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MINING WORKERS SAFETY HELMET USING IOT

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Abstract

The safety helmet has a sensor and is intended to stop accidents from happening in the workplace. It helps maintain worker safety and job functionality by preventing accidents. It will lower the company's costs associated with safety monitoring. This study suggests equipping safety helmets with a variety of sensors that may track worker health problems over time and upload the information to a cloud database. The workers are always visible to the managers or controllers. In case the worker is unable to move, the ESP in this helmet will provide the worker's location. In the event of a perilous situation, the sensors included inside the helmet will sound an alarm. To assist with data collecting, hot spot towers with sensors and ongoing internet connections are offered. The controller in this helmet is a node MCU with Wi-Fi drivers so it can be used for ongoing communications. Due to the device's ongoing internet connection, the worker controller is able to continuously review the data. The temperature, humidity, and other sensors employed in this helmet are among.

Keywords: ESP NodeMcu Temperature Humidity, LCD display Buzzer Smartphone

1. INTRODUCTION

Any nation's economy needs mining because it creates numerous opportunities across many industries. Circuitry is used to find workers moving around the mining site. A monitoring system included into the helmet uses Wi-Fi to connect with all of the trackers and exchange data [1]. To obtain the information, the system makes use of "mega microcontroller-based Wi-Fi tracker circuitry." This aids in mapping out where the staff are. A button has been used to integrate the helmet circuit for each employee. A crisis indicator can be seen on this button. Rapid market growth in our nation has led to a rise in the Supply of raw materials. Coal reserves are being discovered with the help of fresh international businesses [2]. Because of a lack of qualified staff, terrible accidents in mines are on the rise, and neither the safety of miners nor the manipulation of coal can be ensured. Environmental considerations are a challenge for males who work in coal mining. Through communication and security monitoring, this study seeks to offer a mining solution. When working underground, the person is required to wear the helmet. Security and safety are a must in the mining industry. To avoid certain circumstances, every mining operation takes some preventative measures IoT has a unique role in information technology. A base Station and movement from the mine employees are required for a communication system to be Secure.

The protection of laborer's who routinely face risks while working in coal mines. In locations where there is mineral exploration activity such as coal, gold, etc. these researchers created a gadget that is highly helpful for risk minimization. The most accurate method for locating the coal worker is this one. They have proposed a system that has a remedy for various problems with the help of GPS. This application will search for a pinpoint location, and any missing coal worker can be traced easily with the help of GPS. The client-server architectural design is used in this system [3]. The server allows the client's mobile phone to register and log in, and it stores the client's password and login information in the server's database.

One transmitter and one receiver are included in the two hardware components of the proposed system-based Coal Mine safety helmet Monitoring project. An Arduino board serves as the primary controller in both modules. Inside the coal mine, the transmitter module is mounted. The smoke sensor, temperature sensor, ultrasonic sensor, and heartbeat sensor are all found in the transmitter module. Every two minutes, the Arduino uses the Wi-Fi module to communicate the sensor data to a remote IOT server. The buzzer activates to alert the concerned staff if any of the sensor values surpass a predetermined threshold level. The remote server has an IOT

platform installed on it that shows the pertinent data using a GUI to aid users in system control and monitoring [4].

2. METHODOLOGY

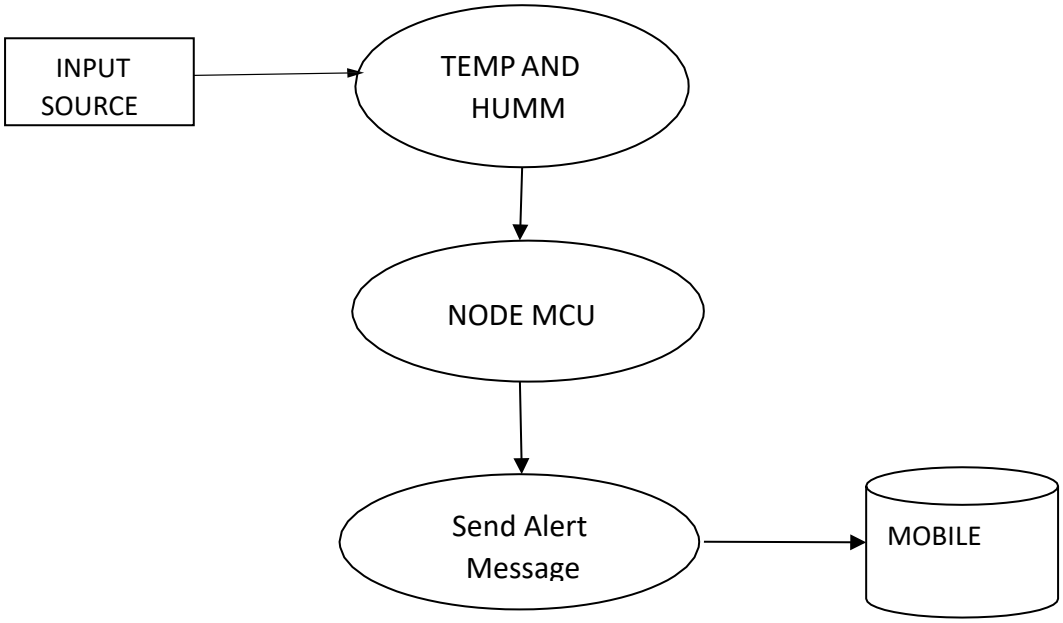

Fig 1 Proposed Methodology -Level 0

Temperature And Humidity Sensor Module

It is ideal for battery-powered applications due to its operating voltage range of 4V to 30V and 60-uA current consumption when in use. Two drawbacks exist with this sensor. This sensor's first significant drawback is that it cannot detect negative temperatures; to overcome this limitation, you must bias the sensor using a dual polarity source. LM36 sensor if your project calls for readings of negative temperatures. This sensor's second drawback is that because it outputs data in analogue format, it is particularly susceptible to noise. The LM35 Temperature Sensor IC Datasheet to find out more information about this sensor. The conversion circuit and a humidity-sensitive capacitor make up the majority of the parts of the temperature and humidity sensor module. A glass substrate, a lower electrode, a humidity-sensitive substance, and an upper electrode make up the humidity-sensitive capacitor. A type of high molecular polymer known as humidity sensitive material experiences changes in dielectric constant depending on the relative humidity of the surrounding air. The capacitance of the humidity-

