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SMART HELMET FOR COAL MINERS FOR MONITORING AND ALERTING

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Abstract: security could be a major concern, particularly within the coal mining industry, where there are dangerous gasses such as suffocation, gas harming, and gas blasts. The framework centers on two major focuses: discussing quality checking and the discovery of unsafe occasions. The framework has an ESP32 module that persistently screens destructive gasses such as carbon monoxide (CO), methane (CH4), and condensed petroleum gas (LPG) and temperature varieties. Real-time information empowers the location of hurtful gas levels, empowering security activities and ventilation. In extraordinary temperature conditions, the framework incorporates a crisis caution that can jointly address the concern of laborers not wearing protective caps by counting a constrain switch to decide whether a mineworker has expelled their protective cap. Alarms are naturally sent to bosses to implement security conventions.

Keywords: ESP32, hazardous gases, MQ2, temperature (DHT11) sensor, fire sensor, LDR module.

I.INTRODUCTION

The world has expansive and different mineral assets and a huge mining industry. The right supervision and communication are an exceptionally vital necessity for the mining industry. Administrators are dependable for all wounds under their supervision, and they ought to be mindful of possibly unsafe circumstances. The issue tended to them is the advancement of a mining protective cap to guarantee more security and mindfulness. When mining with boisterous gear, being mindful of one's surroundings can sometimes be challenging. Within the mining industry, diggers evacuate a few of their security gear since the hardware is heavy and they are not comfortable working with it. Diggers don't evacuate their protective caps. These days, security protective caps have the purpose of protecting the miner's head against potential perilous occasions.The security protective caps don't have any innovation included in them to let mineworkers know when another digger has run into a dangerous event. Therefore, the purpose of the extension is to alter an existing mining security head protector to make it more secure. The work was amplified by planning the framework to be small enough to fit into the security head protector and sufficient while running on battery control. The other challenge was to alter the head protector without changing its physical structure. A protective cap ought to be altered to move forward with digger security by including more sensors in the protective cap. When a miner evacuates, the head protector has to be cautioned. In case a roof falls on a mineworker, indeed, when wearing his head protector, he can end up oblivious or stable. The framework must decide whether a digger has

supported life-threatening harm. These two events are defined as dangerous occasions. Thirdly, perilous gases had to be recognized and declared as destructive gases within the mining industry. Two more sensors are put at domestic to sense the mugginess and the temperature in the coal mine where the digger is working. Within the coal mining industry, guaranteeing the security of workers is of utmost significance. Keen head protectors have risen as a ground-breaking arrangement, joining and progressing innovation to improve security and give real-time alarms in unsafe situations. These head protectors combine sensor innovation, communication frameworks, and information examination capabilities to screen conditions, alert diggers to potential threats, and encourage quick reactions in crisis circumstances. By advertising security highlights custom-fitted to the special challenges of coal mining, smart head protectors could be a basic step in ensuring the miners and moving forward operational framework effectiveness.

II.EXISTING METHODOLOGY

Many sensors are positioned on the head protector of the mining industry's keen protective hat. Zigbee-based remote arrangement is a workable solution for communication between the base station and the underground mine. The sensors used are the following: an infrared sensor to determine whether the digger is wearing a head protector, a temperature sensor, a humidity sensor, an LDR for light escalation, and a gas sensor. through the use of Zigbee technology. In any mining framework, whether it be for coal or any other material, worker security should always be the top priority. Compared to open pit mining, underground coal mining poses fewer risks due to its ventilation system and collapse possibilities. This framework lacks versatility and is overly complex.

III. PROPOSED SYSTEM

To detect temperature and hazardous gasses in the mining industry, the suggested device would embed sensors into the helmet. Two additional sensors are installed in the miner's residence to monitor the temperature and humidity levels in the coal mine. These sensors—a temperature sensor (DHT11), a fire sensor, an LDR module, and a gas sensor (MQ2)—are coupled to an ESP32 module. This has an LCD that shows all of the sensor values.After computation, these values are sent to the base station. The supervisor may determine the miner's condition from the base station by looking at the temperature and other data and then taking the necessary action.

