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Design and Fabrication of Heat Detection System in a Car Passenger Cabin

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ABSTRACT
In this project we aim in placing a heat detection system in a car . The heat detection system would sense the rise in temperature inside the car. Because of increase in temperature during day time the requirement of cooling system in absence of person inside the car is a major concern. In order to meet this requirement a method to reduce the temperature inside a car is required .In our project we are using DHT-11 sensor to detect the heat change inside the car .This sensor which is connected by an Arduino uno board sends the signal to the motor which slides down the window and cools the interior . After attaining normal temperature the window again slides up. In the past few years many fatalities have been reported as the result of internal car heat. Problems arise when the temperature in a car cabin is too hot when parked under direct sunlight. The trapped and accumulated heat causes the temperature inside a car to reach temperatures soaring high temperatures.
Keywords - Arduino, Car cabin, Heat Detection

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I. INTRODUCTION

With the popularity of cars into the family, more and more people pay higher requirements for the thermal comfort of car passenger compartment. The thermal comfort of occupant in car passenger compartment has become more important due to their increasing mobility leading to more time spent by people inside cars. This paper mainly introduced the influence of car passenger compartment's temperature variation on thermal comfort by conducting a field experiment. Two different cases were analysed during parking and driving stage.

One consisted of opening window gaps and adding sunshade during parking, the other mainly compared the difference between ventilation and air conditioning when driving. Measured data showed the temperature difference between the inside and outside of the car passenger compartment was relatively small when car opened window gap. The result revealed a clear temperature reduction of the air conditioning systems when the car moved forward. In summary, our results demonstrate that opening window gap and air conditioning can provide a comfortable thermal environment in car passenger compartment in summer.

1.1 NECESSITY OF HEAT DETECTION SYSTEM

Need of a temperature maintaining system in every car is mandatory because abnormal increase in temperatures lead to fatalities of infants and pets when left under no supervision . Our system aims at maintaining ambient temperature and to supply proper ventilation with keeping safety in concern

II. COMPONENTS

The functioning of entire device depends upon the four important parts. They are:

2.1 ARDUINO

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable.

2.2 DHT 11 SENSOR

The digital temperature and humidity sensor DHT11 is a composite sensor that contains a calibrated digital signal output of temperature and

humidity. The technology of a dedicated digital modules collection and the temperature and humidity sensing technology are applied to ensure that the product has high reliability and excellent long-term stability. The sensor includes a resistive sense of wet component and an NTC temperature measurement device, and is connected with a high-performance 8-bit microcontroller. The schematic diagram of the Humiture Sensor Module is as shown following:

Only three pins are available for use: VCC, GND, and DATA. The communication process begins with the DATA line sending start signals to DHT11, and DHT11 receives the signals and returns an answer signal. Then the host receives the answer signal and begins to receive 40-bit humiture data (8-bit humidity integer + 8-bit humidity decimal + 8-bit temperature integer + 8
bit temperature decimal + 8-bit checksum).

2.3 RACK AND PINION

Fig 1: Rack and pinion arrangement

A rack and pinion is a type of linear actuator that comprises a pair of gears which convert rotational motion into linear motion. A circular gear called "the pinion" engages teeth on a linear "gear" bar called "the rack"; rotational motion applied to the pinion causes the rack to move relative to the pinion, thereby translating the rotational motion of the pinion into linear motion.

For example, in a rack railway, the rotation of a pinion mounted on a locomotive or a railcar engages a rack between the rails and forces a train up a steep slope.

For every pair of conjugate involute profile, there is a basic rack. This basic rack is the profile of the conjugate gear of infinite pitch radius (i.e. a toothed straight edge). A generating rack is a rack outline used to indicate tooth details and dimensions for the design of a generating tool, such as a hob or a gear shaper cutter.

III. WORKING

On detection of slight increase in temperature by the the DHT11 sensor , it sends signal to the Arduino uno .The Arduino Uno then sends signal to the relay switch ,which there by functions the servo motor .the servo motor runs the gear which in turn slides the acrylic glass .There is also a PIR (passive infrared sensor)to detect any obstacle.Interference when the glass is down.

3.1 Analysis of Rise in temperature

Fig 2 : Rise in Temperature in Celcius vs Time Graph

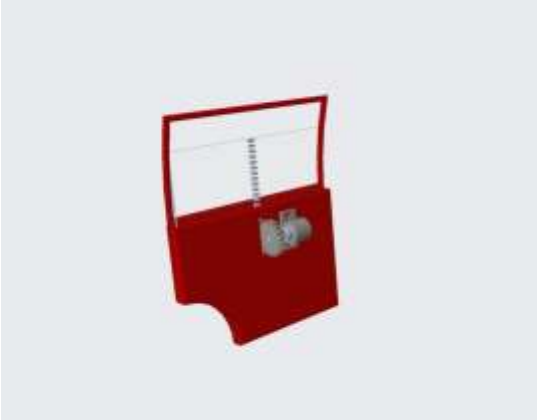

Fig 3: 3D diagram of Heat Detection System prototype

IV. CONCLUSION

The air trapped within the car, has poor thermal communication with the air, and so must become considerably hotter than the outside air in order lose enough heat to its surroundings to balance the heat budget. having to transfer heat from the solid interior of the car, to the air within the car, then to the glass, then finally from the glass to the outside air ,so a system is then added to keep the ambient temperature maintained by providing proper ventilation and keeping safety in concern

ADVANTAGES

- Automatic sliding of windows without any external source.
- It senses both change in temperature and humidity change.
- It not only slides down the window but also it slides the slide up when an external source tries to open the window from outside.
- It increases the comfort inside the car.

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