PROJECT-TVISHA An Automatic Corridor Light Control System

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***Abstract*--Electrical energy is playing a very important role in today's world. It is important to save power for our future. So, we thought of reducing power consumption, especially in corridors. This paper is mainly focused on the Automatic corridor light control system. The main purpose of this idea is to make corridor light autonomous and effective, which leads to reduced power consumption. The corridor is not always occupied by people, hence there is no need for light to be always turned ON. The presence of people in the corridor makes the corridor light be turned ON/OFF automatically. This paper is based on Arduino UNO, Ultrasonic sensor, and relay module. With the assistance of this system, power will be consumed only in the presence of a person in the corridor, hence we can save the energy bill.**

Keywords—Relay module; motion sensor; Ultrasonic sensor; Arduino UNO; power consumption;

I. INTRODUCTION

The average need for usage of power is increasing day to day. The usage of electricity is increasing as per the increase in industrialization and modernization. Using automation in switching the corridor lights the consumption of electricity can be comprehensively reduced [1]. The power is being wasted when people forget to switch OFF the lights, in some situations, power is wasted by the use of low efficient appliances. Project TVISHA is a system where the switching of corridor lights is caused by human presence. Generally, in institutions, hostels, and museums, a large amount of power is wasted in corridor lights and street lights, etc, observed. So, we identified this problem in our department and planned to overcome it. Hence, the decision is taken to make use of some electronic components to build a corridor system that reduces power consumption [2].

II. LITERATURE SURVEY

In [3], the system uses Arduino and PIR sensor which turns ON and turns OFF the illumination system by sensing the presence of a person in the range of the sensor [4]. It is applicable only where we do not need constant light but only when an individual is present. This model only detects the change in IR radiation. So, a person must move. The system fails to turn ON the light if the person is stationary. To overcome this limitation, the PIR sensor must be replaced which is discussed in [5], Daeho Kim et al., worked on a smart LED lighting system by using Infrared and Ultrasonic sensors together. This paper proposed a model that continuously tracks the human presence. Output based on the human tracking data, which is obtained by these sensors is responsible for ON-OFF control of the LED lighting. The previous system fails to continuously monitor the human presence, but in this proposed model human presence is detected by an IR sensor and continuous tracking is possible by the ultrasonic sensor [6].

III. METHODOLOGY

This project uses an Ultrasonic sensor (HC-SR04) that detects human presence within its range [7]. And turns ON the light in the same range when human presence is detected.

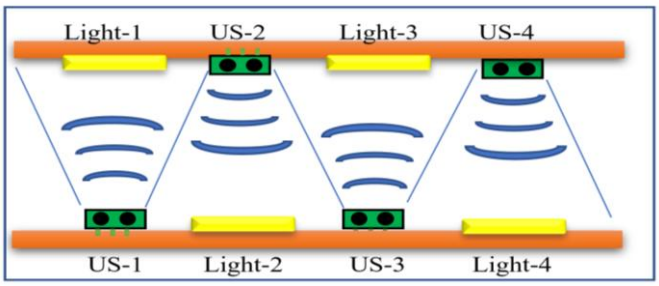

Figure 1. Ultrasonic sensor and light placements in the corridor.

Figure 1, shows the top view of the corridor in which the automatic corridor system is implemented. The total sensing angle of the Ultrasonic sensor is 45^0 [8]. The Ultrasonic sensors are placed in such a way that the gray areas are nullified, that is the Ultrasonic sensors are placed in a zig-zag pattern as shown in the above figure [9].

A. Flow Chart

The below figure shows the flow chart for this system.

