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INTELLIGENT OBJECT DETECTION AND LOAD SWITCHING

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ABSTRACT

It is seen in the shopping mall, big business building, airport that the running stair (escalator) is always running even there is no people on the stair and conveyor belt is also kept running even there is no object on conveyor belt. This is a complete loss of power because this power is wasted for unused activity. This paper will discuss the way to prevent this misuse of electric power and save the unnecessarily used power. This feature is mainly modeled using Microcontroller PIC16F73 and obstacle sensor which plays a vital role.

KeyWords

Obstracle sensor; Operational amplifier; MicroC; Microcontroller; LM358; PICkit2; ISIS.

1. Introduction

Existing world is highly reliant on electricity because it is widely used in every piece of our life. Generation of electrical power and reduction of power waste is very imperative issue. Because possessions used for electrical power generation are inadequate but necessity of electricity is very high because present world people, industries and almost all the things are highly hooked on electrical power. In this clashing condition saving of electrical power from misappropriation is very important. In some big shopping malls, airports, business buildings automatic running stair is always running even if there is no people on the stair and conveyor belt is also kept running even there is no object on conveyor belt. It is a completely left-over of power. It is impossible to stop using the modern technology. It is also true that electricity is necessary for modern technology. So, it is vital to emphasis on gratuitous misapplication of electricity.

In this project, this misappropriation of power can be prevented by automatic detection of object. Here object detection is done by IR sensor. Motor will run only when IR detects any object passes through it. Motor will run only for given time. Main objective of this project to reduce such kind of unreasonably mismanagement of power.

2. Overview of the system

In this system IR segment is used for recognition of objects [1][2]. Comparator is used for equate the voltage from IR section and a given reference voltage [3][4]. This reference voltage is from a variable resistance. From the output of the comparator is goes to microcontroller section as input and output of the microcontroller is going to two outputs. One output from microcontroller is goes to LED and another output from microcontroller is goes to transistor base.

Motor is connected amongst source and collector of the transistor and emitter is connected to ground. Transistor is used here for run the motor with proper current and voltage since microcontroller output is not given sufficient power to run the motor [5]. Microcontroller output to the transistor base is used for switching determination.

3. Methodology

3.1 Infrared Sensor Section

In this scheme, Infrared Sensor (IR) is cast-off for exposure of object. IR transmitter diode engenders infrared signal and IR receiver receives the signal. Transmitter is associated in forward bias and receiver is allied to reverse bias. While receiver obtains infrared continuously it acts as short circuit. If there is any object in amid the transmitter and receiver, then the receiver cannot receive the signal which is transmitted from the transmitter. Fig. 1 depicts the simplified operation of infrared transmitter and receiver.

3.2 Operational Amplifier

LM358 operational amplifier is used to associate the signal. Output from IR receiver is taken crossways resistance is connected to inverting input of Op-Amp and a variable resistance is connected at non-inverting input [6]. While no object is passed through IR then inverting portion remains high because receiver acts as short circuit and current passes through resistance so output of Op-Amp is low. While any object passes through IR then receiver turn out to be open and voltage at inverting portion is almost zero and then output of Op-Amp is high. Variable resistance is tweaked at a point that non-inverting voltage is slighter than the inverting voltage when IR-receiver receives IR from transmitter and greater than inverting voltage when IR-receiver does not receive IR from transmitter. However, the Op-Amp connection with IR section and variable resistance is shown in Fig. 2.

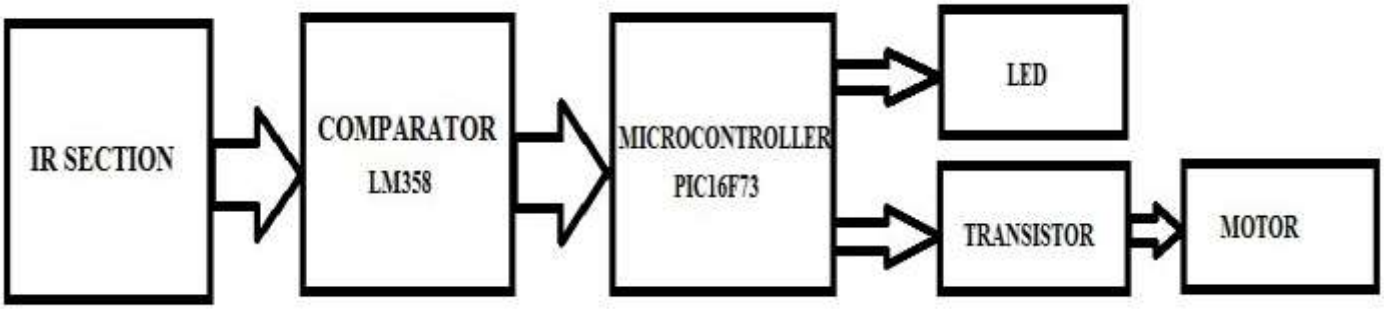

Fig. 1. Block diagram of the system.

