Manu's Employee Estimating Device

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Abstract- In the present era of computerization, computation has become a part and parcel of our technological life. Numerous methods have been employed for counting purposes. MANU'S EMPLOYEE ESTIMATING DEVICE, is one of the counting device, which is used to count the number of persons present in an hall or a company. The estimating device was made by using LDR, IC CD4026 and common cathode seven segment display. It works on the principle that when the light falling on an LDR is interrupted the resistance increases which provides a clock pulse to IC CD4026. CD4026 IC is used in the circuit to drive the seven segment display. At this occurrence, LED stops glowing to indicate that someone is entering or exiting the hall. The interrupts are counted and then it is indicated in the seven segment display. The main advantages of this device are low cost, less complexity and efficient performance.

Index Terms- estimating device, interrupts, efficiency, small-scale industries, counter.

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1. INTRODUCTION

A counter is a device which is used to store the number of times a particular event or process occurred according to a clock signal that is applied to the counter. A people counter, is an example of a counter that is used to measure the number and direction of people travelling through a certain passage or entrance path in a unit time.

There are many technologies used in people counting devices. Some of them are using infrared beams, computer vision, thermal imaging and pressure-sensitive mats.

There are many applications for people's counter .Some of them are: The professionals, who are working in shopping malls, rely on visitor statistics to calculate their marketing. It offers a relatively accurate data. In non-profit organizations, like libraries and museums ,where there are no tickets counting of clients are either automated or the staff keeps a record of it.

MANU'S EMPLOYEE ESTIMATING DEVICE is a type of people counter that is used at the entrance of a building so that the total number of employees can be recorded.

2. OBJECTIVE

There are many technologies and devices to count the number of persons that are entering or exiting a room like, using IR rays, microcontrollers etc. Some are efficient but most of them are costly, complex in design and needed to be programmed. So our approach was to create simple , low cost, non programmable and efficient counter, which was our MANU'S EED.
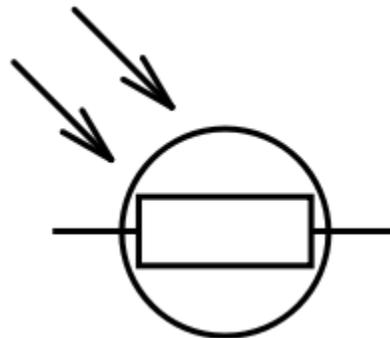
3. PRINCIPLE USED

Fig. 1. Representation of a photoresistor.

A light dependent resistor is also known as a photoresistor or a photocell[1]. It is a light controlled device in which the resistance decreases with increasing light intensity. It exhibits photoconductivity. In the absence of light, resistance increases. The LDR is made of a high resistance semiconductor in which during dark time it exhibits high resistance ,while in the light it has low resistance.

4. CIRCUIT AND COMPONENTS

The circuit consists of two IC CD 4026, BC 547 npn transistor, 5 mm LED, common cathode seven segment display,1 kilo-ohm resistor,10 kilo-ohm resistor , 100 ohm resistor ,4.7 kilo-ohm resistor , Light dependent resistor (LDR),power supply,connecting wires and push-to-on switch (S1). The two IC's are synchronized to get the required value.
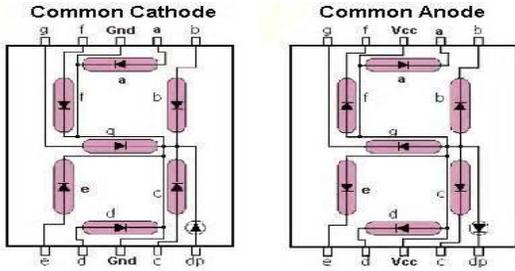
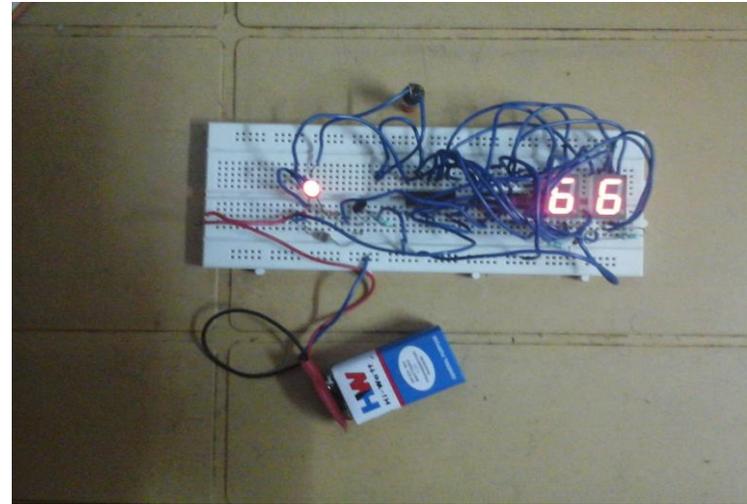Fig. 2. Pin Configuration of a seven segment display.
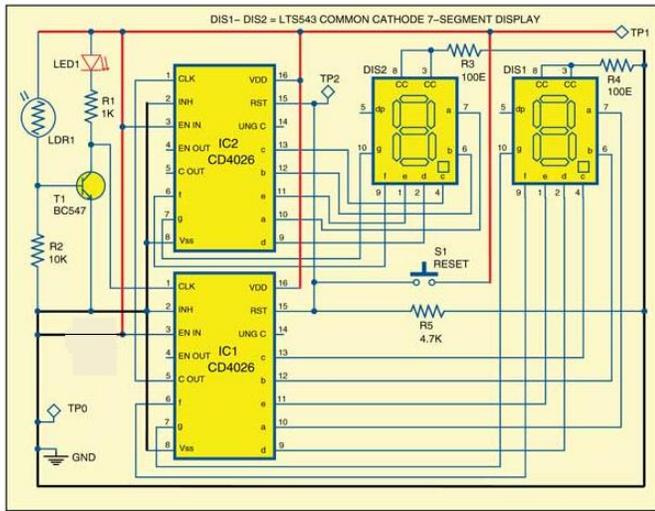