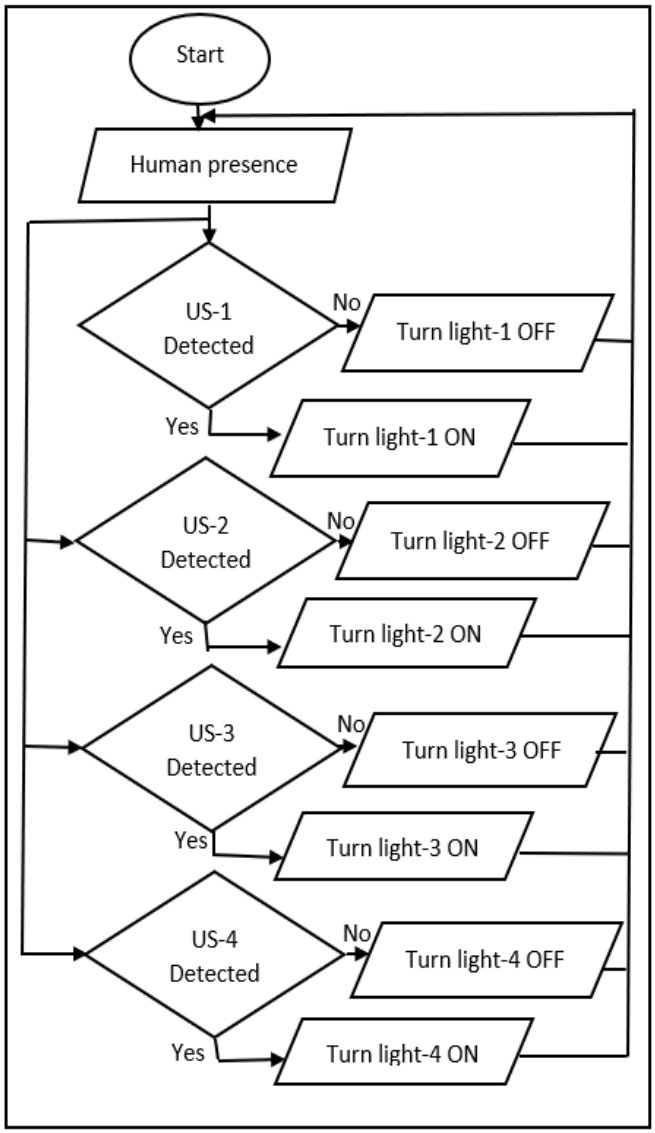

Figure 2. Flow chart of the proposed system.

Let us discuss some of the possibilities between a person and ultrasonic detection.

Case 1:

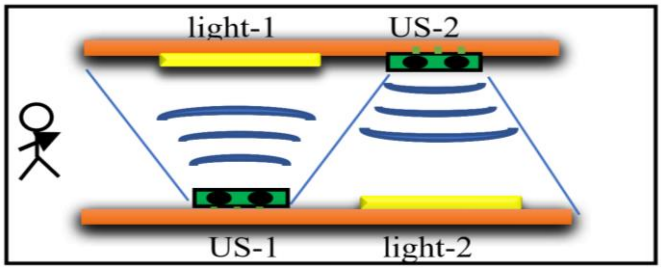

Figure 3. A person is out of the ultrasonic sensor range.

In this case, since the person is not present in the range of the Ultrasonic sensor (US-1 or US-2), hence no lights are turned ON.

Case 2:

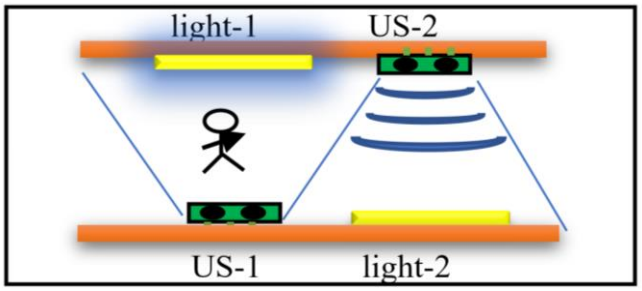

Figure 4. A person is present in the range of US-1.

In this case, when the person enters into the range of the US-1 Ultrasonic sensor, the light-1 will be turned ON.

Case 3:

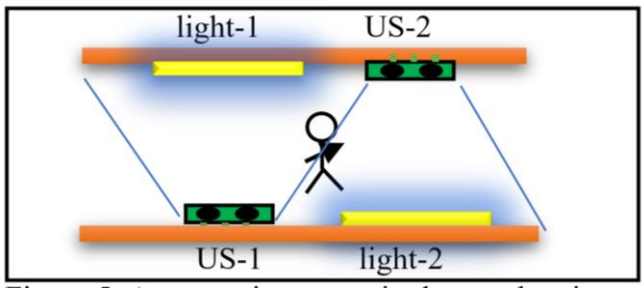

Figure 5. A person is present in the overlapping section.

In this case, the person is present where the range of two ultrasonic sensors (US-1 and US-2) overlap each other. because of this both light-1 and light-2 are turned ON.

Case 4:

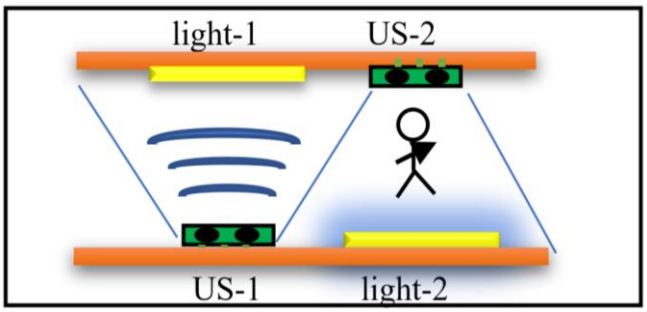

Figure 6. A person is present in the range of US-2

In this case, the person is present in the range of the second Ultrasonic sensor (US-2), so only light-2 is turned ON. This process repeats for all four Ultrasonic sensors and lights.