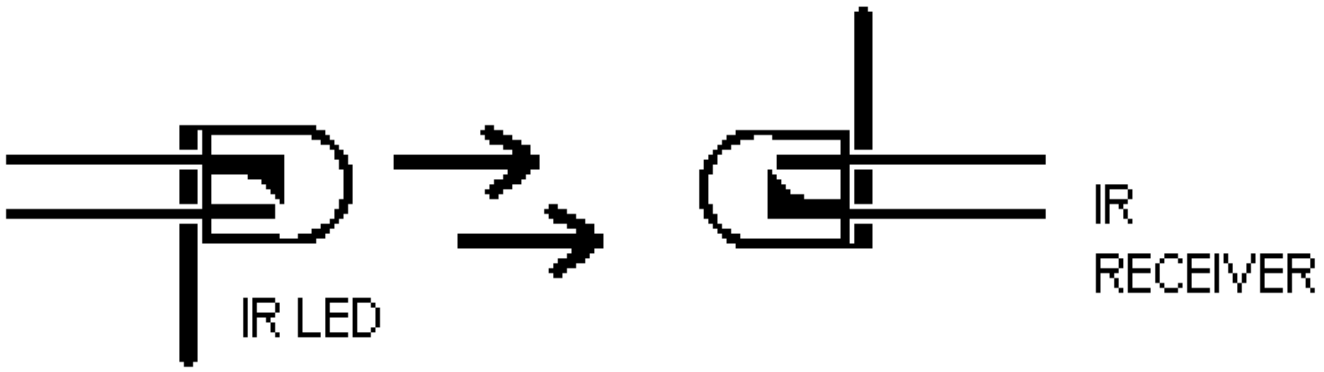

Fig. 2. IR LED transmit signal and IR Receiver receive signal uninterruptedly.

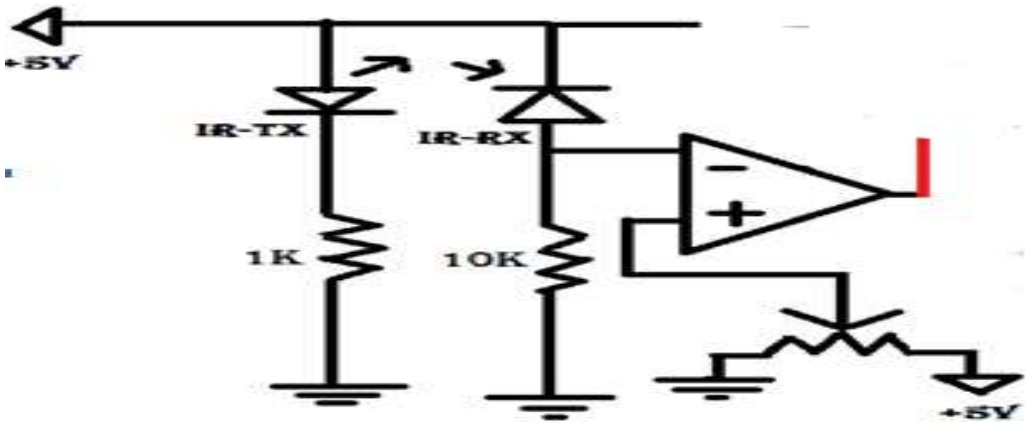

Fig. 3. Connection of IR section to Op-Amp section.

3.3 Microcontroller Section

Output of Op-Amp LM358 drives to the microcontroller's (PIC16F73) f7 pin of PORTB register which is input signal of microcontroller and output signal of microcontroller is goes from both f6 and f4 pin of PORTB register [7]. While an object in between IR-tx & IR-rx then input of microcontroller goes high and output of microcontroller also goes high. One output is going to LED and another output is going to motor through transistor.