Fig. 3 . Circuit Diagram of MANU'S EED

5.   WORKING

The main component in the circuit is a LDR. LDR is used as a sensor.

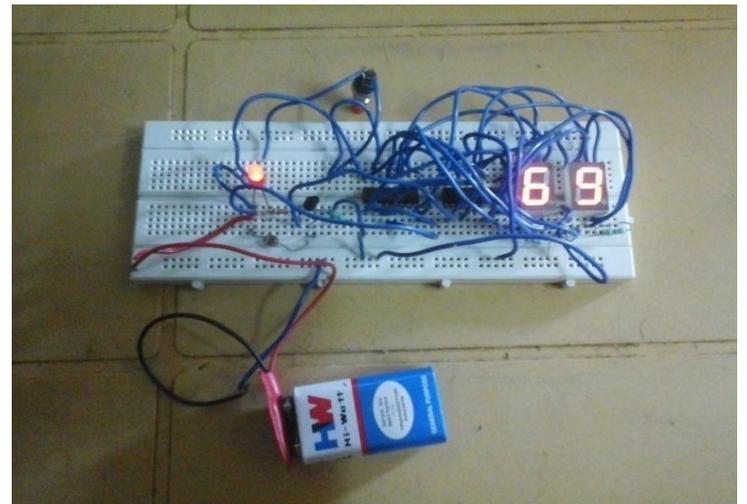Fig. 4. The device after giving connection.

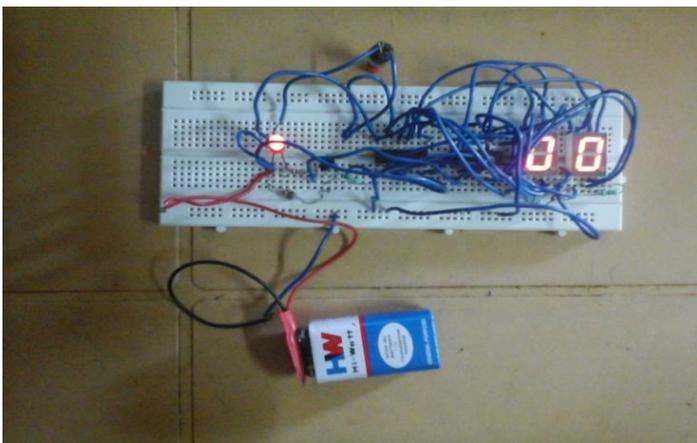Fig 5. The reading noted on the device after 66th interruption of the LDR.

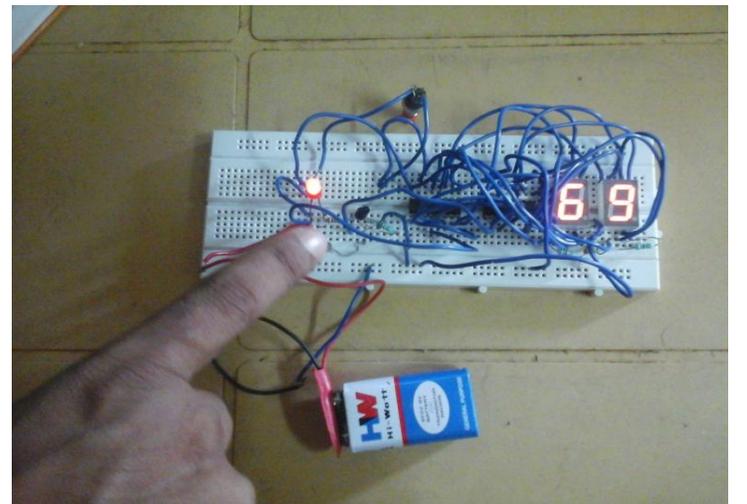Fig. 6. The device having the count 69.

