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Smart Helmet for Detection of Unsafe Events in Mining Industy Based on IoT

Subhash Rathod, Pratiksha Bagal, Rushikesh Gujar,
Aishwarya Hannure and Digambar Waghulde

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Prof. Subhash Rathod

Pratiksha Bagal
Rushikesh Gujar
Aishwarya Hannure
Digambar Waghulde

Abstract - In current days coal mining has been a totally risky interest which can bring about some of unfavorable consequences at the surroundings for instance in the course of mining operations methane, a regarded greenhouse fueloline, can be launched into the air. Underground mining risks encompass suffocation, fueloline poisoning, roof fall apart and fueloline explosions. Keeping most of these components in thoughts we designed a machine, i.e. clever helmet the use of ZigBee generation for tracking the dangerous gases, strange temperature situations and the humidity degrees withinside the air. The progressed protection capabilities in our machine will dramatically boom lifestyles expectancy of the coal miners through alerting them approximately the risks. A clever helmet has been advanced this is capable of come across of dangerous activities withinside the mines industry. In the improvement of helmet, we've got taken into consideration the 3 foremost varieties of danger consisting of air quality, helmet removal, and collision (miners are struck through an object). The first is the attention degree of the dangerous gases consisting of CO, SO2, NO2, and particulate matter. The 2nd dangerous occasion changed into labeled as a miner doing away with the mining helmet off their head. An IR sensor changed into advanced unsuccessfully however an off-the shelf IR sensor changed into then used to efficaciously decide whilst the helmet is at the miner's head. The format of the visualisation software program changed into completed, but the implementation changed into unsuccessful. This paper provides the undertaken layout detailing answers to troubles raised in preceding research.

Keywords - IOT, ZigBee Sensor, electricity supply, mining and safty.

1.INTRODUCTION

conventional version of the clever helmet has been evolved for the mining enterprise with a purpose to locate unsafe occasions withinside the mining environment. The evolved prototype is capable of feel the nice of air, humidity, putting off the helmet through miner, and crash of an item on head. The air nice is decided through the saturation stage of the damaging fueloline including carbon monoxide. The elimination of helmet through miner is likewise taken into consideration as one of the risky occasion and it's miles detected through the usage of Infrared (IR) sensor Led kind helmets are commonly powered through 3 or 4 AA or AAA batteries. Systems with heavy batteries (4xAA or extra) are commonly designed in order that the mild emitter is located close to the the front of the pinnacle, with the battery compartment on the rear of the pinnacle. The headlamp is strapped to the pinnacle or helmet with an elasticized strap. It is from time to time feasible to absolutely disconnect a headlamp's battery pack, for garage on a belt or in a pocket. Lighter headlamp structures are strapped to the consumer's head through a unmarried band; heavier ones make use of an extra band over the pinnacle of the consumer's head. White LEDs had been speedy followed to be used in headlamps because of their smaller size, decrease electricity intake and progressed sturdiness in comparison with incandescent bulbs. Power LEDs rated 1 watt or extra have displaced incandescent bulbs in lots of fashions of headlamps. To keep away from harm to digital parts, a heatsink is commonly required for headlamps that use LEDs that expend extra than 1W. To adjust electricity fed to the LEDs, DC-DC converters are frequently utilized in 1W+ lights, from time to time managed through microprocessors. This permits the LED to offer brightness that isn't always suffering from a drop in battery voltage, and permits selectable degrees of output. Following the creation of LEDs for headlamps, from time to time mixtures of LED and halogen lamps had been used, permitting the consumer to pick among the sorts for numerous tasks. This traditional LED lamps doesn't offer any type of protection to the mine workers. Hence an concept of enforcing a clever helmet has been developed after studies on numerous varieties of helmet fashions.

2. PROPOSED METHODOLOGY

1. This assignment consists of numerous sensors which might stumble on numerous dangers for employees operating in a mine.

2. The assignment makes use of ZigBee for lengthy variety dependable communication. The assignment makes use of an Oximeter for pulse price detection in addition to oxygen stage detection. It makes use of an IR sensor for detecting falling rocks.

3. The tool makes use of Gas sensors for detecting stage of poisonous gases within the mine. 3. It additionally makes use of an Atmospheric Pressure sensor for detecting growth or lower in atmospheric strain that could bring about dangers for the mine worker.

4. A temperature and humidity sensor also are used. ZigBee forums are used at each end – Mine worker's helmet in addition to Supervising Unit.

