Traffic Data Vertical of Geospatial Data Centre

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Abstract- *This study develops an ultrasonic & IR sensor that can be used to determine the number of vehicles and persons passing a point over some specified time period. The proposed system consists of ultrasonic sensors, IR sensors and a microcontroller equipped with data logging shield. The data were recorded & then analyzed using a computer programming. Actual experiments that have been conducted indicates that this system can give a correct number of vehicles and persons in a given interval of time.*

I. INTRODUCTION

This project is collection of geospatial data very precisely measure at different location. Simple data measuring device will be made in order to collect location specific data of different verticals. The vertical daily data such as traffic density on highway also the crowd density at stations. This data on day-to-day basis will be stored & published on website made by us. This website will be open access and act as a data center. We will be monitor & analysis the data and hence in the future data prediction can be made easy.

Electronic devices are capable of replacing human in non-stop duties some typical reasons of why electronic device is more preferable over human is that it can work faster and more reliable as it cannot feel tired. Device that is used to do a continuous measurement is often called monitoring system Vehicle & person counting system is very important as it can automatically count the number of vehicles & person entering, leaving an area for counting the density of traffic which will later processed & store and published on website.

The Internet of Things enables opportunities for more direct integration between the physical world & computer-based systems. Furthermore, each technology has its own specifications & limitations, creating some technical restrictions during the construction of an IoT device. In this way, this paper presents the implementation of an IoT device that has the ability to inform how many persons there are in a railway & bus station. This information can be useful in a variety of scenarios: to control the crowd to alert if the number of persons exceeds the supported by the site; to send information about trespassing; Since imperfect or incomplete data may hinder the proper functioning of an IoT-based system, the proposal was implemented using two different approaches: IR sensors and ultrasonic technology. Those technologies have been combined with microcontrollers to create a device capable of informing, with accuracy, the difference of individuals entering and exiting a particular person in railway & bus station.

II. METHODOLOGY

Traffic data vertical of geospatial data center system proposed in this work is implemented with basic open source microcontroller, ultrasonic sensor, IR sensors, and data communication channel that transmit the state of traffic to a computer system (server). An Arduino UNO, an HR-SR04 Ultrasonic Sensor, and a laptop were primarily used for the counting vehicle and processing of the signals captured for this project. A USB cable connected the Arduino and the laptop and therefore served as a channel to transmit the state of traffic flow for further analyses or processing. In this project, the data transmitted to the laptop was saved into a data file which was later on analyzed & the traffic state visualized to compare results with what happened on the road. Fig.2 and fig 3 illustrate the HC-SR04 and Arduino UNO respectively.
The ultrasonic sensor is used to measure the distance between it & any object that is placed in its line of sound or sight. The object must be capable of reflecting audio signals for the estimation of the distance. Soft surfaces that absorbs sound & rough surfaces which disperses sound signals normally results in an error in the readings of the measurement of the distances. The HC-SR04 used for this project is capable of measuring distance between 2 cm to 400 cm.

The sensor is aligned vertically & the surface of the road is considered a stationary object with vehicles as moving objects. The ultrasonic sensor is hanged 4 m from the surface of the road position in the middle of road and periodically measures the distance. Any vehicle that comes between the sensor & the road reduces this distance. Distances measured by the sensors that are less than the predefined distance of 4 m will be considered as the present of a vehicle and the period of occupancy considered as the nature of traffic flow on a particular stretch of road.

The sensor was placed in a protected cone to help prevent stray ultrasonic sound that may be coming from the environ-ment having minimal impact on the performance of

the setup. Without the flat hard surface, the sensor may estimate wrong distances which will impair the results generated by the system. A simple presence and absence scenario is illustrated in fig 1

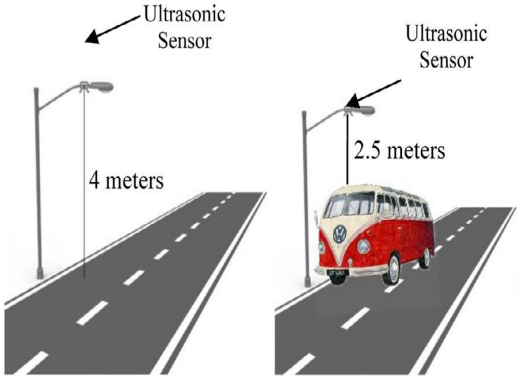

Fig.1. SensorMount.

III. LITERATURE REVIEW

Here are more than one method to count the persons by IR sensor & vehicle by ultrasonic sensor. It can be depends on the intensity of people and the no of vehicles on the road. The below papers were studied and analyzed to understand the recent scope of people detection & density of vehicle on road
Obed Appiaha et al[18]The data provide as input to the system to help make necessary decisions. The number of vehicles & speed of movement within a specific time period in the road networks are normally used as mechanism to know the traffic confition such as congestion & jams.. The method has been used to identify the presence and absence of vehicles to help make necessary decisions & take actions.

This paper proposes the use of ultrasonic sensor for traffic information to counting vehicle. The overhead or in vertical manner is used in this method in order to limit the interference of humans & other non-vehicular objects that may move across the sensors when mounted horizontally or sideways.In this paper, we proposed a new traffic information acquisi-tion system with small ultrasonic sensors in wireless sensor networks. The proposed vehicle detection algorithm exhibits high detection accuracy with low complexity, & its routing protocol minimizes the power consumption & transmis-sion delay.