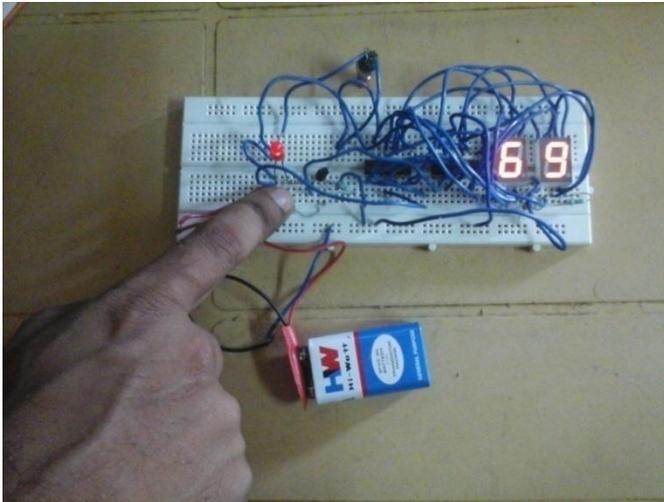Fig. 7. Interrupting the LDR, which is having a count 69.

Fig. 8. During interruption the led glows off.

When the intensity of light that is falling on LDR increases the resistance of it decreases to few milli ohms and in dark or in the absence of light the resistance of LDR increases to mega –ohms.

When a person is entering or exiting a path or a room or a hall in which the circuit is placed, the amount of light falling on the LDR decreases and the shadow of the person falls on the LDR[2]. It provides a clock pulse to pin 1 of the IC through transistor BC 547. The LED is connected parallel to the LDR. When 6V power supply is applied to the LED ,it glows. When the person is entering ,the LED stops glowing momentarily, indicating that someone is passing through the entrance.

The IC CD 4026 is activated by the LDR. The IC comprises of a Johnson decade counter that counts the number of persons entering a hall and an output decoder that converts the code from Johnson counter into a seven segment decode output, which is used to drive the seven segment display. On each clock pulse received by the IC the count on seven segment display is incremented by 1.

When the count on the first seven segment display reaches 9 one cycle of operation finishes and the pin 5 of IC 1 becomes high which is connected in cascade to pin 1 of IC-2, which acts as a clock pulse to IC-2. On the next clock, the counter of IC2 is incremented by one and the operation cycle of IC 1 repeats again and when its value reaches 9, the counter of IC2 is incremented by 1.

The counter-1 shows the unit's digit and counter-2 shows the ten's digit. The circuit can be used to count any number of employees by adding corresponding number of IC's and seven segment display and connecting pin-5 of each IC to pin-1 of next IC. Pin-15 of all the IC's are connected to ground through a 4.7 kilo-ohm resistor. The pin-3 and pin-8 of the displays are connected to ground. The reset switch is used to reset the displays to 0 when required.

The Johnson counter used in the circuit, is also known as a switch tail ring counter or a twisted-ring counter[3] . It is a modified ring counter, where the output from the last flip-flop is inverted and fed back as input to the first flip-flop. Johnson's counter can be implemented using D- or JK-type flip-flops.

6. 6. PRESENT TECHNOLOGIES USED

Some of the common people- counting systems used nowadays are :

A hand- held Tally counter is used for people counting purpose[6]. One press is given for each person. To reset the counter to 0 a knob in the device is used.

In another type of technology single horizontal or vertical infrared beams are used across an entrance and it is linked to an LCD or a PC, which is kept at the side of the doorway. When the beam is broken the count is made. Its accuracy depends on the width of the entrance and and the amount of traffic. The Disadvantages of this technology are: the sensors used are limited to non-directional counts, it can't differentiate when people walk side-by-side,it can't be used for high volume of traffic, it gets blocked when a person stands near the entrance and also it is inefficient in direct sunlight.

Computer vision systems use a television or IP camera to send signal to a computer. Some of the camera have built-in technologies to process the image directly[4]. Its accuracy depends on the systems used and their installations. Its disadvantages are: high cost, lower lifetime, high power consumption, and less accurate.

In Thermal imaging systems array sensors are used to detect heat sources. They are implemented using embedded technology and are mounted overhead. They have high accuracy. They are susceptible to external weather condition. Its Disadvantages are : higher cost, lower field of view, susceptible to external weather conditions and cannot be used for ceiling height below 2.2 metre.

Artificial intelligence system uses multiple IR transmitters and receivers[5]. It creates a count zone. When a person passes through this zone a pattern is created. The onboard processor takes a decision based on this pattern. This system acts like a human brain. It gives count per direction.