5. Alerts at each ends are given the usage of buzzer and LED indications. .

3. LITERATURE SURVEY

C. J. Behr, A. Kumar and G.P. Hancke, "A Smart Helmet for Air Quality and Hazardous Event Detection for the Mining Industry", IEEE 2016. . A clever mining helmet turned into advanced this is capable of discover 3 varieties of risky activities which include threat stage of risky gases, miner helmet eliminating, and collision or impact (miners are struck with the aid of using an object). The risky activities had been categorised as a miner eliminating the mining helmet off their head. An off-the-shelf IR sensor turned into then used to correctly decide whilst the helmet is at the miner's head. Ge Bin, LI Huizong, "The Research on ZigBee-Based Mine Safety Monitoring System", 2011 IEEE. . In this paper the studies technique of Mine Safety Monitoring System primarily based totally on ZigBee is elaborated, and the hardware layout of ZigBee sensor node and device software program layout are discussed. The self-organizing routing set of rules for ZigBee networks and the gateway layout and structures integration also are studied. ZigBee-primarily based totally Mine Safety Monitoring System can obtain plenty of protection elements of production, and underground surroundings (which include fueloline, temperature, humidity and different environmental indicators) for tracking, controlling mine production, protection control to offer an amazing foundation for selection making. Tanmoy Maity, Tanmoy Maity, "A Wireless Surveillance and Safety System for Mine Workers primarily based totally on Zigbee", 1st Int'l Conf. on Recent Advances in Information Technology | RAIT-2012 | 2012 IEEE This paper addresses a cost-effective, bendy answer of underground mine workers' protection. A module of MEMS primarily based totally sensors are used for underground surroundings tracking and automating development of dimension facts via virtual wi-fi communique method is proposed with excessive accuracy, easy manipulate and reliability. A microcontroller is used for accumulating facts and making selection, primarily based totally on which the mine employee is knowledgeable via alarm in addition to voice device. Abhijeet Kumar Student Member IEEE, 1Harish Kumar Member IEEE, 1V.N. Pandey, 2D.K.P Singh, 3S.K. Chaulya "Gas Monitoring and Power Cut-off System for Underground Mines", 2012 seventh IEEE Conference on Industrial Electronics and Applications (ICIEA) In this paper proposed fueloline tracking device performs a essential position in tracking the gases withinside the mines. This paintings consists of designing and implementation of a device that constantly video display units the awareness of methane (CH4) and carbon-monoxide (CO) fueloline withinside the underground mines, which routinely cuts off the electricity deliver of the specific sector in an underground mine, whilst the awareness of CH4 exceeds extra than the permissible restrict determined with the aid of using the user. For higher accuracy, we advocate the move checking of the awareness of the gases from or extra sensors. The gift paintings is dedicated at the designing a part of the sensor circuit which is devoted for the higher protection environments and want of the miners and mining area.

4.AIMS AND OBJECTIVES:

1) To locate the unsafe events .

2) To keep away from the accidents.

3) To offer higher security.

RELATED WORK

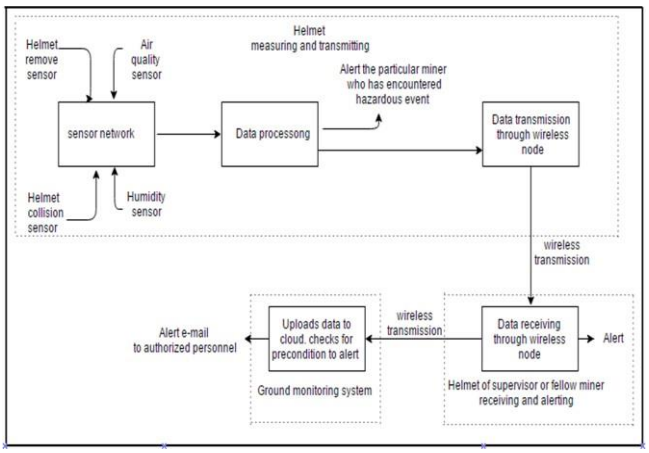

Fig 4.1 Architecture of Smart Helmate for unsafe events detection

WORKING

The operating of Zigbee Controlled Smart Helmet is as given below:
1. On the transmitter facet the Zigbee is attached to the PC.

2. Commands are given to the Zigbee the use of the PC app evolved the use of python tkinter library.

3. The Arduino reads all of the sensor values and encodes it and sends it the use of the Zigbee linked on Helmet

. 4. The Zigbee on every other quit gets this facts and decodes it.

5. This decoded facts is then displayed at the terminal of the manager.

6. If any of the sensor fee is going past threshold then the helmet notifies both; the person in addition to the manager the use of led and buzzer indication.

7. The manager can then take movement in addition to the mine employee also can take movement accordingly.

5. PROPOSED SYSTEM

This mission consists of diverse sensors which might locate diverse dangers for employees running in a mine. The mission makes use of ZigBee for lengthy variety dependable communication. The mission makes use of an Oximeter for pulse price detection in addition to oxygen degree detection. It makes use of an IR sensor for detecting falling rocks. The tool makes use of Gas sensors for detecting degree of poisonous gases in the mine. It additionally makes use of an Atmospheric Pressure sensor for detecting boom or lower in atmospheric strain which could bring about dangers for the mine worker. A temperature and humidity sensor also are used. ZigBee forums are used at each end – Mine worker's helmet in addition to Supervising Unit. Alerts at each ends are given the use of buzzer and LED indications.

7.CONCLUSION

As the gadget requirement and the specified additives may be effortlessly made to be had this task may be carried out effortlessly. It will offer the protection to coal miners and alternate the manner in their running in addition to gadget controlling the diverse environmental adjustments in mines. It has been offered the unique layout of the low strength Zigbee sensor gadget with a really decreased cost. It is dependable gadget with brief and smooth installation. The gadget is probably effortlessly extended. It will enhance gadget scalability and expand correct role of underground miners in future.

8.REFERENCES

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