DESIGN OF SMART HELMET FOR MINING WORKERS SAFETY

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Abstract

Underground mining hazards include suffocation, gas poisoning, object fall, roof collapse and gas explosion. So, air quality and hazardous event detection is very important factor in mining industry. This system provides a wireless sensor network for monitoring real time situation of underground mines from base station. It provides real time monitoring of harmful gases like CO, CH4 and LPG and also temperature. The main reason for death of miners is that due to any reason miners fall down and loses consciousness also proper treatment is not provided them at that time. To overcome this problem the designed system, provides emergency alert to the supervisor if person collapses by any reason. For this project, Selenium IDE Software is used for programming and output is viewed in serial monitor and LCD Display

Keywords: Air Quality Sensor, DHT11 Sensor, Heartbeat Sensor, Arduino Uno, Arduino Nano, Buzzer, LCD Display, RF transmitter, RF Receiver.

Introduction

Previously, the accident rate was high becauseindividuals were driving without helmets and were unaware of the importance of wearing one. As a result, the mortality rate gradually increased.

The issue addressed was the enhancement of a helmet in order to increase safety awareness among miners and riders. Being aware of one's surroundings might be difficult when working with noisy equipment. Wearing a helmet reduces the risk of serious injury by 79% and the chance of death by 43%.

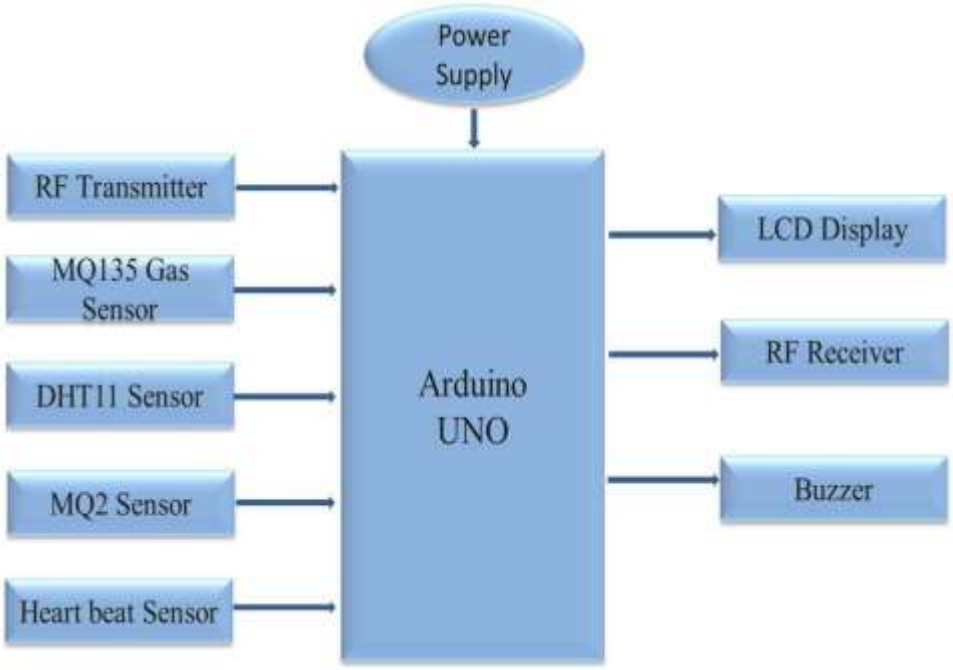
In the mining industry, miners often remove portions of their safety equipment because it is too heavy, heated, or uncomfortable to work with. They will also deliberately or unconsciously absorb harmful gas concentrations such as CO2, SO2, NO2, and particulate particles. When it comes to traffic accidents, residents' safety has become a serious concern. People, on the other hand, do not usually wear helmets when riding motorbikes. As a result, this is a major explanation for India's dramatic increase in mortality rates. The inspiration for creating this art stems from our societal obligation to society. The key to preventing such mishaps is to foresee outbursts using sensors and microcontrollers and to develop an alarm system before critical air levels are reached. Continuous monitoring is required, which necessitates the use of an effective and precise sensor system. To detect the presence of these toxic gases, several approaches are used.

To address these issues about power consumption, cost, and design simplicity, we present a smart helmet system consisting of discrete components thatverifies whether the rider/miner is wearing the helmet.

Objective

The project's major goal is to create a low-cost intelligent helmet capable of detecting alcohol use and averting traffic accidents. This device can offer bicyclists with security and protection from road accidents. The circuit is structured in such a way that the bike will not start if the rider is not wearing a helmet, and if the rider is inebriated, the GSM system will worldwide find the biker and send an urgent message to family members about the location of the accident. The concept will be hardwired into an existing helmet and bicycle. It is not our intention to be able to shift the system from bike to

bike, but rather to design a system that is unique to each bike in order to guarantee the system operates well. Our goal is to integrate this technology onto a bike that does not have an internal computer and so must be unique to the bike. We want to overcome the limitation of one bike per system by keeping costs low, allowing more than one system to be acquired more readily if necessary. Each aim has been broken down into quantifiable targets to guarantee that the defined goals are accomplished. These goals will be used to create requirement specifications andto guide overall design decisions.



Block Diagram

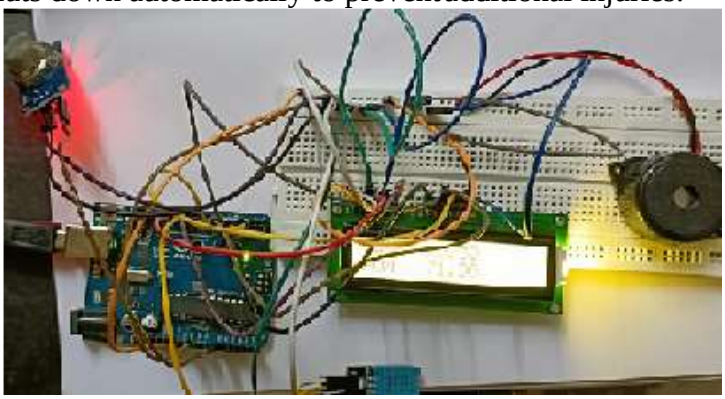
Methodology

Solving the problem of miners removing their safety equipment was a difficulty, because any new safety equipment that is not lightweight and non-distracting will simply be removed, along with all previous safety equipment.

Because the helmet is the sole piece of safety equipment thatminers/riders often wear, here is where the new safety equipment was introduced. There were three sensors used: a vibration sensor, an alcohol sensor, and an infrared (IR) sensor. These were used to identify if a miner/rider had beenhit on the head or to remove his helmet and detect the level of pollution around him.

Results

All of the components have been successfully built and tested. The course is structured in such a way that the bike will not start unless the rider wears a helmet. The smart helmet buzzes an alarm if there is a high concentration of dangerous chemicals in the environment. If an accident happens, the engine shuts down automatically to prevent additional injuries.



Output

Conclusions

The primary goal of designing this project is to ensure the safety of people in coal mines and on highways. We may reassure the individual that he will be able to recognise the harmful gases present. Or how about the regular abrupt short-coming accidents? It is divided into two sections: a helmet portion and a bike section. The helmet portion detects alcohol and can determine whether or not the rider iswearing a helmet. The second part of the project is concerned with whether or not the Zigbee transceiver isinstalled in the car. It was created by integrating functionality from all of the hardware components used. Every module's presence has been carefully considered and arranged, resulting in the optimum possible operation of the unit. Second, employing extremely advanced integrated circuits and with the assistance of evolving technology, both prototypes and a real-time working model have been successfully implemented.

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