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## SMART SAFETY MONITERING SYSTEM FOR SEWAGE WORKERS WITH TWO WAY COMMUNICATION

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### Abstract:

A large number of sanitation workers die every year due to erratic and lack of facilities available, and harmful toxic gases released while cleaning the sewage. Real time health monitoring systems for such workers will prove helpful. This real time health monitoring device will work in a sewage as a safety equipment. In this paper, the device presented will monitor the pulse rate of a person using a pulse oximetry sensor, the methane concentration and the atmospheric oxygen concentration and provide alert to worker and exterior unit. when parameters deviate from the safe range. This parameters in real time will promptly alert the workers to stay safe and detect toxic gases before any harm.

**Keywords:** Carbon Monoxide sensor, Hydrogen sulphide sensor, Methane gas sensor, IOT, Heart Beat sensor, LCD, Drainage Channel.

### 1. INTRODUCTION

Sewage system is an underground system of pipes commonly used to transport waste water from homes and business either to a treatment facility,

where the water is treated and released into natural water bodies like lakes and streams or in any river to permanently drain out from the area.

Sewer manhole is one of the most important parts of the sewer system. Sewer manhole is a structure through which a person can gain access to the underground wastewater collection system. Manholes are not designed for someone to work in regularly, but workers may need to enter inside the manhole to complete their jobs such as cleaning, repair, inspection etc. The lack of prior caring of sewage work is the witness for the deaths of thousands of sewage cleaners throughout the year from accidents and various diseases such as hepatitis and typhoid due to sudden or sustained exposure to hazardous gases like CO, hydrogen sulphide, methane. A better knowledge related to hazards in the surroundings is necessary for the prevention of poisoning of gases. These gases have to be keep on track so that enormous rise in the normal level of effluents should be known and corrective measures can be taken. In contrary, the existing systems available are not much portable and are not affordable. In

the previous the designed Surveillance rover detects the presence of CO gas for monitoring system. The device consists of a processing section which takes input, processes it and provides output. This system requires base station should near to the sensors. In our project an embedded system is designed with Arduino MC and various gas sensors for the purpose of detection and altering that helps in eliminating the lives of human which is being endangered. The system is affordable to implement at well-defined monitored. In the existing system, a number of jobs related with gas detection and ensure security system. It has been implemented among these some were theoretical research approach and some were demonstrated in practical field to detect the gas but both approaches were effective manhole gas sensing unit has been developed which is capable to detect the toxic and explosive gases individually within a minute and LCD Display. Harmful gases like CO detection, Methane gas detection, Hydrogen Sulphide gas detection these gases are very toxic to the human, Heart Beat sensor this will be fixed on the workers hand watch and message will be sends to outside workers and Municipal Officers by using IOT.

## PROJECT OBJETIVE

The main objective of this project is to keep the city clean, safety and healthy. To help contractor's and workers to prevent gas poisoning during drainage work.

## PROPOSED SYSTEM

The smart drainage system will have: Sensors to detect blockage, flood and gases. The intelligence of sensors and system will identify the clogging inside the drainage system and will give the details of the location and other information for further actions. The system will also sense the presence of various harmful gases such as CH<sub>4</sub>, SO<sub>2</sub>, CO etc.

## 2. LITERATURE SURVEY

T. Machappa, M. Sasikala, and M. V. N. Ambika Prasad exhibited a framework that electrical obstruction WeinanDeng and Huaxing Zhang, the building of highways in China has led to an increasingly serious problem leaving more and more coal under highways. Having as much as possible the unexploited coal and maintaining highway safety at the same time becomes a problem that must be addressed as a matter of urgency. The paper addressed the characteristics of road deformations caused by underground mining, suggesting the rules to be followed while mining under highway protective coal pillar. Methods for the security mining of protective coal pillar under highway were put forward in the study on the basis of improving and integrating the existing methods for mining protective coal pillar.

Bo Tan ;Yimeng Song ; Wendong Shi, The importance of the Coal Mine Production Safety Supervision and the specific issues that might

occur under the concept of safety supervision function is proposed to create the Coal Mine Safety Production Supervision Program. The results, show that the addition of independent third parties to the coal mine production process implementation services in compliance with applicable guidelines, laws, rules and regulations and technical standards and the conduct of coal mining companies to establish an effective restriction framework can compensate for the government's macroscopic control and its own limitations. The establishment of the system to provide a reliable guarantee for coal mine safety production.

