

Mall Automation: A Study

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Abstract- The paper presents the design of a working model of Mall automation system that uses Arduino to control the whole process. The system can be divided majorly into 2 sections. 1) The first section is automatic door unit which uses PIR sensor as the sensing machine. 2) The other section is the rest unit of the mall including escalator, air conditioner, emergency alarm system, smoke detector, etc.

The hardware implementation of the model includes various sensors such as DHT11 temperature sensor, smoke detector sensor, PIR sensor, piezoelectric sensor, etc and interfacing of the components with the Arduino manages the all major operations the proposed design. This proposed system is a better as it is compact and cheap and it will be useful in the future because of the energy conservation ideology. Because of the presence of the piezoelectric sensor near or close to the doormat at the entrance, the sensor converts some scalable amount of potential energy into electricity. This may help in storing energy that can be helpful in some small scale application in future. Moreover, this system is flexible as it can adjust with new system behavior, if any, in the future work.

Keywords- Arduino UNO, Automatic door, PIR Sensor, Temperature sensor, DC servo motor, buzzer, energy conservation



I. INTRODUCTION

Mall automation is an information design that is proposed to provide information related to shopping centers, entertainment places, commercial complexes, etc. In Mall automation, we are going to use controller which controls the system such as, opening and closing of the door by detecting any change in the heat of the surrounding (radiated by the human body or any object). The main function of the door automation is opening and closing of the door without any human efforts. This project makes difference regarding the better energy management and use of energy like pressure i.e. converted into electric energy for further process. In escalator system, when there is no one in front of the sensor which is fitted at the starting point of the escalator, then escalator do not work and saves large amount of mechanical energy. As automation is a user-friendly and smart process, henceforth, it is useful in industrial as well as commercial applications.

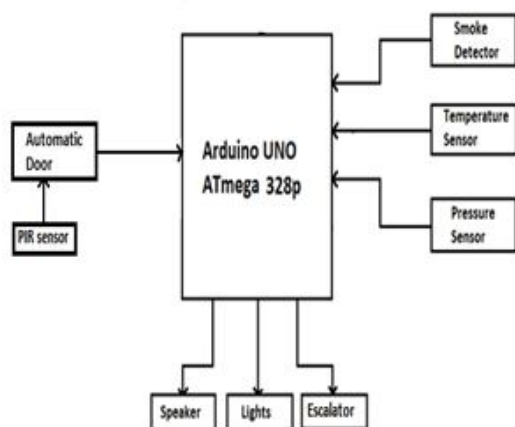
II. METHODOLOGY

In this project, the microcontroller and software were chosen as the basis for this project because of its open-source nature and will be programmed as per requirement. 1) In this project, we are going to use such a sensor which continuously senses variation in terms of heat radiated by anybody and thus help in opening and closing the door. 2) Also, we use one sensor which counts the temperature at a point and maintains the air conditioner temperature according to set-point. 3) In the escalator system, when an event happens or any interrupt occurs across the sensor, at this time the escalator gets started until a person reaches to the endpoint. Otherwise, the escalator stops. 4) In case of emergency i.e., fire in the mall, the smoke detector sensor detects the rise in the temperature about set-point and the controller starts alarming for an alert in the people. Also at the same time the red LEDs start blinking simultaneously. 5) Further, we have taken some steps towards energy conservation using a sensor which is placed beneath the doormats which can help in converting some scalable amount of potential energy into electricity.

The controller is used to control and take right decisions by observing the situation and comparing the data which is provided by sensors to the standard data that is obtained through set-point. This system is flexible and cost effective with increasing variety of devices to be controlled. In mall automation installation, automation is as straightforward that by just opening the door and people entering the mall will show the working of the proposed system. In advanced installations, the controller checks the present temperature and on the air conditioner and hold the temperature to set point.

SR.NO	NAME	OUTLOOK	DESCRIPTION
1	Arduino UNO		Operating voltage:5V Operating current at 3.3V: 50mA
2	PIR Sensor		Operating voltage between 4.5 to 20 V, Detection range between 3 to 7 meter, duration from 5 to 20ms
3	DC servo motor		Operating voltage between 4.8 to 6V, Torque : 2.5 kgf-cm (4.8V) and 3 kgf-cm (6V)
4	Temperature sensor		Operating voltage 3.3 to 5V DC, Temperature measuring range : 0 degree to +50 degree
5	Buzzer		Operating voltage 1.5 to 24 V, Dimension 7 to 25 mm
6	LED's		Operating voltage 3V to 5V, Operating current 25mA

III. HARDWARE FRAMEWORK



1) Arduino UNO 328p

The basic principle of this project revolves around the microcontroller operation. Objective behind using Arduino UNO is that it is user friendly as compared to other microcontrollers like pic Microcontroller. Are you know users 14 digital input output pins out of which 6 can be used as pwm output, 6 can be used for analogue input And 2 pins are used as transmitter and receiver. Arduino microcontroller is classified into three the first is the Mega the second is UNO and the third is the nano. Arduino Uno field fits the bill perfectly for our project instead of using Nano which has very less pins.