Mullapudi Chaitanya Krishna et al[17]:

The counter system has the ability to detect visitors, entering or leaving at the same time. The system is developed using Arduino UNO development board and it's IDE.The counter system is designed to detect the number of visitors entering or leaving the premises. "The ultrasonic sensors Continuously measures the distance of vehicle ahead, sending a signal through Trigger pin e receiving through Echo". Two infrared sensor (IR) are placed side by side & an programm is made to count the number of visitors entering the area where device is installled. They have also implemented another method which uses motion sensors to detect any motion& movement of an object or a person & compared the two methods to know which method is efficient to implement in actual one this method

[1] Arduino

Arduino Uno is an open-source prototyping platform composed by a microcontroller or physical programmable circuit board & a software or IDE that runs in a computer. The Arduino Uno boards interacts with the environment via. peripheral components, like electronic sensors, motors and lights. Then, using the Arduino programming language & the Arduino Software (IDE), it is possible to manipulate data captured . there are different types of controllers on Arduino platform, which differ mostly on IO pins and version of flash memory. The most important ones are Arduino Uno, Arduino Mega2560, Arduino Nano, Arduino Mini, Arduino Due, Arduino Leonardo & Arduino ADK.

Fig.2. ImageofArduinoUNO.

[2] UltrasonicSensor

The operation of an ultrasonic sensor is based on the transmission of ultrasonic pulses & the time response of the pulses. In this way, the principle underlying this technology is that speed of sound in air is approximately constant Thus, estimating the time for pulse reflection allows knowing the distance to the object due to the proportionality relation. Therefore, ultrasonic sensors are used frequently to detect distance measurement applications.

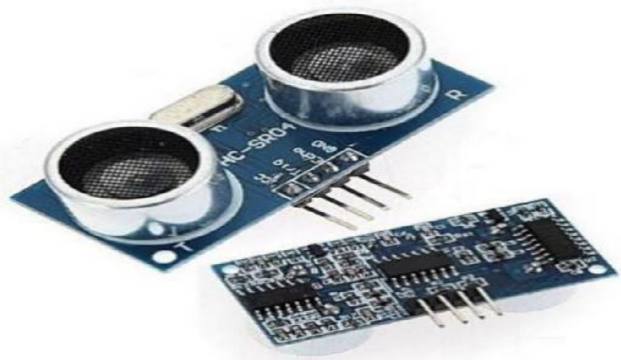

Fig.3. Imageo fultrasonic sensor.

[3] IR sensor

IR sensor module uses IR signal to detect the people, object entering through a entrance. This was done by sending a Pulse of IR signal from IR LED & detecting the reflected signal by using a photodiode. The IR signal will get only reflected back when there is a people going through that path

Fig.4.Image of IR sensor

1.I.1 Circuit Schema

The ultrasonic circuit schema is shown in figure 5. An Arduino UNO is responsible for collecting the information captured by the ultrasonic sensors. This circuit has two HC-SR04 sensors (ultrasonic sensor) connected with one Arduino Uno. The VCC is supplied by the 5V Arduino pin and the GND of each sensor is attached in the GND Arduino pin. Each sensor has one Trigger and Echo pin. The first sensor has Arduino digital pin 7 and 6 connected, respectively, to Trigger and Echo. Besides that, the second one is attached with digital pin 9 on Trigger and digital pin 8 on Echo

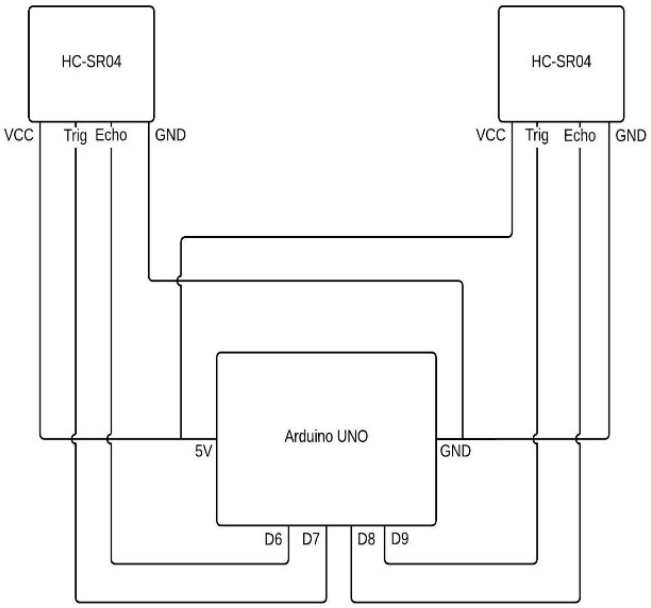

Fig.5. Ultrasonic vehicle counter circuit schema

IV. CONCLUSION

Vehicle and person counting system based on two ultrasonic sensors & IR sensors has been successfully built. The distance between ultrasonic sensors and IR sensors can be varied to adjust the measurement accuracy or to meet the user's need. A computer program developed in this research was able to calculate the number of each type of cars & persons passing the detection area in certain interval of time, the number of peaks shown in the graph and the calculation result shown in the vehicle detail window give the same values.

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