3.4 Switching the Load

Transistor is used because output current and voltage from microcontroller is not appropriate to make motor run. Output of micro-controller is connected to transistor base through resistance and collector is connected to another power supply through motor and emitter is grounded. Input of microcontroller in base of transistor is used for switching. While microcontroller output goes high then base input also goes high. Then collector and emitter become short and activate at saturation region and motor starts running.

3.5 Programming and Simulation

Here to get signal from Op-Amp and response of microcontroller against the input signal, to make motor run for a particular time starts from finding of objects necessary programming is coded by microC compiler [8][9]. Both motor and LED remain in on state for that particular time and back to off state until another output signal comes from the microcontroller. Flowchart of the overall system is shown in Fig. 5. PICkit2 programmer is used to load the program into the microcontroller 16F73[10]. Project simulation is done by ISIS simulation software [11].

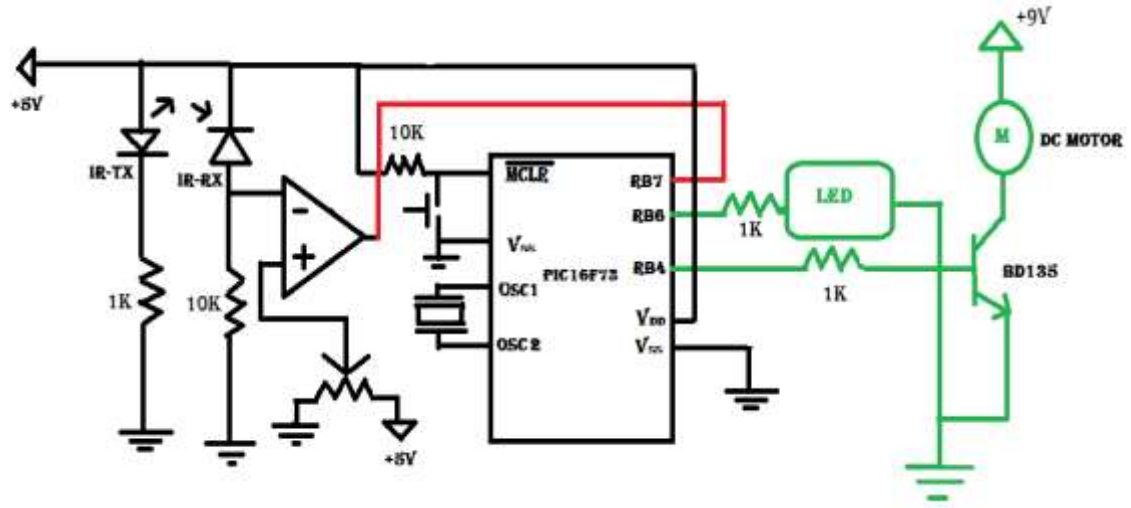

Fig. 4. Connection diagram of the whole system.

