Organization name : Ajay Binay Institute of Technology

Problem Statement : Work clothing that has sensors embedded in it to securely transmit data to managers about hazardous conditions and the workers' physical conditions, improving safety overall

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ENVIRONMENTAL ATTRIBUTE

01 PART

TECH STACK

Perception Layer

- The perception layer is the foundation layer, and it contains all of the sensors required to acquire information about the mining environment.
- It detects several physical and gaseous factors in its surroundings.

DEPENDANCIES

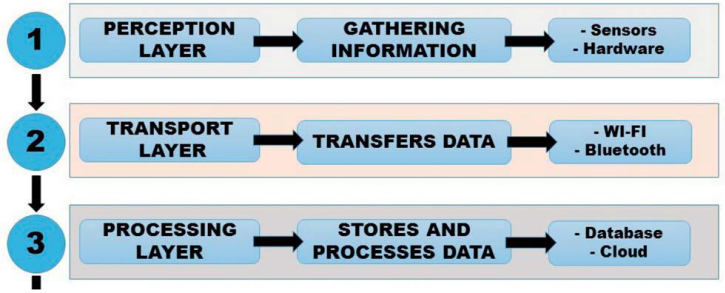
- MQ - 9
- MQ - 135
- LM - 35
- Arduino Uno Rev 3.0
- ESP 8266 WiFi Dev Board
- Arduino IDE

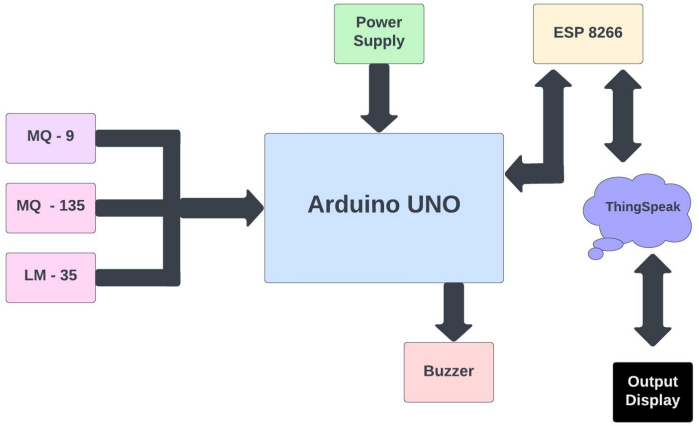
USE CASES

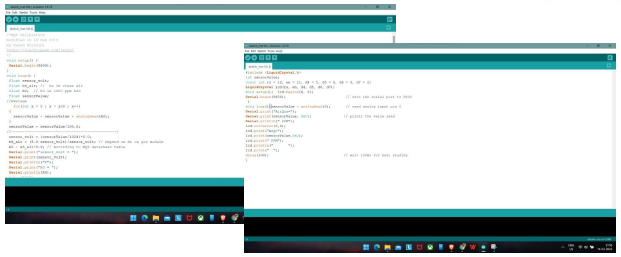
- Protection from invisible risks - PPE with gas, dust, sound, smoke and temperature sensors can monitor both the external environment and the user, alerting them in time about hazardous environments and alerting supervisors if workers are in unsafe conditions.
- Real-time data analytics - this would enable an immediate alert to a worker if he enters a potentially hazardous zone or somehow risks his safety.

Transport Layer

- The transport layer sends sensor data from the perception layer to the alarm system and then to the processing layer via WiFi.







Processing Layer

- The processing layer stores and analyses massive amounts of data received from the transport layer.
- With the support of data bases and cloud computing modules, the processing layer can deliver a range of services to the lower levels.

WORKING

- In PSE, sensors are attached to gather data points in real time about gas levels and exposure to other harmful elements whose data is then sent through Wi-Fi to networking device that enables the data to store locally or in cloud.
- Stored data in the cloud that holds is then sent to reasoning engine for performing a real time assessment of risks for individual workers.
- Then this data is analysed, if the data reaches a certain threshold level or appears to reach the threshold level then it will alert the worker for evacuation.
- With the help of attached sensors perception layer detects environmental information with signs of fire.

