Developing Infrared Controlled Automated Door System

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ABSTRACT- *As a result of enhanced civilization and modernization, the human nature demands more comfort to his life. Automated doors have acquired and have become part of one's life from his office to shopping complex. Automated doors are quite common and a vast field of research now days. Many attempts are made to decrease the manufacturing cost and achieve an efficient and inexpensive output. This paper will focus upon giving a brief idea about construction of an automated door using IR sensors. A small experiment was performed which gave the desired output.*

Keywords – IR sensor, Comparator, DC Motor, Motor driver circuit, sliding door.

I.   INTRODUCTION

Automatic door is an automated movable barrier installed in the entry of a room or building to restrict access, provide ease of opening a door or provide visual privacy. This is being achieved by various detection circuits available in the market. These detection circuits vary from basic sensors like IR sensor, force sensors to complex and expensive vision circuitry. To this end, we model and design an automatic sliding door with a room light control system to provide the mentioned needs. This was achieved by considering some factors such as economy, availability of components and research materials, efficiency, compatibility and portability and also durability in the design process. This system works on the principle of breaking an infrared beam of light, sensed by a photodiode. It consists of transmitting infrared diodes and receiving photo-diodes. The system is to detect whether someone is coming in or not. The photodiodes are connected to comparators, which give a lower output when the beam is broken and high output when transmitting normally. The general operation of the work and performance is dependent on the presence of an intruder entering through the door and how close he/she is in closer to the door. The overall work was implemented with a constructed work, tested working and perfectly functional.

II.   COMPONENTS

IR SENSOR- The sensor senses whether receiver of it is receiving light from transmitter or not and feeds the result to the comparator. If any obstacle comes in between receiver or transmitter then the path of infrared between receiver and transmitter breaks off. This result of receiver receiving the light or not is sent to the comparator.
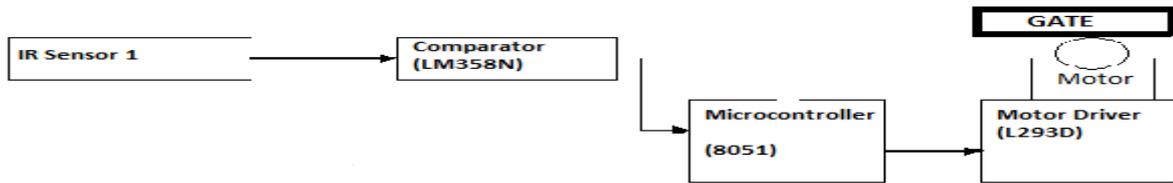
COMPARATOR- Comparator compares the analogue inputs from the sensors with a fixed reference voltage. If this voltage is higher than the reference voltage than comparator outputs a low voltage and if the voltage is lower than the reference voltage than it outputs a high voltage to the decision making element that is the microcontroller. The IC used of the comparator is LM358N.

MICROCONTROLLER- Microcontroller is pre-programmed to turn on the motors or supply required current and voltage to motors only if the condition is fulfilled. Microcontroller check when the output of comparator is low it turns the motor on as the path between receiver and transmitter is broken due to some obstacle between them. The microcontroller feeds the output to the motor driver. After providing the output to run motor it must also give some delay that can be the time for the person to pass through the gate and after the body goes away it should also run motor anticlockwise to close the door.

MOTOR DRIVER- The current supplied by the microcontroller to is not sufficient to drive the motor. Thus motor driver provides sufficient current to run motor. It can take a maximum current of 600mA per channel which is more than enough to drive two motors. The IC used for it is L293D.

Voltage Regulator: 7805IC gives the output of 5V from 9V to microcontroller and motor driver.
Thus this way you can have a black line following robot ready to perform tasks.

III.   BLOCK DIAGRAM

IV.   SYSTEM PROGRAMMING

The program is being written in C language and the target we are trying to achieve through this program is already being defined in the above section.

```c
#include <AT89X51.H>
#define L293D_A P2_0          //Positive of motor
void rotate_f(void);          //Forward run function
void rotate_b(void);          //Backward run function
void breaks(void);            //Motor stop function
void delay(void);             //Some delay

void main(){                  //Our main function
   while(1){                  //Infinite loop
          rotate_f();         //Run forward
          delay();            //Some delay
          breaks();           //Stop
          delay();            //Some delay
          rotate_b();         //Run Backwards
          delay();            //Some delay
          breaks();           //Stop
          delay();            //Some delay
     }                        //Do this infinitely
}

void rotate_f(){
     L293D_A = 1;             //Make positive of motor 1

}

void rotate_b(){
     L293D_A = 0;             //Make negative of motor 0
     }

void breaks(){
     L293D_A = 0;             //Make positive of motor 0

}

void delay(){                 //Some delay...
   unsigned char i,j,k;
   for(i=0;i<0x20;i++)
     for(j=0;j<255;j++)
      for(k=0;k<255;k++);
}
```

V.   CONCLUSION

This project gave an insight into designing of an automated door just by using IR sensors. This helped in reducing the cost spent in construction of automated doors. This project has lot of future scope like the same way we can construct a sliding door with a security system by attaching a keypad to enter password and then providing the access to the person into that secured area.

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