B. Block Diagram

The working of this project is explained by using this block diagram.

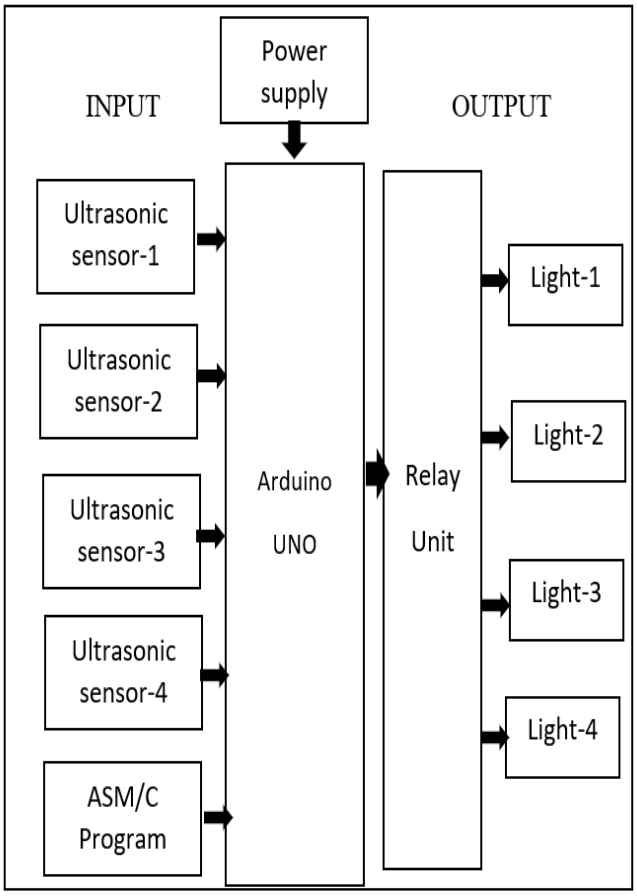

Figure 7. Block diagram of Automatic corridor system

Figure 7. shows the block diagram of the Automatic corridor light control system. It mainly consists of four Ultrasonic sensors, Arduino UNO, a Relay unit, and four lights. Arduino UNO is the main processing unit of this system which requires 5V of power supply. Each of the Ultrasonic sensors is connected to Arduino UNO. The relay unit controls all the lights corresponding to the result of Ultrasonic sensors.

IV. EXPERIMENT RESULTS

By implementation of this PROJECT TVISHA, we found that whenever a person walks through the corridor, the light was turned ON instantaneously in the range of the sensor and when the person moves ahead, the previous light was turned OFF and the next immediate light got turned ON. Hence the power consumption can be reduced by implementing this project.

V. APPLICATIONS

- *Highways*: Automatic light control system on highways detects the vehicles and turns ON the light only when there is a need. During the nighttime, all the lights on the highway road should be ON throughout the night, so the power consumption will be high when there is no presence of vehicles. This project gives a path for saving energy [10].
- *Museums*: Museum is a building in which objects of historical, scientific, artistic, or cultural interest are stored and exhibited. This project implemented in the museums will make museums more attractive [11].
- *Metro stations*: The Automatic light control system has been installed by the zonal railway in which all the lights will be turned on when the train arrives.
- *Hotels*: The guests in the hotel rooms do not care about the energy costs. The Automatic lighting control system prevents unnecessary lighting in the absence of persons. This saves energy costs, significantly [12].

VI. ADVANTAGES

- *Power efficiency*: This automatic corridor light control system is power efficient, which means it uses very low power [13].
- *Flexible installation and integration*: We can easily integrate this new system with existing technology, the Automatic corridor lighting control systems are flexible in the design options [14].
- *Low maintenance*: Once this project is implemented there is no need for manual efforts. This is a one-time investment project [15].

VII. LIMITATIONS

- Temperature fluctuation affects the speed of an Ultrasonic sensor pulse, as temperature increases, sound waves travel faster to and from the target. Hence Ultrasonic sensor gives an inaccurate value, in this situation which leads to the failure of the system.
- Ultrasonic sensors are not suitable for wide-angle, so it increases the requirement of Ultrasonic sensors. If the length of the corridor is too long it also increases the number of sensors to be used.

VIII. CONCLUSION

From this system, we built an idea to control the corridor lights using ultrasonic sensors. These days a large amount of power is wasted in our daily life. By using this system, the energy can be saved and also leads to a huge amount of power-saving. The cost of this system is very low. This system is cheap and improves power saving as it is autonomous hence switching ON/OFF of corridor lights is not manual. This system helps us to lead a comfortable and peaceful life. Hence, this system is economical, easy to operate, and also reduces power consumption.

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