IV.IDENTIFICATION OF HARDWARE ASPECTS

The hardware aspects which have been identified for our proposed system are:

1. ESP 32 Microcontroller 2. Gas sensor 3. Fire sensor 4. DHT11(temperature sensor) 5. LDR module 6. Buzzer 7.LCD 8. DC Fan.

V.IDENTIFICATION OF SOFTWARE ASPECTS

The software aspects that have been identified concerning our proposed system are as follows:

1. Arduino ide

2. Embedded C

VI.BLOCK DIAGRAM

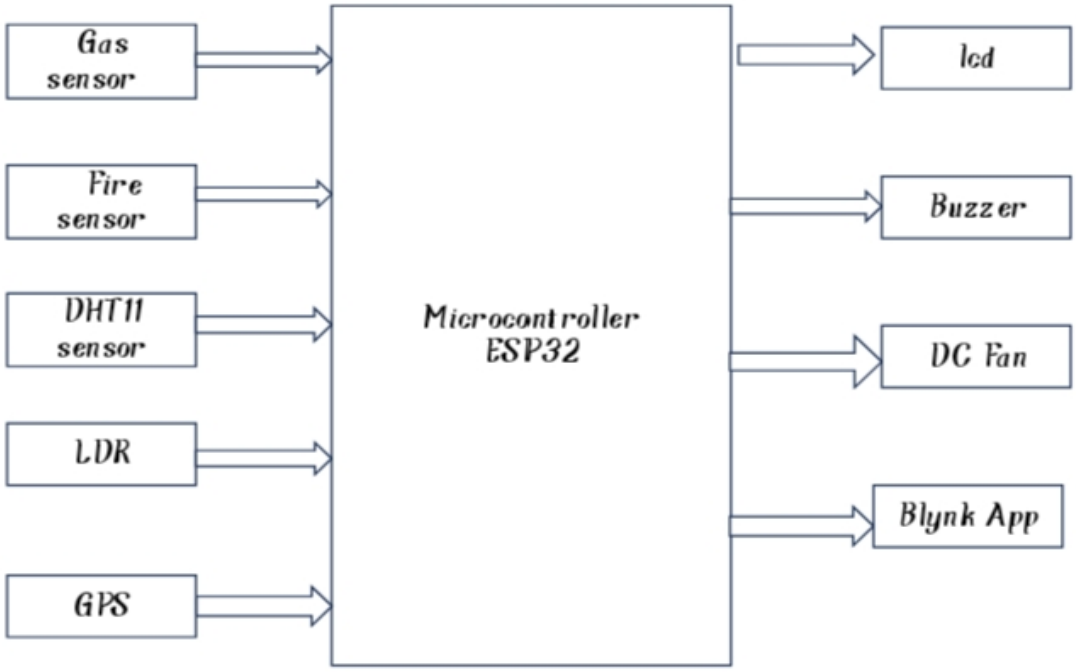
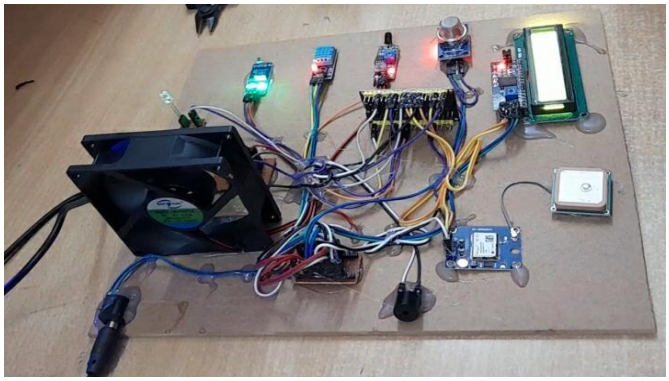