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SELF HEALTH AND DATABASE

02 PART

DESCRIPTION

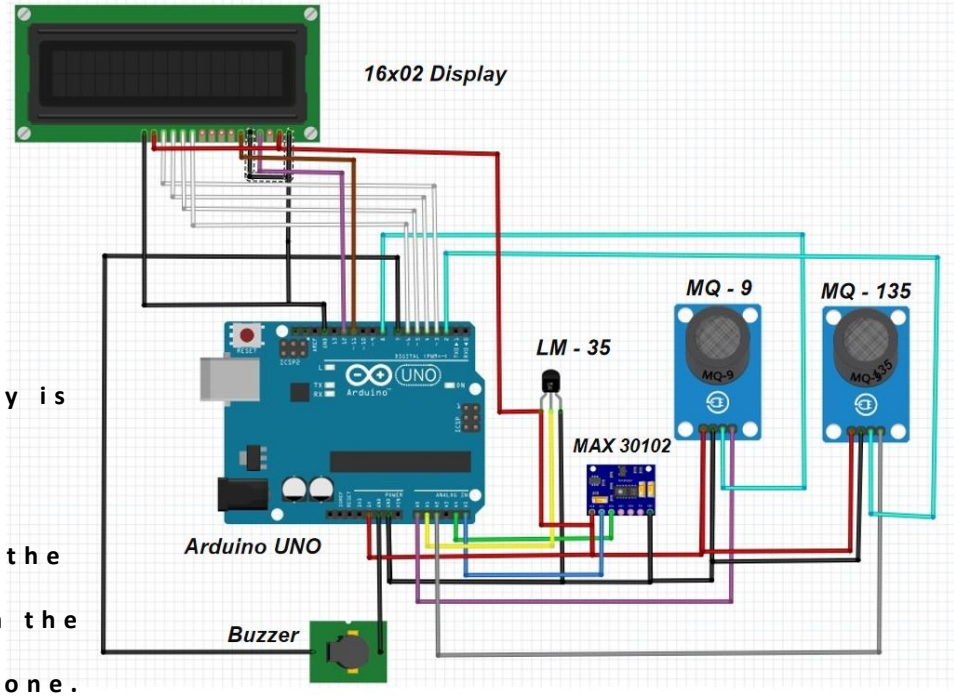
- Mining dust exposure can cause a variety of pathological symptoms based on the mineralogical composition, size, shape, and degrees and duration of exposure.
- Mining and mineral processing also expose workers to harmful compounds such as chromium, vanadium, cyanide, and diesel particulate.
- To address this issue, we have developed a pulse oximeter that uses the Arduino Uno with MAX30102 Sensor to monitor a worker's blood oxygen levels, compare the data to the surroundings, and warn the worker about his health state in comparison to that specific section of the region.

DEPENDANCIES

- Arduino Uno
- MAX30102 Sensor
- 16x02 Display

USE CASES

- The purpose of pulse oximetry is to see if your blood is well oxygenated.
- Monitoring a worker's blood oxygen levels and comparing the data to the surrounding environment in order to warn the worker about their health in comparison to that working zone.



WORKING

- This oximeter, like all other pulse oximeters, works on the principles of spectrophotometry, but we've designed it to communicate with the Arduino UNO at the same time to monitor environmental factors and the workers' own health.
- This oximeter monitors a person's heart rate in relation to the environment in which they will be working and alerts then if there's any abnormalities in their BPM or SpO2 Levels.
- BPM are the "beats per minute" and they are around 65-75 while resting for a normal person, athletics may have lower than that, and the SpO2 is the Oxygen saturation level, and for a normal person it's above 95%.

DATABASE CONNECTIVITY

- The google spreadsheet will store the real time data and analysis of the individual workers.
- The sensors will be connected with the database with the help of google spreadsheet.
- Spreadsheet will analyse the data according to the threshold value of the sensors and will provide feedback.
- ESP8266 Wi-Fi is used to upload data to the cloud whenever connection is available.