Mine Safety Alerting System Using IOT With GSM

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Abstract- With coal mine industry growing in continuous depth there are large number of exploiting areas ,which have some blind spots there, these blind spots might be dangerous. So special precaution should be taken to reduce all of this inconvenience. Miners who work at higher altitude must handle extreme condition which might be related to the climate or danger from the mine in form of hazards. With medical guidance all of these problems can be supervised. So there are some special system whose only purpose is to stay within a device or be encapsulated inside it, now this system ca control that device in a way it is programmed such system is called embedded system. The combination of Hardware and Software with some components which show different types of mechanical tasks are embedded system.The physiological variables of miners at high altitudes are monitored with wireless communication, safety monitoring.

I. INTRODUCTION

The safety of the coal industry is still in major lows. Where disasters tend to occur more frequently. So, the safety of the coal miner has become one of the most important priority, so that life and resources can be saved. Due of variety of work condition and changes in the environment, more focus is generated on them by monitoring them.Due to the presence of various gases such as methane, carbon monoxide, variable temperature and minimum oxygen. So all these parameter should properly monitored with all the installed system. Themine requires a simple sensor network protocols, self-organized, self-healing system. Measurement of Gas concentration is really important. During coal mine production it is necessary to preventive measures against these gases, they might lead to gas disaster. If there are safety measures or protocols coal production would be more secured. The gas and humidity sensor are used to monitor the current working environment for the coal mine workers. There are various types of sensors that are present to monitor the condition of

These health workers all these data are sensed from the sensors and then control is given to the micro controller. All these data will be transferred by using IOT and these levels will the be monitored. If there is an differential in these levels a buzzer is used which will make an alarm. And for the safety of the coal mine GSM module is also integrated to their

system in which the emergency numbers will be fed already, it sends a text message or a call to those numbers in order to alert the paramedic teams. There is the sensors that measures the heart rate , humidity and temperature which are all present in the jacket of the worker.

II. LITERATURE SURVEY

1. This paper depends on the advancement of an IEEE 802.15.4 good remote sensor arrange (WSN) hub for mining and common wellbeing conventions.

2. The sensor hub will gain and inside store information of sensors occasionally. Beginning occasions just as the time interims for the estimations can be unreservedly modified over the system framework. When a deterrents is distinguished in its closeness the hub will naturally move information. Alternatively sensor information can be conveyed on request. When in its inert express the hub stays in shut down mode so as to limit power utilization.

3. Secondly endeavor can likewise be make in this work to create the cautions according to settable scope of unfortunate conditions. In typical Industrial information move conditions standard current circles of 4mA-20mA or standard voltage circles of disconnected 12V, 24V and 36v are utilized. Be that as it may, every one of these procedures are related with the significant distance and short separation wired topologies. As wired interchanges are expensive and needs the regular upkeep cost arrangements their structures the need of improvement of reasonable profile with appropriate information rates. The profile here created structure the one of a kind Secondly endeavor can likewise be make in this work to produce the alarms according to settable scope of undesirable conditions.In ordinary Industrial information move situations standard current circles of 4mA-20mA or standard voltage circles of detached 12V, 24V and 36v are utilized. Be that as it may, every one of these procedures are related with the significant distance and short separation wired topologies. As wired interchanges are expensive and needs the regular support cost arrangements their structures the need of advancement of reasonable profile with appropriate information rates. The profile here created structure the

III. SENSORS

Sensors are detecting device whose main purpose is to sense any change in the surrounding areas or environment. These data sensed is send to the computerized device for processing.