2) IR Sensor

The purpose of using IR sensor for the automatic door is that the proposed model of a project is of small scale while using for a large scale we have to use the PIR sensor. An IR Sensor detects the heat of an object as well and it detects the motion.

3) PIR Sensor

PIR sensors are used in this project to detect the human motion in the room so that when a human passes from light, the light will turn on and off according to his/her motion. PIR sensor is a passive Infrared sensor which is an electronic sensor that measures the infrared radiation which are being emitted from the objects are humans that units that are in its field of view. The range of IR sensor is approx 10 meters.

4) Temperature Sensor (DHT11)

DHT11 is a temperature sensor that senses analogue temperature and converts it into its equivalent digital output. We can also use DHT11 as a humidity sensing device. Talking about the use of this temperature sensor in a project we find that this sensor continuously monitors room temperature and according to the Rise and fall in the temperature it turns the fan circuitry on and off. This concept yields conservation of energy as well because the fan circuitry is on only when it is needed and not continuously. DHT11 is superior to rest of the temperature sensors as it consists of resistive sense of wet components and is also connected to a high performance microcontroller.

5) DC motor

The motor is used for automatic door control. The motor will be supported by rack and pinion. The movement of the door will be in sliding pattern displaying the opening and

closing. The motor converts electrical energy into mechanical energy as sensor senses the motion and causes the door to open by operation of motor aptly supporting it.

6) Pressure sensor

The innovative concept that is used in our project deals with the use of pressure sensor. This is one step towards creation of a small amount of electricity with the help of relentless human effort. The pressure sensors that we are using are in the form of small piezoelectric chips that are laid beneath the tiles or the doormats either just in front of the main entrance door or gate or inside the mall. These small chips when pressed due to the impact of the footsteps of people will produce some amount of voltage and very small amount of current. The voltage then can be stored and then utilized for some small scale application.

7) Escalator

The proposed escalator works on the principle of motor operation and IR sensor sensing. The escalator will be in steady condition i.e., stop position when there is no human or object detected by the IR sensor at the starting point of the escalator. If the IR sensor detects anything at the starting point of the escalator, the escalator will be in motion and will remain in the same state up to some interval that will be fixed by the controller and then stop. The escalator will remain in motion if multiple people use it and the time interval will be recalculated for every person or object that is detected by the IR sensor. This can also help in energy conservation to some extent.

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V. CONCLUSION

The proposed project is basically to reduce the human efforts and save energy that is consumed in large amounts in malls these days. On small scale medium we intend to showcase various processes or simulations of displaying the objectives mentioned. This paper focuses on pitching the ideas that have come across our minds and we hope to play a tiny role in the betterment of the society with our project.

REFERENCES

- [1] Prof. R.S. Suryavanshi, Kunal Khivensara, Gulam Hussain, Nitish Bansal, Vikash Kumar, "Home Automation System Using Android and Wi-Fi" International Journal Of Engineering And Computer Science ISSN: 2319-7242 Volume 3 Issue 10 October, 2014 Page No.8792-8794.
- [2] Vaishnavi S. Gunge, Pratibha S. Yalagi, "Smart Home Automation: A Literature Review" International Journal of Computer Applications (0975 – 8887) National Seminar on Recent Trends in Data Mining (RTDM 2016).
- [3] 3. Tarun Agarwal, "Movement Sensed Automatic Door Opening System Circuit and Working" El-Pro-Cus.
- [4] Karthik Krishnamurthi, S. Irudaya Mary, B. N. Sumalatha, Adler Pereira, "Automatic Door Opener using Arduino" Circuit Digest.
- [5] A. S. Biradar, S. B. Dhage, V. V. Jamadar, H. S. Kasar, Prof. Javed Shaikh, SKN-SITS "Smart Home Automation System" IJARCET, ISSN-2278-1323, Volume 5, Issue 4, April 2016.