INTELLIGENT HIGHWAY TOLL COLLECTION SYSTEM

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ABSTRACT

In today's world, everything is going fast and every human being tries to save their time as much as possible. So different technical gadgets came in the market to maximise the output and minimise the time consumption. In today's transportation, we can see a Toll plaza at very short distances and to proceed through these Tolls without technology is quite a huge time consuming. So we take the concept of smart Toll plaza. It simply works on LabVIEW software platform. In this, we basically apply three sensors vertically at equal distances which will tell that the vehicle coming to the Toll is a light weight vehicle or a heavy weight vehicle. According to the size of vehicle automatically the receipt is printed for the fair after asking whether ride for one side or two sides. This project further can be used more widely by applying web cam on the front which will note down the registration number of the car and can be thus used for security purposes. It somehow reduces the man power at the Toll plazas to some instant and provides fast data regarding vehicles to the administration for any further legal action etc.

Keywords: IR sensors, LabVIEW , Microcontroller, Radiations, Toll plaza.

I INTRODUCTION

In today's time, there is high traffic in the G.T roads or main roads. Due to highly communication between the cities, transportation have been improved which results to more take care of roads So More number of companies are taking the contract to make roads ,bridges and fly-over's. Due to high communication by roads there is huge number of vehicle passes through the Toll. So our project is basically is to reduce the human work in Toll by applying various techniques such as by sensing the car to see whether it is heavy vehicle or light vehicle and select the Toll either one way or two way In our project we used techniques which will tell whether the heavy weight vehicle or light weight vehicle is passed. This whole procedure will be done through sensors and other peripheral's interface with LabVIEW software. It also asks whether the ride is for one way or two ways through the screen. The remaining components of the projects are explained in section-II, III and IV etc.

1.1 Software Used

The input and output is controlled by LabVIEW software by serial communication. We used VISA instructions to interface the microcontroller with LabVIEW software and baud rate is set to 9600 bps. Rx and Tx pins of microcontroller port are used to sharing the data with the LabVIEW software which is in the form of strings and sends 8 bits at a time.

1.2 Sensor Mechanism

An IR sensor is basically a device which consists of a pair of an IR LED and a photodiode which are collectively called a photo-coupler or an opto-coupler. The IR LED emits IR radiation which is detected by the photodiode and dictates the output of the sensor. Now, there are so many ways by which the radiation may or may not be able to reach the photodiode. Few are elaborated as below:

(a) Direct Incidence

We may hold the IR LED directly in front of the photodiode, such that almost all the radiation emitted, reaches the photo-diode. This creates an invisible line of IR radiation between the IR LED and the photodiode. Now, if an opaque object is placed obstructing this line, the radiation will not reach the photodiode and will get either reflected or absorbed by the obstructing object. This mechanism is used in object counters and burglar alarms.

(b) Indirect Incidence

High school physics taught us that black color absorbs all radiation, and the color white reflects all radiation. We have been used this very basic knowledge to build our IR sensor mechanism of this project. If we place the IR LED and the photodiode side by side, close together, the radiation from the IR LED will get emitted straight in the direction to which the IR LED is pointing towards and so is the photodiode, and hence there will be no incidence of the radiation on the photodiode. If we place an opaque object in front the two, two cases occur:

(1) Reflecting Surface

If the object is reflective, (White or some other light color), then most of the radiation will get reflected by it, and will get incident on the photodiode.

(2) Non- Reflecting Surface

If the object is non-reflective, (Black or some other dark color), then most of the radiation will get absorbed by it, and will not become incident on the photodiode. It is similar to there being no surface (object) at all, for the sensor, as in both the cases, it does not receive any radiation.

We have used reflective indirect incidence for making proximity sensors. The radiation emitted by the IR LED is reflected back on the photodiode by an object closer the object, higher will be the intensity of the incident radiation on the photodiode. This intensity is made analogous to a voltage by a circuit, which is then used to determine the distance.

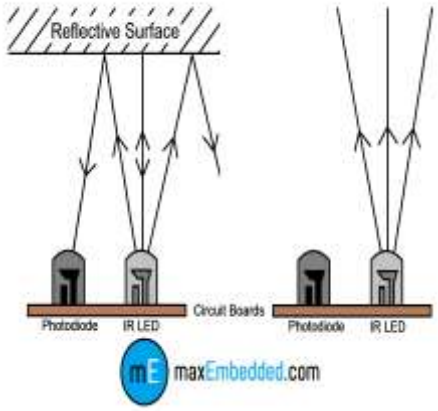

Fig.1: Proximity sensors

Proximity sensors find use in Touch Screen phones, apart from many other devices. In a Touch Screen Phone, the touch screen needs to disabled when it is held near the ear, while in use, so that even if the cheek makes contact with the tough screen, there is no effect.

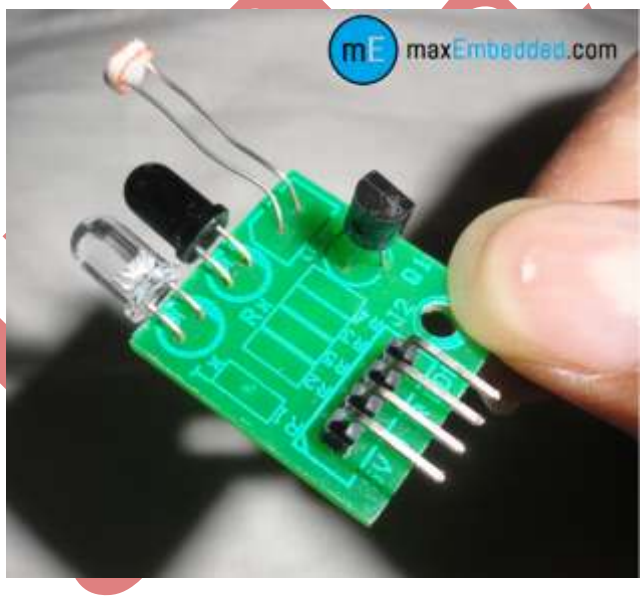

Fig. 2: One Set of Sensor Mechanism used in Designed Model

II WORKING OF DESIGNED MODEL

In the proposed model, three IR sensors are connected vertically in series to get the input near the bonnet. Because if we apply it vertically then the last sensor may sense the vehicle if there is car know the model will tell it is heavy vehicle which is not and we also not apply at near centre of the car because sometime there is luggage at the upper part of car and the third sensor may sense it and our model tells it is heavy vehicle so to avoid these errors. We applied it at all best suitable place near the bonnet. This input is fed to microcontroller which further is in serial communicated with LabVIEW software. If the lower 2 sensors bits are high then it is light weight vehicle and all the

3 sensors are high then it is heavy vehicle. After its type detection, it will ask for one way fare or two way fare through the display present on the Toll plaza. Accordingly that Toll is collected and gate will be opened.

III CONCLUSION AND DISCUSSION

The designed model is effiecent and much accurately detects the vehicle size and estimate the Toll tax value. But it has many limitations like less accuracy due to less number of sensors. This can be improved by combining the automatic visual system with the sensor mechanism. By adding number plate recognition system, we can use it as a check post for security purposes. It can also be used to approximate vehicles coming in and out of particular city to the administration; accordingly steps will be taken to minimize jams problems.

REFERENCES

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