Fig. 9. AI using Pattern Recognition Technology (SRT).

The disadvantages of artificial intelligence system are: complex design, cannot be used for high volume of traffic and has high potential to be blocked by people standing in an entrance.

3D camera technology is another technology ,which is used for acquiring a 3D image. It uses 2 video cameras to produce human 3D vision. The accuracy depends on image processing and 3D camera technology used. The sensors used are Time-of-flight (TOF) sensors that use IR light to obtain the 3D image of the scene and Structured light sensors that use projected light pattern

to obtain the 3D image. Its disadvantages are: high cost and design is complex.

7. WHY TO USE MANU'S EED?

It is of less cost, can be used to count in a large scale, design is simple ,best solution in small scale industries, can be used for a long term and has sufficient efficiency.

It can be used to count large numbers by synchronizing sufficient number of IC CD 4026 and seven segment display.

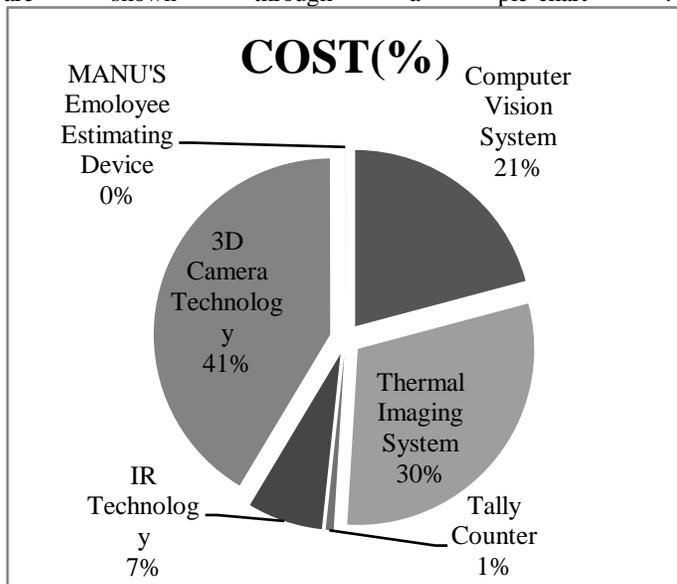It has less power consumption, the sensor used is simple(LDR) and has larger lifetime.

The cost of each counting devices are provided in optics

planet website on 2 Feb,2015 as :

Devices	Computer Vision System	Thermal Imaging System	Tally Counter	IR Technology	3D Camera Technology	MANU's EED
Cost(in Rupees)	279072.97	402884.85	9831.1347	92362.67	553865.87	300

Tab. 1. The cost of various counting devices.

Its cost efficiency comparing to other present counting devices are shown through a pie-chart :

COST(%)

Graph. 1. Graph plotted according to the data provided in optics planet website on 2 Feb,2015 comparing the cost of various counting devices. The cost of MANU'S EED is very less (near to 0%) comparing to other devices.

8. DRAWBACK

It is a light dependent device. The device doesn't provide high accuracy. Its working is satisfactory. No electronic system can be 100% accurate and therefore must not be entirely relied upon for the purposes of health & safety.

9. APPLICATIONS

The MANU'S Employee Estimating Device can be used in future for various applications. They can be used in the public transport sector to record the passengers in it or it can be used in stores and at trade fairs to record the flow of visitors.

For safety purposes, public buildings are often rated to hold a certain number of people. This device can be used to ensure that the building is below the safe level of occupancy. In retail stores the device can be used as a form of intelligence-gathering. It is necessary in the retail environment to calculate the conversion rate, i.e., the percentage of a store's visitors that makes purchases. This may serve as a key performance indicator of a store's performance and is superior to traditional methods, which only take into account sales data. It can also be used in the process of optimizing staff shifts. Staff requirements are directly related to density of visitors arriving and services such as cleaning and maintenance are typically done when visitors are at its lowest. It may also be used in queue management and customer tracking.

10. IMPACT OF MANU'S EED

An efficient counting device with simple design and that can be used comfortably by small scale industries and has less drawbacks compared to other present technologies used. It is cost efficient. Implementing it in industries can help to count the number of employees present during a day and to keep their records.

11. FUTURE PLANS

The works are done to construct a device that can be working in synchronous with this device to be kept at the exit gate of an industry so that number of employees entering and exiting can be counted and recorded for security purposes.

12. CONCLUSION

Thus a people counting device to count the number of employees present on a given day is constructed using simple components. The sensor used is an LDR. It is very much affordable even to small-scale industries. The implementation cost is very small compared to present technologies. This circuit is very useful as it does not require any knowledge of programming of microcontrollers. Moreover, it has a flexibility of counting large amount by expanding the circuit.

13. REFERENCES

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