sensitive element adjusts in line with changes in the ambient humidity. In other words, the humidity sensitive capacitance rises as the relative humidity does, and vice versa [5].

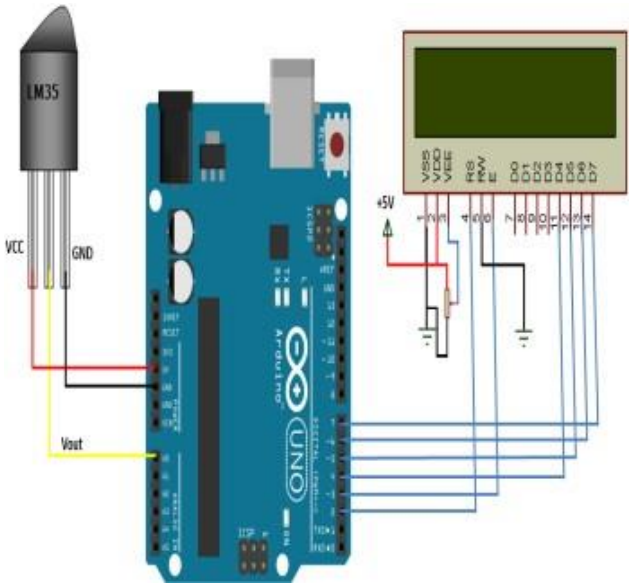

Fig 2 Node MCU

Buzzer

It is two terminal audio signaling device.one of the terminal is connected to +5V where as other is connected to the Ground. It consumes 70 mA while giving audio-signaling. Buzzer can attract the focus of the workers on the danger. Buzzer acts in coordination with the vibration motor. The IR1 sensor detects when the shot is made. IR2 second sensor ensures the shot and then the score will be increased on the LCD. If it is passes through the net from lower to upper it is foul in basketball game, if it detects foul the buzzer alerts to acknowledge. If the IR2 sensor first detects the ball and then the IR1 detects the ball the buzzer will raised and “wrong entry” displayed on the LCD to denotes the foul.

3. RESULT

In result 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 as shown in Fig 2. The sensor-equipped safety helmet demonstrated effective monitoring of key health parameters during mining operations.

The recorded data unveiled meaningful insights into working conditions within the mine. Temperature and humidity fluctuations correlated with physical activity, indicating that the helmet accurately captures environmental changes. The sudden spike in the air quality index at 12:15 PM triggered the crisis indicator, demonstrating the helmet's ability to promptly detect and communicate perilous situations.

Moreover, the three-tier architecture, utilizing an Arduino Uno for environmental and physiological data measurement, a fuzzy classifier for environment categorization, and a cloud database for storage, proved to be a robust system. This architecture enables the creation of detailed health reports and facilitates timely alerts to the monitoring and rescue team during emergencies.

The proposed prototype's real-time monitoring capabilities offer a significant improvement over existing systems. The continuous data review by the worker controller, owing to the device's ongoing internet connection, ensures proactive safety measures. By leveraging IoT technologies, this prototype enhances the overall safety and well-being of mine workers, mitigating risks associated with environmental factors and worker emergencies.

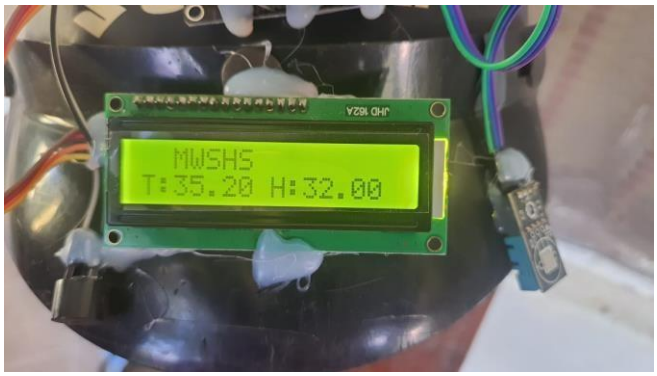

Fig 2 Sensor detects the Temperature and humidity

4. CONCLUSION

Three tiers make up the suggested prototype's architecture. The Arduino Uno used in the first tier measures the environmental and health data. Based on the first-tier parameters, the fuzzy classifier in the second tier chooses the various sorts of environments. The third layer analyzed the information and stored it in a cloud database for future use (creating the miner's health

report), as well as alerting the monitoring and rescue team in case of emergency. In three different settings, the proposed prototype is examined. The three-tier architecture of the suggested prototype. Through an Arduino Uno, the first-tier gauges environmental and physiological indicators. The fuzzy classifier, which makes environment type determinations based on first-tier parameters, is the second tier. third tier is also in charge of notifying the monitoring and rescue team in case of emergency. Three different contexts are used to analyses the suggested prototype. Additionally, the Conclusions of the proposed prototype are contrasted with those of the current prototype.

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