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Solar Power Based Automatic Trench Gas Spotter

M. Kowsalya[1], K. Subraja[2*], M. Sowbarnika[3], V. Swathi[4], P. Subhiksh[5]
[1]*Assistant Professor, Department of Electronics and Communication Engineering, Sri Eshwar College of Engineering, Coimbatore, India*
[2,3,4,5]*Student, Department of Electronics and Communication Engineering, Sri Eshwar College of Engineering, Coimbatore, India*
*Corresponding author: subrajakece@gmail.com

***Abstract*: This project focuses on designing an embedded system to track and remove the effluents automatically and generate alert signal by providing power supply by solar energy. The hazardous gases like ammonia, methane and carbon monoxide turns out from sewage are sensed by gas sensors with ppm values and the ppm values exceeds the normal value the alert message is passed to the scavenger via GSM and the drainage water is removed automatically with relay and motors.**

***Keywords*: Alert signal, Gas sensors, ppm Levels, Power supply, Solar energy.**

1. Introduction

The safety of the people shall be the highest law in all working areas. Toxic effluents are more often released from sewage and sanitary areas which cannot be easily detected and cleaned by human senses. To overcome the problem, we implement this automatic trench spotter and doffer. This concept is to ensure the amount of contains hazardous gases like ammonia, methane, carbon-monoxide and hydrogen sulphide. For control the presence of toxic and non-toxic hazardous gases are frequently monitored and alert message will be passed to the scavenger.

The gas sensor, LCD and GSM module are connected to the microcontroller (Arduino). The microcontroller is powered by the solar source(Solar-panel:24-58Watts). The output from gas sensors are measured and displayed in the LCD and ppm measured of the gases present in the trench are sensed the alert message is passed through the scavenger's vis GSM. The doffing process is carried out through the motor (A.C-Three phase) is controlled by the relay (Solid-state relay).

- Solar Panel: The solar panel is used to provide the power to microcontroller in day time. And the power saver is continuously stored the power can be utilized the evening time.
- Sensor: Gas sensors are used to detect the hazardous gases in the trench. The gases like ammonia, methane, carbon-monoxide, LPG gases are sensed by the gas sensors and ppm levels are frequently monitored.
  MQ-2: The MQ-2 gas sensor is useful for gas leakage detection (home and industry). The ppm level of MQ-2 is 200-10000ppm
  MQ-6: The MQ-6 is used in gas leakage detecting equipment in family and industry. The ppm level of the MQ-6 is 1000ppm.
  MQ-4: The MQ-7 is a simple to use methane sensor suitable for sensing natural gas and methane concentrations in the sewage. The ppm level of MQ-4 is 200-10000ppm.
- Display (LCD): An LCD is electronic display module used to produce a visible image. The display normally requires 5V power supply.
- Microcontroller: Arduino is microcontroller based it has 14 digital input/output pins in which 6 can be used as PMW output, 6 analog inputs, a 16 MHZ resonator, a USB connection, a power jack, an ICSP header and a reset button. Normally the Arduino controller is 5v. The LCD, GSM, and the gas sensors are connected to the microcontroller.
- GSM: GSM module is open and digital cellular technology used to transmitting the mobile message. When the ppm levels exceed the normal level alert message sending via GSM to the scavengers.
- Motor: AC (3phase-240V): The motor is used to doffing process. The Three-phase (A.C 240v) motor is help to the relay and pumps to carried out the water in the trench.

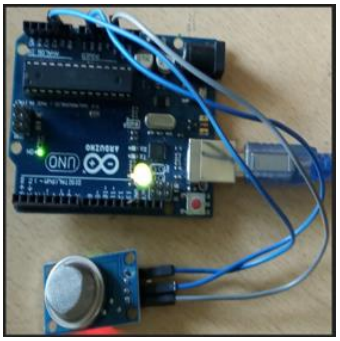

Fig. 1. Gas sensor output

The image shows the output of the gas sensor.

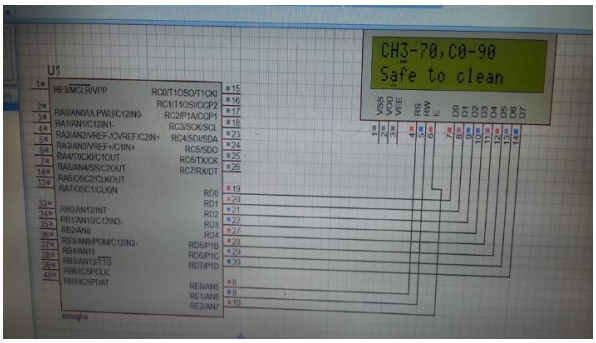

Fig. 2. LCD display output

The image shows the output of the LCD display.

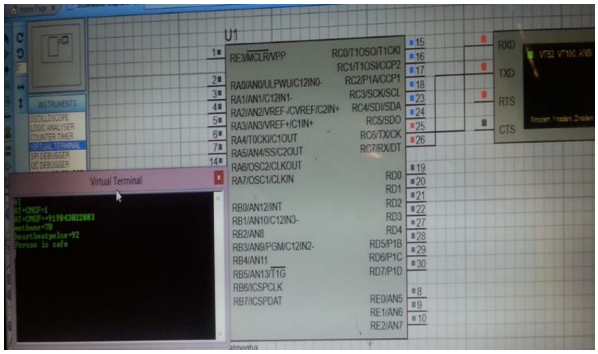

Fig. 3. Output of GSM

The image shows the output of GSM.

2. Conclusion

This paper presented an overview on solar power based automatic trench gas spotter.

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