Design and Implementation of Footboard and Social Distancing Alert System in Bus using Arduino and Ultrasonic Sensor

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***Abstract*:- A major portion of the population relies on the public transport, particularly buses, for their day-to-day travel. This results in fatal accidents of the passengers especially during travelling in the footboard of the buses. Therefore, there is a need for an automatic footboard accident prevention system in buses for ensuring the passenger safety. The present work, design and development of automatic footboard accident prevention system iscarried out to ensure the safety of the passengers from accidents during travelling in the buses. The present system comprises of an load cell and arduino board. This present system ensures the safety of the passengers during boarding and deboarding of the buses by preventing the acceleration of the buses if there is any passenger on the footboard during the stationary position of the bus. The hardware of the above system occupies only less space and consumes lesser power.**

Keywords: Arduino mega, Ultra sonicsensor, Load cell, Buzzer.

INTRODUCTION:

Intelligent Footboard Accident Prevention System is an Automated Accident Prevention system to prevent the accidents occurring due to footboard travelling in buses. A major portion of the population depends upon the public transport system especially buses for their daily commute and a large number of accidents take place almost every day. Every year a large number of passengers die due to accidents caused by footboard travelling in buses. The negligence of either driver or passenger can result in a tragedy. So by developing an intelligent system in buses the passenger safety is assured.

PROPOSED SYSTEM:

In the proposed system, when the bus is in a stationary condition and if the passengers are boarding or deboarding the bus, the loadcell and ultrasonic sensor detect the presence of passengers on the footboard and check social distance. The signals from the sensors are communicated to the Arduino board and the Arduino board actuates the motor (If the person stands on the footboard after a limited time the buzzer will alert and the bus speed will be reduced and get stop at some distance.

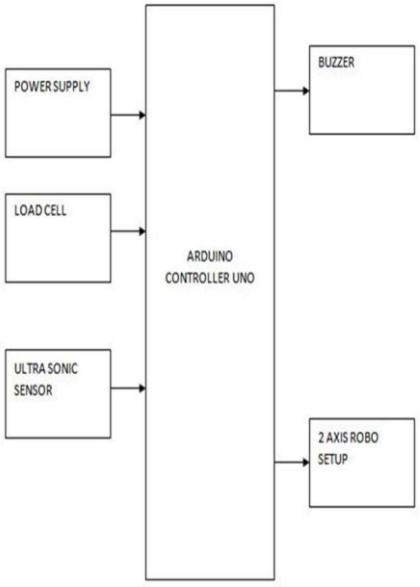

Fig (1) Block Diagram of MonitoringSystem

WORKING:

The working of the system is briefly presented here. In one preferred working mode of the system, when the bus is in a stationary condition and if the passengers are boarding or deboarding the bus, the loadcell and ultrasonic sensor detects the presence of passengers in the footboard and checking social distance in the hall effect sensor detects whether the bus is in stationary condition. The signals from the sensors are communicated to the arduino boardand the arduino board actuates the motor (If theperson stand in the foot board after the limited time the buzzer will alert and bus speed will reduced and get stop in some distance. And the ultra sonic sensor is used to maintain the social distance during the covid situation. Here the ultra sonic sensor is placed in limited distance.

This sensor will check absence of passengers in Limited distance is anyperson were detected means the sensor will alert us. when the bus is in a stationary condition and if the passengers are boarding or deboarding the bus, the ultrasonic sensor detects the presence of passengers in the footboard and the Hall effect sensor detects whether the bus is in stationary condition. The signals from the sensors are communicated to the arduino board and the arduino board actuates the DC motor in the forward direction in

order to move the rack gear for locking the accelerator pedal and also the alarm indication system is initiated. After the passengers have boarded or deboarded the bus, the ultrasonic sensor detects the absence of passengers in the footboard of the bus and actuates the DC motor in the reverse direction to move the rack gear away from the accelerator pedal. Thus the accelerator lock is released and the driver is free to use the accelerator pedal for moving the bus. The alarm indication system is also made to stop its function.

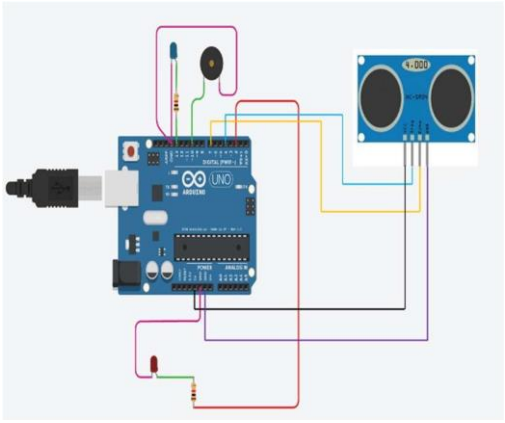

Fig (2) Circuit Diagram

RESULT:

The sample sketch above is a blink which is also applicable for LEDs. When the bus is in a stationary condition and if the passengers are boarding or deboarding the bus, the loadcell and ultrasonic sensor detect the presence of passengers on the footboard and check social distance. The signals from the sensors are communicated to the Arduino board and the Arduino board actuates the motor (If the person stands on the footboard after a limited time the buzzer will alert and the bus speed will be reduced and get stop at some distance. The output is the turning on and off of the buzzer every other second. The picture below shows the setup of your module and Arduino:

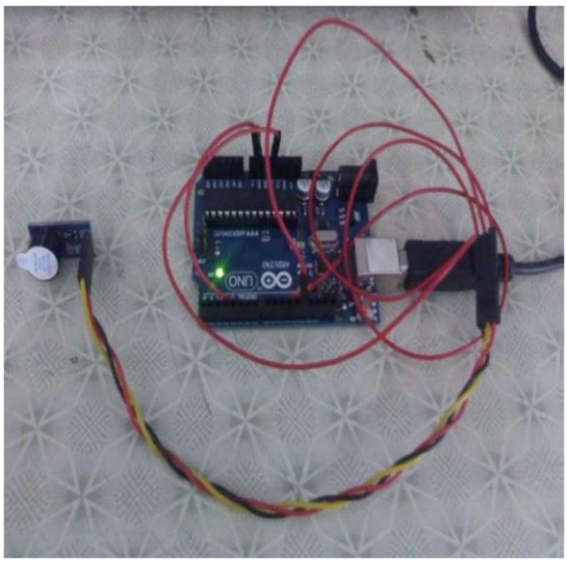

Fig (3) Expected Output

CONCLUSION:

This project focuses on implementing a system that will be beneficial for the passengers of the local buses. The passengers will be privileged with the location of nearby buses and online payment systems. We have tried to make their journey disciplined through an android app. But not only these can eradicate the practice of reckless driving, but it also prevents road accidents. There are more reasons for reckless driving such as drowsiness of driver, the influence of drug or alcohol on him, irregular lane changing. To limit the effects, we have another two features called drowsiness detection and lane detection. Both features we are providing are for controlling the careless tendency of the drivers.

FUTURE ENHANCEMENT:

In the future, we will try to ensure that the raspberry pi will be using the battery directly from the bus. As the raspberry pi consumes high power, so in our prototype, we have used10000mAh power bank. But in real-time implementation, the power supply to the pi will be directly from the bus. Another feature we want to include in the future is that QR codes for the designated locations tracked by the GPS module are changed by the conductor of the bus manually. But we want to manipulate the QR codes of various locations dynamically and showing them on an LCD monitor in the bus so the users will be able to scan the QR codes in a shorter time than before. Besides, while implementing, we are going to use the night vision camera instead of the pi camera. Lastly, there are still some people alternative way of money transactions for them instead of mobile banking. less in quantity, who do not have smart phones. In that case, we are thinking of an We also hope that, in the future, this portion of people will also have smart phones, as the use of smart phones is increasing day by day.

REFERENCES:

[1] Sahana Srinivasan, Rujula Singh, Revathi, Ruchita R Biradar, “COVID- 19 Monitoring System using Social Distancing and Face Mask Detection”, International Conference on Emerging Smart Computing and Informatics(ESCI), 2021.

[2] Adnan Azmee, Benjir Islam Alvee, Abdulla Hil Kafi, “Bus Management & Road Accident Prevention System for Smart Cities”, International Journal on Computer and Information Technology 2020.

[3] P.A.Mathina, L.Sakkanan , A.Selwin Raja, S.Sendurapandi, “Footboard Avoidance System in Public Transport”, Journal of Emerging Technologies and Innovative Research (JETIRBJ06019) & 2019.

[4] K. Vigneshwaran, M. Kanthababu, “Design and Development of Automatic Footboard Accident Prevention System”, International Journal of Innovative Research in Science,Engineering and Technology& 2018.

[5] Dr. G. Kalivarathan, R. Prem Sankar, Rohith Rajeev, “Intelligent Footboard Accident Prevention System in Buses”, International Journal of Advanced Research in Biology, Ecology, Science and Technology & 2017.

[6] M. Madhur, S. Kolagani, C. Kurakula, K. Nandan and B. Kumar,”Smart Bus Tracking And Management System”, Iconic Research And Engineering Journals, vol. 1, no. 8, pp. 80-84, 2018.

[7] S. Vijayakumari, R. R and B. Kirthana, ”Bus Tracking Using Raspberrypi”, International Journal of Pure and Applied Mathematics, vol. 119, no. 15, pp. 937-942, 2018.

[8] D. Subedha, G. Antony, V. Arunkumar and A. Venkatachalam, ”Iot Based Smart Bus Tracking And Ticketing System”, International Journal of Advance Research in Engineering, Science & Technology, vol. 5, no. 3, 2020.
[9] S. Lee, G. Tewolde and J. Kwon, ”Design and implementation of vehicle tracking system using GPS/GSM/GPRS technology and smartphone application,” 2014IEEE World Forum on Internet of Things (WF-IoT), Seoul, 2014.