fig 2:block diagram

VII. METHODOLOGY

To detect temperature and dangerous gasses in the mining industry, the suggested device would implant sensors into the helmet. Two additional sensors are mounted on the miner's helmet to measure temperature and humidity in the coal mine. These sensors—which compute values—are attached to an ESP32 and include a temperature sensor, gas sensor, fire sensor, and LDR module. After computation, these values are sent to the base station. From the station base Consequently, the supervisor may determine the miner's condition and implement the necessary actions based on the temperature and gas values obtained.

VIII. IMPLEMENTATION AND RESULTS



The LCD will Display all the values of sensors and whether he is wearing a helmet or not. By using GPS location will be tracked and the LDR module is used to switch lights automatically when the light intensity is low. The DC Fan will ON when the temperature is high, According to temperature Fan will change the speed.

IX. ADVANTAGES

It can track crucial indicators like blood pressure and oxygen saturation. Miners can be alerted by integrated sensors that can identify dangerous gasses like carbon monoxide and methane. Miners' locations may be traced in real-time using GPS technology, which helps with rescue efforts. Miners can stay in touch with supervisors above ground and with one another thanks to built-in communication capabilities like two-way radios or message systems, which facilitate cooperation and response during emergencies.

X. APPLICATIONS

Hazardous gases like methane and carbon monoxide can be detected by sensors, which can immediately notify miners With alarms, constant temperature monitoring within the mine can assist avoid overheating or exposure to extremely high or low temperatures. Vital indicators of miners, such as body temperature and oxygen saturation, can serve as precursors to possible health hazards. In the event of accidents, collapses, or other catastrophes, GPS technology allows for real-time tracking of miners' locations, aiding quick responses and rescue operations.

XI. CONCLUSION

Coal miners' smart helmets provide essential monitoring and warning functions to improve worker safety in the mining sector. The helmet provides early warnings of threats like gas levels, temperature extremes, and falls by detecting harmful gasses, tracking locations, and monitoring vital signs. By providing emergency alarms and communication capabilities, they guarantee prompt emergency responses, which makes mining operations safer and more effective overall**.**

XII. FUTURESCOPE

To provide safer working circumstances, modern sensors are integrated for real-time monitoring of environmental parameters like gas levels, temperature, humidity, and air quality. Using Internet of Things (IoT) technology, supervisors may monitor the status of numerous miners at once and respond to emergencies more quickly by enabling seamless data transmission and remote monitoring**.**

XIII. REFERENCES

[1] Y. Shi,J. Chen,J. Hao,J. Bi,M. Qi andX. Wang," Statistical Analysis of Coal Mine Accidents of China in 2018," 2019 Prognostics and System Health Management Conference(PHM- Qingdao),(2019).

[2] Ericsson,M., Löf,O. Mining's donation to public husbandry between 1996 and 2016.

[3] Hong Chen, Hui Qi, Ruyin Long, Maolong Zhang, Research on 10- time tendency of China coal mine accidents and the characteristics of mortal factors, Safety Science, Volume 50, Issue 4,(2012).

[4] Dennen, R S, and Stroud, WP. Radar hazard Discovery in a coalstructure.UnitedStatesN.p.,(1991).

[5] Hebblewhite, Bruce.(2009). Mine safety – through applicable combination of technology and operation practice. Procedia Earth and Planetary Science. 1. 13-19.10.1016/j.proeps.2009.09.005,(2009).

[6] T.Liuetal.," Advances of optic fiber detectors for coal mine safety monitoring operations," 2013 International Conference on Microwave and Photonics(ICMAP),(2013).

[7] Jiang Y, Li Z, Yang G, Zhang Y, ZhangX. Recent progress on smart mining in China Unmanned electric locomotive. Advances in Mechanical Engineering. March 2017.R.K. Kodali,T.DeviB.