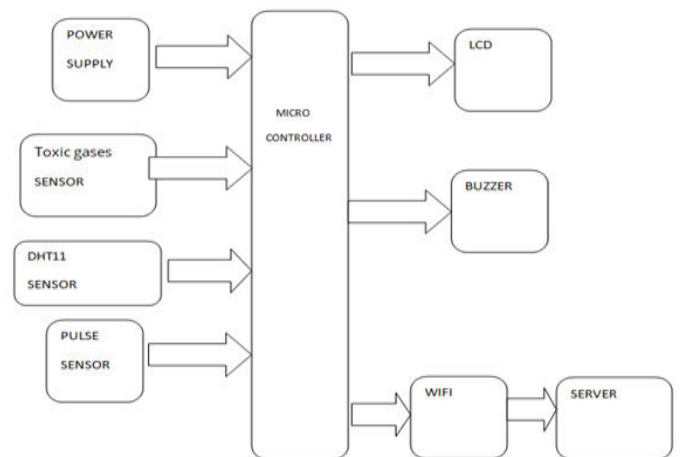
Yiqing Zhao, Yaodong Zhou, Cuiping Li and Zhiguo Cao, In the supply chain management (SCM) of coal companies, the volatility of the occurrence of raw coal and coal quality and the various limitations on mine production capacity are the major factors that need to be taken into account. This paper combines a supply chain model for coal mine planning with a linear programming model for production scheduling to allow coal companies respond quickly to changes in customer demand and boost supply chain and logistics management level.

The aim of production management and scheduling optimization model is to optimize sales volume with customer demand constraints, lead time, resource constraints and supply chain inventory. To illustrate the model application and its ability to reduce planning and scheduling time

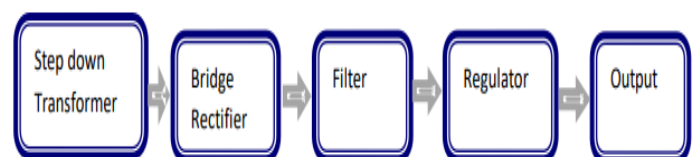
and respond to uncertainty, an example of an open pit coal mine is used.

Liu Xianglan, Big data has infiltrated various industries and their functions, has become important development factors in Research Article Volume 9 Issue No.10 IJESC, October 2019 23932 <http://ijesc.org/> the global economy. Big data processing is the cornerstone of the big data development process. Big data technology should concentrate on processing, analyzing, combining and visualizing unstructured data and semi-structured data. Big data will no longer be the core of traditional structured data.

### 3. Block diagram:



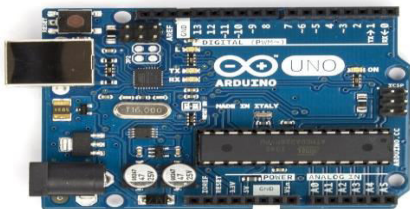
### Power supply diagram:



## 4. HARDWARE IMPLEMENTATION

### a. Arduino.

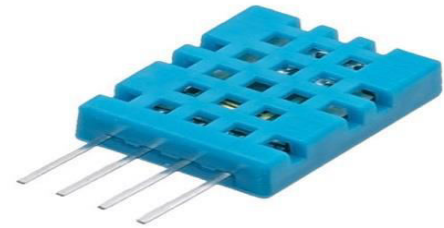
The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.



**Fig 4.1 : Arduino**

### b. DHT SENSOR

Humidity is the measure of water vapour present in the air. The level of humidity in air affects various physical, chemical and biological processes. In industrial applications, humidity can affect the business cost of the products, health and safety of the employees. So, in semiconductor industries and control system industries measurement of humidity is very important.



**Fig 4.2 : DHT Sensor**

### c. GAS SENSOR

A gas detector is a device that detects the presence of gases in an area, often as part of a safety system. A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals.



**Fig 4.3: Gas Sensor**

### d. HEART BEAT SENSOR

The heartbeat sensor is based on the principle of photoplethysmography. It measures the change in volume of blood through any organ of the body which causes a change in the light intensity through that organ (avascular region).



**Fig: 4.4 : Heart Beat Sensor**

**e. WIFI**

A wireless network uses radio waves, just like cell phones, televisions and radios do. In fact, communication across a wireless network is a lot like two-way radio communication.



