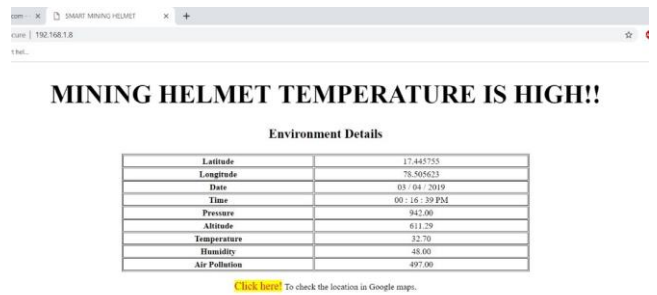


Fig 3.3 Temperature is high

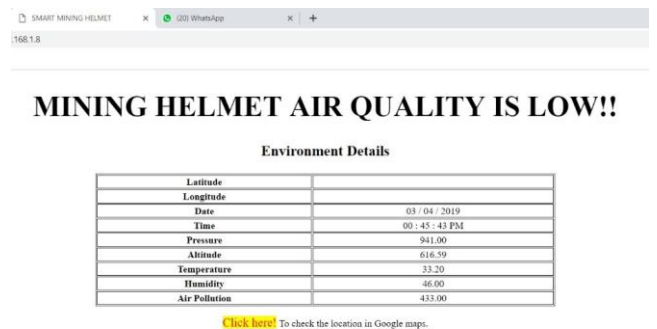


Fig 3.4 Air quality is low

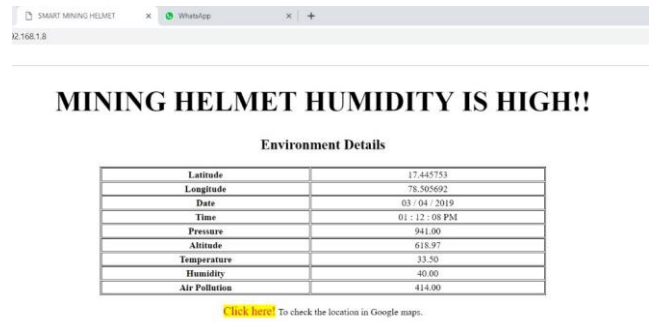


Fig 3.5 Humidity is high

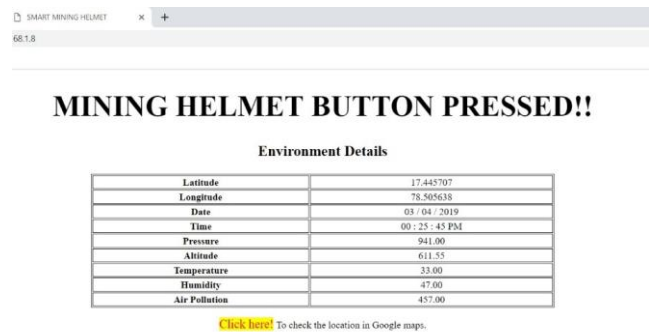


Fig 3.6 Button is pressed

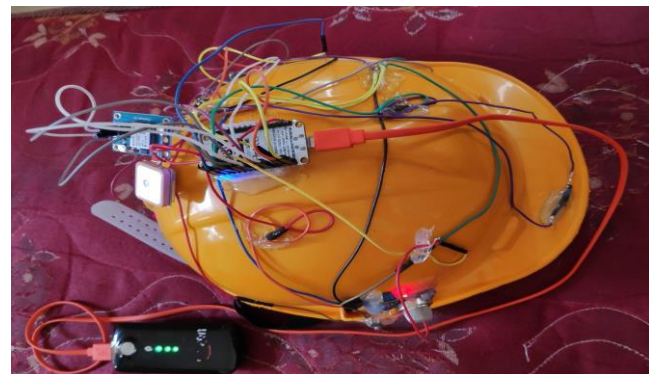


Fig 3.7 Complete setup top view

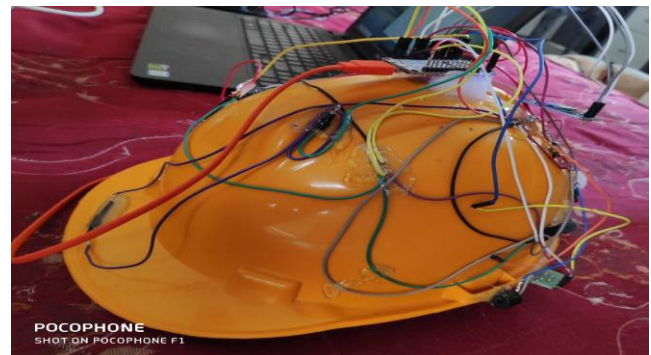


Fig 3.8 Complete setup side view

4. CONCLUSION:

We have developed a smart helmet to help workers to get rid of hazardous events in mining such as humidity and temperature condition and existence of combustible gases. Significance of each block has been resonated out and placed carefully, thus contributing to the best working of the unit. Heart of the system is NodeMCU which controls and monitors these events using IOT. This system is displaying the parameters on the base station PC and

alerting miner, from base station higher authority can monitor everything and provides rescue operation for the miner. Alarm triggers when sensor values cross the threshold level. As we are storing the values of the parameters like temperature, humidity in the PC, the stored values can be used to detect the hazards before the lost happens. As we are giving the information to the personnel regarding the measures to be taken in case of a hazard, it will be useful for them to save their life before any one comes and help them to come out of the mine. It also provides a technique for tracking the position of the worker which enables the rescue team to provide immediate help in adverse conditions. Hence the system is reliable with simple and easily available components, making it light weight.

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FUTURE SCOPE :

In order to confirm that the system works according to the requirements specified, it was broadly tested. A couple of attributes of the system can be enhanced. To increase more human interference and to enhance the signal range and signal strength an additional antenna can be added. To allow faster sensor data processing speed can be enhanced. The infrared sensor can be tweaked to work just inside the safety helmet by not provoking due to internal reflections.

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