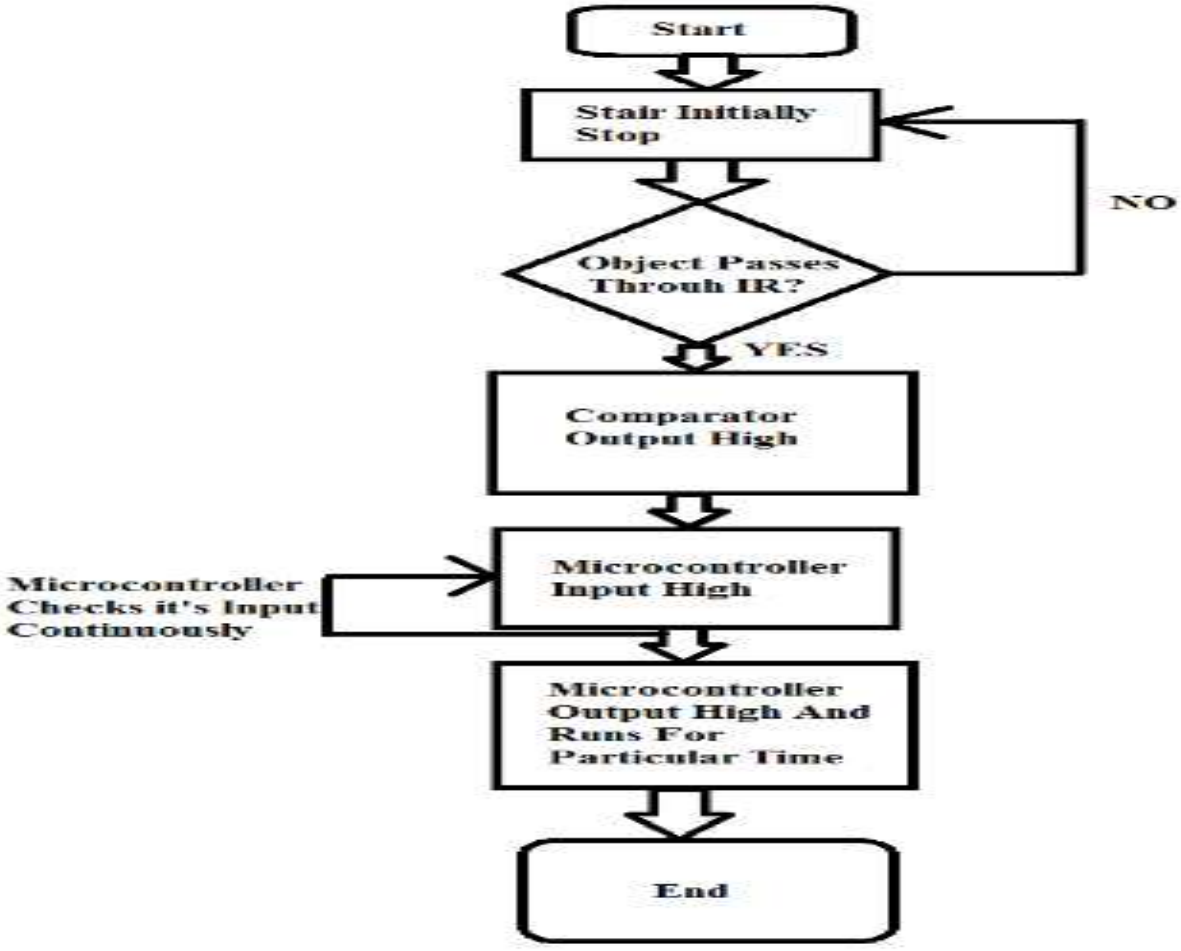

Fig. 5. Flow chart of the control system.

According to the above flow chart it has seen that stair is intially off. If no object passes through the IR section, the stair will be remained stop. But when any object passes through the IR section then compator section gives output high and makes the microcontroller input high. In this time microcontroller makes the output high and makes the stair running. In the same time microcontroller section checks it's input repeatedly because in this time another object may cross the IR section. If any object does not cross the IR section after passing the previous object then it makes the stair stop after some particular time.

4. Result

While object comes in between IR-tx and IR-rx then output voltage of receiver section taken across resistance becomes low. This output voltage goes to inverting input of the comparator. So, the output of comparator becomes high. Comparator output goes to microcontroller as input. While input of microcontroller goes high bestowing to programming in microC output of the microcontroller goes high. Then both LED and motor go on state. This output remnants high for a particular time given in the code. This output goes off state after this precise time.Fig. 06 shows the instigated view of the project.

5. Conclusion

This project deals on to reduce unnecessarily wastage of power by running the escalator while there are no people on it. Electrical power generation and diminish the wastage of electrical power is a sweltering question in contemporary world with the shortage of power generation resources and high necessity of power. By implementing this project, the superfluously wastage power can save with low erection cost. It may also pertinent for conveyor belt control in industry and automatic on off door application.