Sensor converts nonelectrical, physical or chemical quantity into an electrical signal. Sensors are commonly called as transducers that convert the analog signal from the device into a digital waveform. Four sensors are used in here Temperature sensor, Gas sensor, Humidity sensor, Heartbeat sensor. Humidity sensor is a device that measures the humidity in the surrounding area. A humidity sensor can be used outdoors as well as indoors. Gas or co2 sensor is a chemical optical sensor utilizing the acidic nature of co2 for detection. Temperature sensor is used to detect the environment temperature. And that data is converted to digital form and displayed. It is the key to read and control temperatures correctly.Heartbeat sensor is designed in such a way that when a finger is placed on it , it gives digital output of heartbeat in form of a pulse.This sensor detects the values and transfers the data to the microcontroller to be processed.
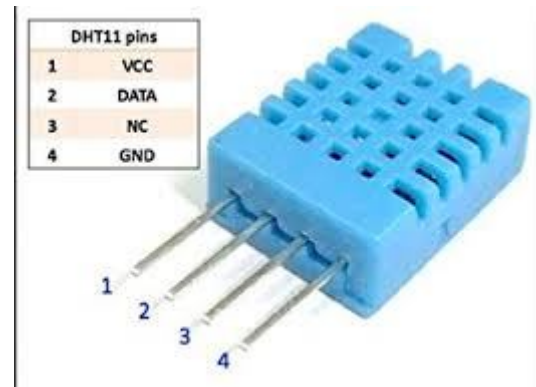
IV. DATAFLOW IN THE SYSTEM

The data are sensed from the sensors and they will now be send to do some processing, the processing will be done by a microcontroller now this microcontroller is now present on a Arduino UNO. So any values which are negative there will be medical team which will be always alarmed through the GSM module. IOT will be handling the monitoring of this data and will be seeing any changes in it.

I. **Arduino Uno**

The Arduino Uno is a microcontroller board which is based on ATmega328. It has fourteen digital input and output pins out of which six are used as pulse width modulation outputs which mean to reduce the average power of electrical, 16Mhz crystal oscillator , six analog inputs, a USB connection, a power jack and a reset button. Everything needed to support the microcontroller is present within it; also it can be connected to the computer with the help of usb cable to power it and load/flash the code into it or once the code is loaded a ac to dc battery can be used to power it .

GSM

GSM is a mobile communication modem; it is stands for global system for mobile communication (GSM). The GSM network consist of three networks

MOBILE SATION

It is generally a mobile phone which consist of display, processor and transceiver.

- **Base Station System**

Between the mobile station and the network subsystem it acts as an interface. To handle the protocols for communication with mobiles the Base station has a radio transceiver which in turn is present in the base transceiver station. And also to control the base transceiver station It also has base station controller which acts as an interface between the mobile station and mobile switching center.

- **Network Subsystem**

It is one of the main functionality for the mobile phones as it is the component of GSM SYSTEM that carries out the mode of communication in the form of calls and mobility management function for the mobile phones that are roaming of the network of the base station. The network switching subsystem is circuit switched network used for the GSM services to take place like calls or video calls. This allows the access of many things like mms and even the internet. So msc(mobile switching center) is setup for the end to end connection handles mobility and handover requirements .For routing voice calls and SMS as well as other services the GSM acts as a primary node for the mobile switching centers. This system provides connection to the mobile station in this network.It has homelocation register and the Visitor Location Register which provides the call routing and roaming capabilities of GSM. Equipment Identity Register which is also present in the application of GSM, where it has the account of every person who is using a mobile phone, this is

identified by the IMEI number. IMEI stands for International Mobile Equipment Identity

BLYNK

In order to control mining project model from an specialized iot device like smart phone a platform is set up in android or ios phones this is known as Blynk.So every other project of Arduino or raspberry pi can be controlled with some movement of data packets over the internet.A interface can be build which can be represented however the user wants graphically, every possible functionality can be set up. If the interface is established properly by sending the API the project can e controlled from the phones. Blynk is software tool which is used to interact if there is any alarm or preventive warning that is raised during the working of system. Instead, it's supporting hardware of your choice. Whether your Arduino or Raspberry Pi is linked to the Internet over Wi-Fi, Ethernet or this, Blynk will get you online and ready for the Internet of Your Things.
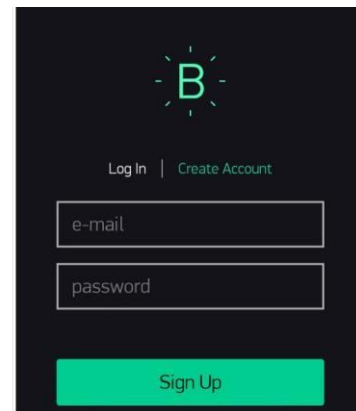
## V. PROPOSED SYSTEM WITH MACHINE LEARNINGALGORITHM FOR MINE WORKER SAFETY

