DESIGN OF A HARMFUL GAS DETECTION SYSTEM

Mustafa Kemal TEZCAN[1], Taşkın TEZ[2], Fatma TEZCAN[3], Hilmi KUŞÇU[4]
[1]*The University of Trakya,*
[2]*Edirne Provincial Health Directorate,*
[3]*The University of Kırklareli,*
[4]*The University of Trakya*

Abstract
    With the growth of the livestock sector, the need for automation is increasing. Animal feces in cattle farms must be cleaned. This cleaning requires labor and time. Based on this, it is thought that this process will be done automatically in animal farms. Phospor (P) and Nitrogen (N), which are excreted with animal feces, can turn into different gases such as nitrate (NO3), nitrous oxide (N20), nitrogen monoxide (NO) and nitrogen dioxide (NO2), methane (CH4) as a result of chemical transformation. The gas sensor will measure the amount of gas in the waste generated in cattle farms and when the amount of gas exceeds a certain value, it will activate the electric scraper and automatically skim the animal waste. Experimental findings have discussed and recommendations for the development of harmful gas detection systems have been presented.

Keywords: harmful gas detection, animal waste, electric scraper.

INTRODUCTION

Manure removal in farms is one of the most important problems of animal husbandry. Caregivers in the farms try to scrape the manure with their own means, and with this method, both the animal keepers get tired and the expected productivity and efficiency cannot be obtained from the animals because the desired hygiene and cleaning cannot be provided in the barns. Electric manure scrapers have been produced with the ever-evolving machine technology in world animal husbandry. But these are controlled manually. By automating this process, it is aimed to increase the hygiene of the environment and the productivity of the animals.

EXPOSITION

In this study, the data coming from the mq-135 harmful gas sensor for the measurement of harmful gases is processed by the atmega processor based arduino Uno microcontroller, and it sends a signal to the LCD screen and peripheral units, and provides the necessary actions. The measured harmful gas values are read on the LCD screen and the cleaning of the barn is performed by sending a signal to the relay at the determined values.

SYSTEM COMPONENTS

The MQ-135 has a high reliability and stable for long-term operation. The fast-responding and high sensitivity sensor measures 10ppm to 1000ppm. gas concentration. It is an advanced sensor unit that are used in air quality control equipments for buildings/offices, are suitable for detecting of NH3,NOx, alcohol, Benzene, smoke,CO2 ,etc. (Int-1, 2020)
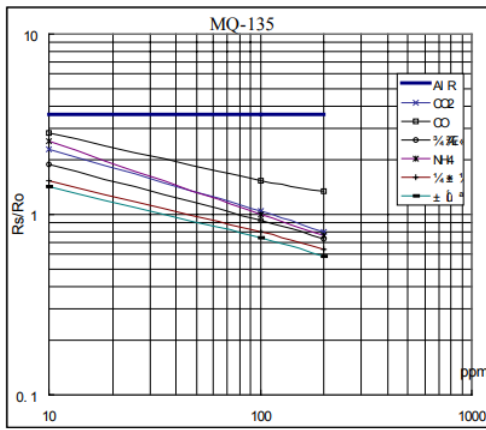

***Fig. 1.** MQ-135 GAS SENSOR*

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Fig. 2. *Sensitivity characteristics of the MQ-135*

This is a 5V 4-channel relay interface board, and each channel needs a 15-20mA driver current. It can be used to control various appliances and equipment with large current. It is equiped with high-current relays that work under AC250V 10A or DC30V 10A. It has a standard interface that can be controlled directly by microcontroller. (Int-2, 2020)
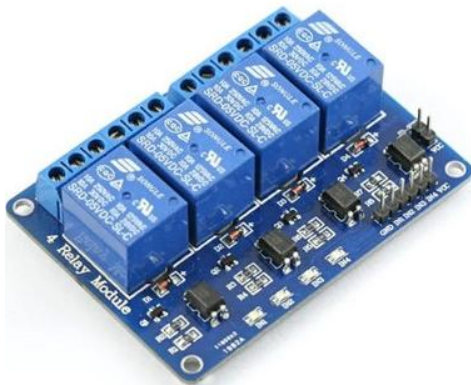

Fig. 3. *4 Relay Module*

The 2x16 LCD Keypad Shield is an LCD display that shows the indoor room temperature and humidity measured by the sensors in the system, the outdoor temperature and whether the window and valve are open in 2 rows and 16 columns. (Int-3, 2020)

Fig. 4. *2x16 LCD Keypad Shield*

Ardunio Uno is a development board with 6 analog inputs, 14 digital inputs and outputs and ATMEL - based ATmega328 microcontroller. (Int-4, 2020)

Fig. 5. *Arduino Uno*

SYSTEM OPERATING CYCLE

With the accumulation of animal feces in the barn over time, the amount of harmful gases in the environment increases. Air quality is divided into three classes by reading the amount of harmful gases with an Arduino Uno based mq-135 harmful gas measurement sensor. If the air quality is measured less than 200, it is considered as "good". If the air quality value is measured between 200 and 400, it is defined as "moderate". If the measurement is higher than 400, the air quality is considered "poor". If the air quality is moderate or poor, the system sends a signal to the relay and operates the electric scraper. If the air quality is "good", no action is required.
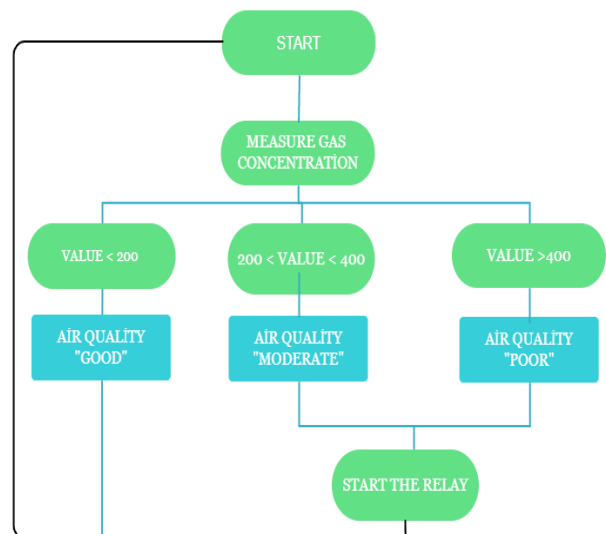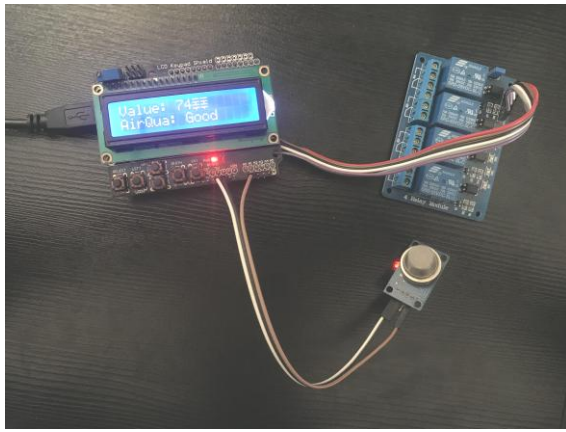

Fig. 6. *Algorithm Flow Chart*

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Fig. 7. *Algorithm Flow Chart*

Fig. 8. *Cattle Farm Air Quality Measurements*

CONCLUSION

By adding different sensors to this system, the type of gases in the environment can be determined. Thus, by making better analyzes

on the nutrition of animals, their diet can be improved and milk yield can be increased. Some diseases can be noticed beforehand.

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