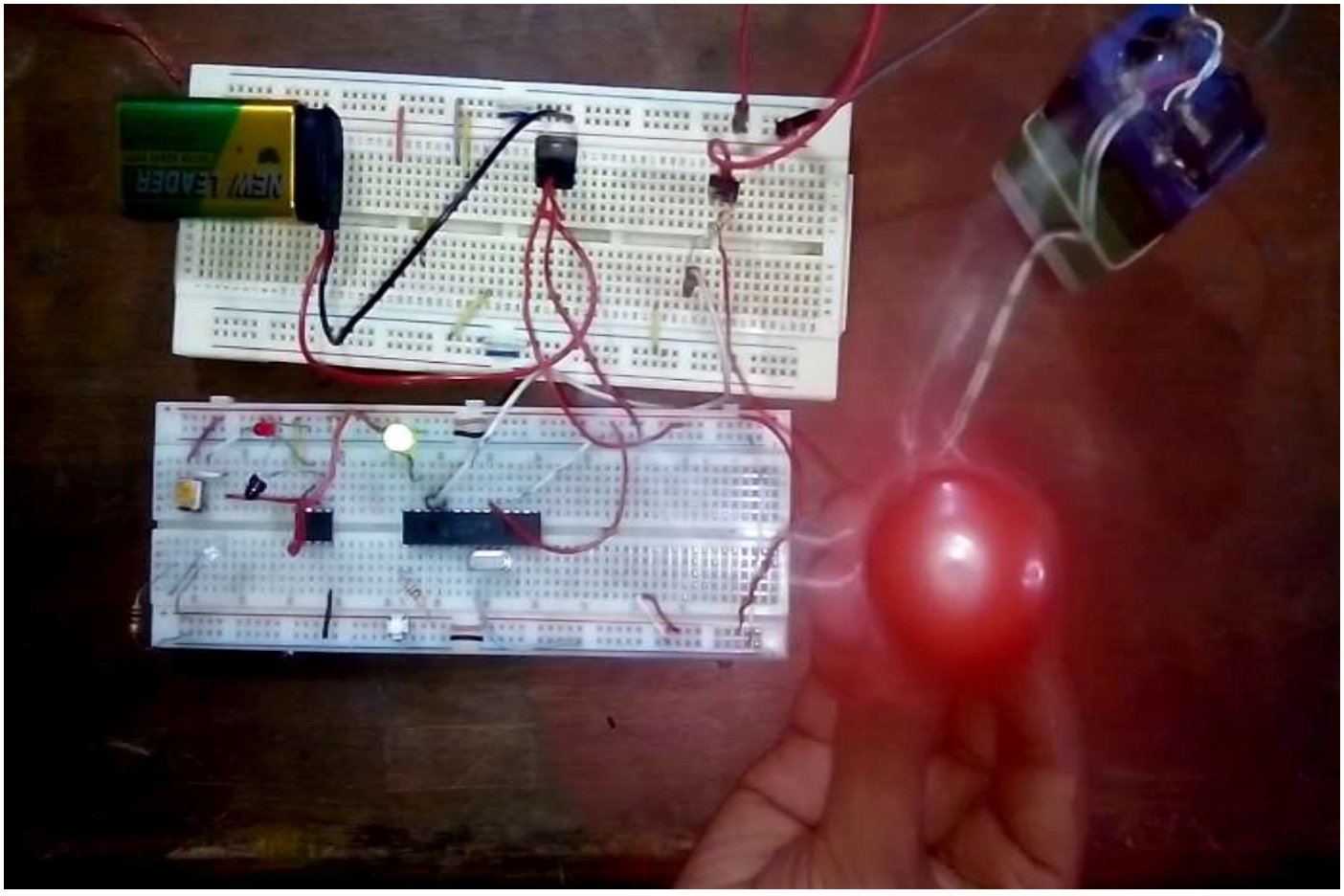

Fig. 6. Implemented view of the Project

References

[1] About IR sensor, available at: http://education.rec.ri.cmu.edu/content/electronics/boe/ir_sensor/1.html (01 May, 2017).
[2] About Obstracle detection, available at: http://www.learnopencv.com/image-recognition-and-object-detection-part1/(01 May,2017).
[3] Himanshu Borse, Amol Dumbare, Rohit Gaikwad and Nikhil Lende, "Mobile Robot for Object Detection Using Image Processing", *Global Journal of Computer Science and Technology Neural & Artificial Intelligence*, vol. 12, no. 1,2012.
[4] K.S. Sandhya, Pokuru Divya and Prajakta Saitwal, "ARM Controller Based Object Recognition", International Research Journal of Engineering and Technology (IRJET), vol. 3, no. 3, pp. 557-562, Mar. 2016.
[5] About Motor Control, available at: http://ab.rockwellautomation.com/Motor-Control (02 May, 2017).
[6] About LM358 Oparetional Amplifier, available at: https://www.fairchildsemi.com/products/analog-mixed-signal/amplifiers-comparators/operational-amplifiers/LM358.html (03 May, 2017).
[7] About Microcontroller, available at: http://www.alldatasheet.com/datasheet-pdf/pdf/74970/MICROCHIP/PIC16F73.html (04 May, 2017).
[8] About MicroC, available at: http://www.innoflowtechnologies.com/commercial/microc (04 May, 2017).
[9] About MicroC Interface, available at: https://www.mikroe.com/pic/ (04 May, 2017).
[10] About PICKit2 programmer, available at: http://www.nskelectronics.com/pickit2_programmer_to_go.html (05 May, 2017).
[11] About Proteus, available at: http: https://www.labcenter.com (05 May, 2017).