This IOT project which mainly majors in the protection of mineworker, so the feat of this paper is elaborated by keeping in mind by keeping the mine people safe. So there has to be much more better technologies that has to be used so machine learning and algorithms can be sought out to find some helpNow since the mining work place is very rich in its infrastructure as it has tools and technology that take care of mining related work. So effort made for upgradation of the tools, so that something of newer technology that comes into picture is encouraged to used in this mining industry. With the help of some algorithms many situation can be overcome. The problem is here is that we could consider as well as assume that an person who suffers from breathlessness or the amount of oxygen entering is less That means that

worker as entered into the zone in the mine where all other chemical composition are less, there is presence of carbon monoxide and other sulphate gases which causes nausea and dizziness. There are sensors to detect it and cloud platform to monitor all this with the help of blynk app But the person isn't still safe yet , how will he be helped a guidance system has to be placed how that particular person when identified by a particular problem, how will he be saved In order to safely evacuate the worker KNN algorithm along with an algorithm which finds the shortest path that can be Dijkstra's algorithm, Kruskal's algorithm or even travelling salesman algorithm and there will also be one more component that will be embedded on to the jacket that is a tracking device .

That comes in the form of the GPS module with this every moment can be noted within the mine, this GPS (neo 6m gps tracking system)module plays only when the mine is thoroughly surveyed and monitored there is overall working map and blueprint of the mine with proper operating system with working personals, an in-charge or group that only care for safety of worker, elevators, surveillance camera with all this in place our model can worked out

Let us first begin with knn algorithm, since this a machine learning algorithm everything depends upon the data that will be acted as an input and how it will be processed .Now the input data will be coming from the smoke, temperature and humidity sensors with all this the reading coming via GSM module it can classified where the worker is present, how is situation is and what his situation will be after certain time period With the help of certain classification algorithms like find-s or candidate elimination a situation based on the data can be classified as positive or negative. So if the data from the sensors are much more inclined towards negative an alarm will be raised for the person. KNN algorithm assumes that similar things exist in proximity in other words similar things are nearby. So if boundary has been set if a person is in trouble then he comes into the area where he is facing some problem so the neatest person can be found which will help this certain man in distress when he receives a signal with alarm.
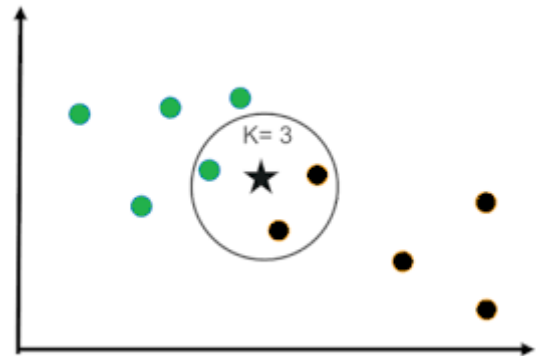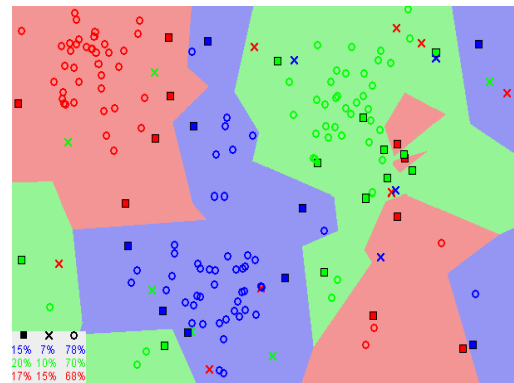
The KNN Algorithm