**Fig 4.5: WIFI**

**f. LCD**

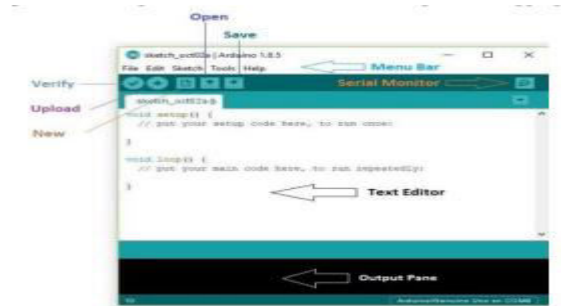
LCD used to display the leakage value will be high or low and also display the heart beat rate of the workers and displays the message as Emergency identified when the worker presses the emergency button.

**5. SOFTWARE IMPLEMENTATION**

**5.1 Arduino IDE**

ArduinoIDE IDE stands for —Integrated Development Environment:it is an official software introduced by Arduino.cc, that is mainly used for editing, compiling and uploading the

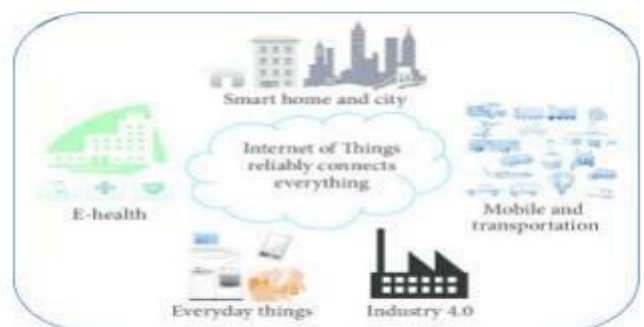
code in the Arduino Device. It is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++.Arduino IDE is anopen source software that is mainly used for writing and compiling the code into the Arduino Module. Ithas serial monitor mainly for interacting with the Arduino board using the computer, and is a great tool for real-time monitoring and debugging.



**Fig 5.1: Arduino IDE**

**5.2 Implementation IOT:**

The internet of things, or IoT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.



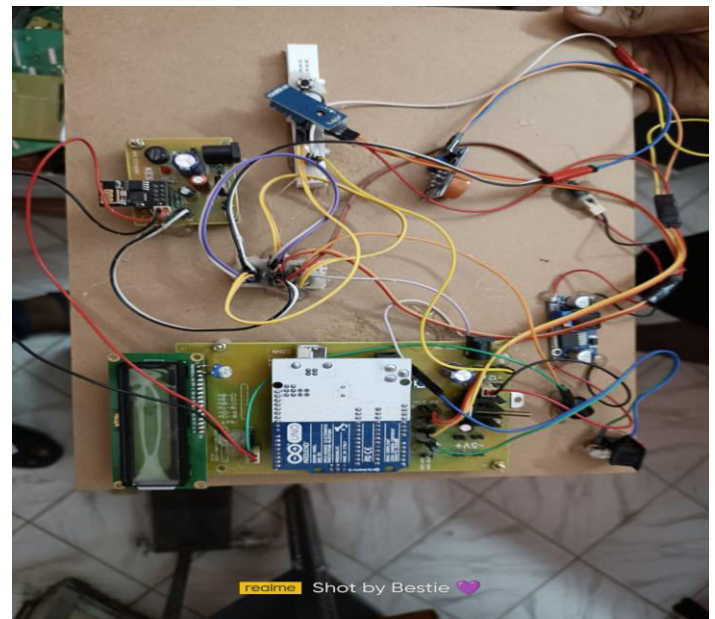
**Fig 5.2: IOT Implementation**

## CONCLUSION:

Internet of Things has gained its wide popularity in recent days due to its various streams of applications which has paved way for smooth, safe and easier mode of living style for human beings. Though, several techniques are existing for the same, yet sewage cleaning is one major concern and a challenge always. This paper thus put forth a new proposed system which is microcontroller-based application of sewage workers health monitoring systems using IOT. This device is designed keeping in mind, the measurement of necessary parameters, which needs to be monitored for unhindered safety of the workers. The device finds major application in household sewage systems, municipal manholes and sewage, sewer, deep well, gutters and drains etc. However, the places where toxic gases or fumes are present should never be handled by human workers directly. In country like India where sewage is mostly cleaned by humans, which make this device useful around India. The proposed methodology helps to prevent the sudden accident of workers and also helps to keep the society clean. The smart safety device is cost wise less and fast in accessing the WSN and transfer the information to both the concerned department and emergency department. The proposed device helps the worker at a basic level of knowledge to understand the gas level and his pulse rate. The smart device can be implemented

and used across the world and also helps to monitor the overflow of the sewage water.

## RESULTS:



## Hardware Prototype

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