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Automatic Door Open/Close System Using Arduino and PIR Motion Sensor

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ABSTRACT

In this project Automatic Door Open/Close System Using ArduinoUno R3 and Passive Infrared (PIR) Motion Sensor is designed. This module is simple in operation where PIR sensor that can detect movement is created. Light Emitting Display - LED will glow up when movement is detected.This system saves lot of energy which can be used for air conditioning, because the door remains open only when a person is sensed and remains closed at other times in the absence of person. This automatic sliding door system can be useful for blind, old and maimed people.

KEYWORDS:Arduino, PIR sensor, motion, movement, door.

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INTRODUCTION

The project module designed is Automatic Door Open/Close System using ArduinoUno R3 [1]and Passive Infra-Red (PIR) motion detector. Open/close of door is always tiresome work especially for blind, disabled and aged people in their home, shopping malls, etc. This project automatically open/close door by sensing any motion near the door using PIR (Passive Infrared) motion detector. Human body has tendency to emit infrared radiation, this will be sensed by PIR sensor. This signal is fed to Arduino UNO R3 board which then operates the door through motor driver IC. When a person is within the operating range of the sensor, it sends a logic signal to operate the door, so the door opens and after sometime when the person has moved and he is out of range of the sensor, the door closes after some delay time.

EXISTING METHOD

In the existing system 8051 microcontroller is used for automatically door opening/closing and weight-sensitive pads were used to control whose performance is not reliable.

METHODOLOGY

Working of Automatic Door Opening System

The working of Automatic Door Opening System is explained below. Passive Infra-Red Sensor detects infrared radiations emitted by Human body in the form of heat. The change in infrared radiation is converted to a voltage. The voltage from the PIR Sensor is given to Arduino UNO R3for further controlling the motor which then drives the door.

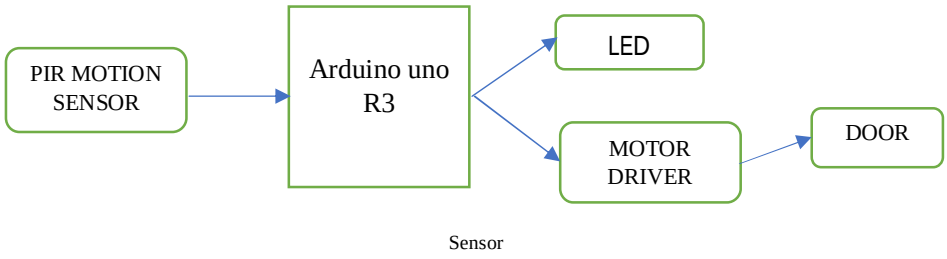

Fig 1 Block Diagram of Automatic Door System Using Arduinoand PIR Motion Sensor

Components Required

- PIR Motion Sensor
- Arduino UNO
- Light Emitting Display-LED
- Motor Driver – L298

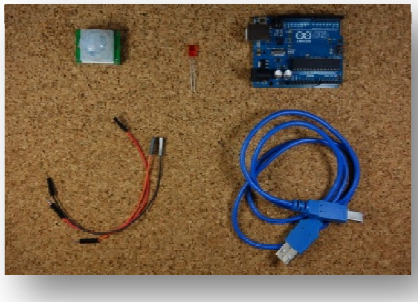

Fig 2. Parts of Automatic door open/close system

PIR Motion Sensor(HC-SR501)

"Passive Infrared" or PIR motion sensor [3,4], is a pyroelectric device which measures infrared radiation from objects within its operating range. It detects motion based on the changes in infrared radiation in the surrounding. This device is smaller in size, ranges from one inch - four inches for. It has long live and are cheap, which finds application in many industries, household, supermarkets, retail and business locations, offices.

Fig 3. PIR Sensor

The sensor in the figure above has two built-in potentiometers to adjust the delay time (the potentiometer at the left) and the sensitivity (the potentiometer at the right). The sensor has 3 pins.

- 5V – connect to 5V
- GND – connect to ground
- OUT – connect to an Arduino digital pin

Interfacing PIR sensor with Arduino is very simple and easy, since the output is digital. For proper operation, the PIR sensor should be started after giving warm up time of 20 to 60 seconds for calibrating itself and the LED glows. The output of the sensor becomes erroneous if the sensor is not given enough calibrating time.

L298 Motor Driver

The motor driver used for open/close the dooris L298 shown in Fig 4.

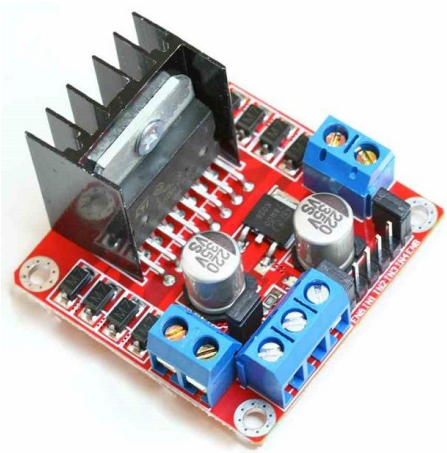

Fig 4 Motor Driver

This dual bidirectional motor driver module L298 is very popular and easily control two motors of up to 2A each in both directions.It is ideal for robotic applications and well suited for connection to arduino. Motor drivers converts low current control signal and provides a high current signal which drives the motorsand act as current amplifiers.It drives two motors both in reverse and forward direction simultaneously. H Bridge is used to control the rotation direction and tis can be achieved by changing the flow of current.

Working of Automatic Door Opening System

The objective is to design an Automatic Door Open/Close System using Arduino Uno R3 and PIR sensor, in which automatically the door is open/close by sensing the motion of a person.The Data OUT Pin of PIR sensor becomes HIGH, When the it detects any motion of a person. The HIGH Signal is detected by the Arduino, since PIR sensor is connected to the Arduino, and it implies that a person is near to the door. Arduino then sends signal to the L298N Motor Driver module and activates it to open the door.The door should remain open sensing the person presence for some time delay. Whenthe person has moved away,the Data OUT of PIR sensor becomes low and the Arduino will once again activate the Motor Driveand the door closes after 2 to 5 seconds. The door remains closed until the arrival of the next person.

RESULTS AND DISCUSSION

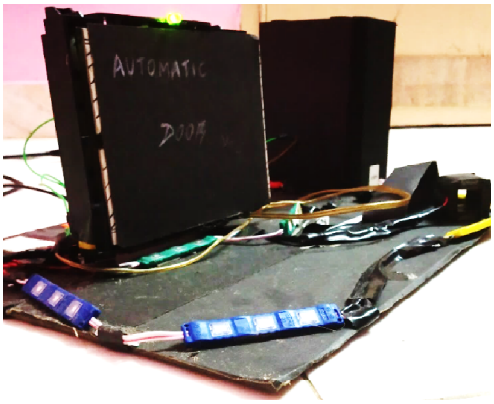

Fig 5. Snapshot of Automatic Open/Close door system

Fig 5 shows the setup of Automatic Open/Close door system using Arduino Uno and PIR sensor.

CONCLUSION AND FUTURE SCOPE

Thus, Automatic Door Open/Close System is implemented using Arduino Uno R3 and PIR sensor.The door remains open when a person is sensed and remains closed when there is no one present, it saves lot of energy and reduces current consumption.This automatic door system with sliding doors can be useful for blind, old, and maimed people.It can be implemented with additional features like face recognition for security purpose in future.

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