1. Load the data
2. chosen number of neighbours and put that value in k
3. For every example in data
    a. distance between query sample and current sample should be calculated from the data.
    b. in the ordered collection add the distance and the index of the example
4. Sort from smallest to largest (in ascending order) by the distances
5. from the sorted collection pick the first K entries
6. for the selected K entries Get the labels
7. mean of the K labels is returned by regression test
8. mode of the K labels is returned by classification ntest

Now that the distance is known the man who is the helper should find the person who needs to be rescued. This is done by finding the shortest path from the source node(helper) to the destination node(the one with problem), hence the algorithms used here are Dijkstra's algorithm, Kruskal's algorithm or even travelling salesman algorithm. The above diagram represents a way to find the shortest path towards the destination node . with help of Dijkstra's algorithm, Kruskal's algorithm.

And pseudocode for one of the algorithms that is Dijkstra's algorithm

```
Function Dijkstra(g,s)
For vetex v i
        distance[v]= infinite
        previous[v]=null
        if v!=s
        add v to priority queue q
        distance[s]=0

while q is not empty
        u= extract min from q
        for each unvisited neighbour v of u
        tempdistance= distance[u] + edgeweight(u,v)
if tempdistance = distance[v]
        previous[v]= u
        return distance,previous
```
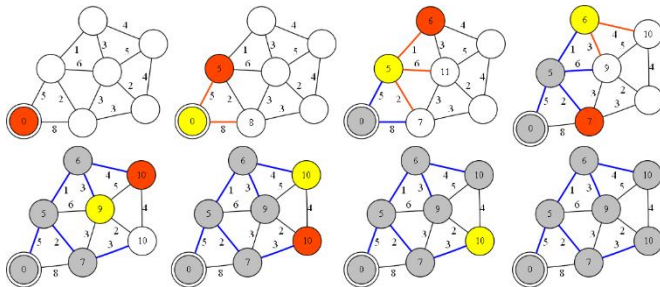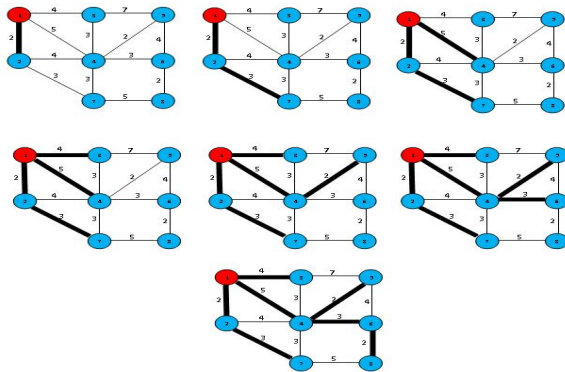

VI. RESULTS

According to our project the safety of the mine workers are ensured by monitoring the psychological variable at high altitude. By using sensor we are able to monitor the physical condition continuously in the mine, and alert the workers during disasters before a life is been spared. We can save the life of coal mine worker through wireless network using IOT. It will provide each person's information to the monitoring unit. The project also helps to contact to the emergency numbers in order to alert the paramedics to help the workers at disaster times

VII. CONCLUSION

This integrated design will replace old-fangled way of mine safety system. The system works on any kind of mine environments, to ensure the safety of the mine workers. The system can be enhanced in future by adding more sensors like mems sensor, flux sensor, etc. in order to ensure the further safety of the workers

This project can be enhanced in future by adding more sensors to monitor the physical conditions of the worker, for example a MEMS sensor can be added to monitor the position of the worker like if he is standing, sitting or lying. If the worker is unconsciously lying down it can be detected through his position. It can be enhanced by changing the Gas sensor according to the geographical conditions of the mine. The gas emitting from the underground may differ from place to place hence it can be changed according to the place and the gasemitting.

VIII. ACKNOWLEDGMENT

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