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Adaptive cruise control for the Public Transport Vehicle

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***Abstract*—This paper provides the implementation of Adaptive cruise control of the vehicle. The distance of the front vehicle is measured using laser sensors. According to the distance the host vehicle speed is controlled. If distance is near the critical zone the sound signal is generated to alert the driver. If the distance is exceeds the critical zone the auto control takes place.**

Index terms –UltrasonicSensor, Microcontroller, StepperMotor.

I. INTRODUCTION

In this Project the distance of the front vehicle is measured using laser sensors. According to the distance the host vehicle speed is controlled. If distance is near the critical zone the sound signal is generated to alert the driver. If the distance is exceeds the critical zone the auto control takes place. If the obstacle is at LHS, RHS and Back side of the Host vehicle near the critical zone then warning signals are generated to inform the driver. CAN bus is used to transfer the data between the devices with an error control.

II. RELATED WORK

Anouck Renee Girard , Jolio Borges De sousa [1]
Cooperative adaptive cruise control which include cooperative forward collision warning. Specific way of organizing the motion control and Navigation functions performed by car. Functions are organized in to hierarchical layers.
Worrawut Pananurak, Somphong Thanok [2],
Developed for highway driving.ACC is developed to cope up with increase in traffic congession.Low Speed ACC and High speed ACC are operates at 5KM/Hrs and 40km/hr respectively.
Vivek Agarwal, N.Venkatamurali and C Chandramouli [3] In urban areas, congested traffic results in a large number of accidents at low speeds. This paper describes an accurate and fast driver-assistance system (DAS) that detects obstacles and warns the driver in advance of possible collisions in such a congested traffic environment the short range driver-assistance systems (DASs) have become highly relevant and important in today's congested urban traffic environment.Jian hu, Gangyan li, Xiude Wu, Jianhua Zhou and Liping Lu [4] development an intelligent control system for city bus .
In this project CAN bus for transferring the data between transducer and microcontroller. Designed the framework of city bus intelligent control system which includes driving information intelligent control, public service intelligent control system and transportation monitoring intelligent control system.

III. PROPOSED WORK

In this Project the distance of the front vehicle is measured using laser sensors. According to the distance the host vehicle speed is controlled. If distance is near the critical zone the sound signal is generated to alert the driver. If the distance is exceeds the critical zone the auto control takes place. It also detects the obstacle is at LHS, RHS and Back side of the Host vehicle near the critical zone then warning signals are generated to inform the driver. CAN bus is used to transfer the data between the devices with an error control.

IV. METHODOLOGY

Sensors are used to get the distance of the obstacle of all the directions. Three Laser (Long Distance) sensors are placed on front side, one ultrasonic sensor at the middle of rear side, one ultrasonic sensor at left rear side and one ultrasonic sensor at right rear side, three ultrasonic sensors left side and three ultrasonic sensors at right side of the vehicle.
All the mentioned sensors are controlled by microcontroller and after getting obstacle distance, if it is in a safe limit then warning signals are generated, as it crosses the safe zone then auto control is takes place. CAN bus is used to communicate the data among the

devices in a system In this system many tasks are executed simultaneously.

Laser sensor is used to detect obstacle at the front of the vehicle. The distance of the obstacle

(z) =c * t/2,

c=speed of light, t=round trip of the laser.

Ultrasonic sensors(Short Distance) are used to detect obstacle at the back (1 sensor), side (two sensor)and rear side(two sensor).

Microcontroller :It is used to trigger the sensors one by one and after receiving the reflected signal. measure the distance from vehicle to obstacle ,based on the distance the controller actuate the warning signal to the driver till the obstacle at the safe limit ,as it cross the limit then switch to auto control mode (Take control of the driver).

CAN bus: It is used to integrate all the sensors and controller for the communication among the devices.

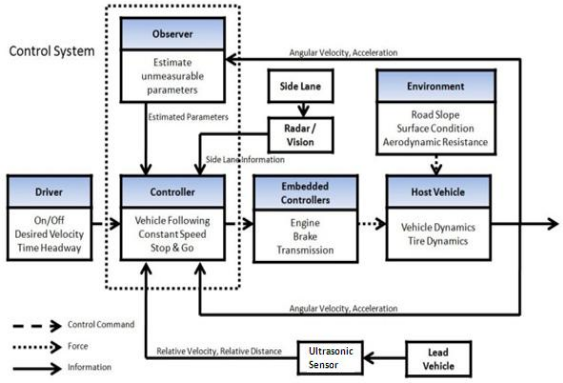


Fig.1 Block Diagram of Adaptive cruise control.

V. ALGORITHM

START

Step 1: Start the Engine.

Step 2: Operate the vehicle manually using the acceleration and brake pedal.

Step 3: check whether Acc is turned on.

Step 4: If the acc is turned off go to step 2.

Step 5: check whether any object is detected.

Step 6: If no object is detected that the host vehicles speed = set speed.

Step 7: After the object is detected calculate the distance using the time difference technique.

Step 8: Get the Host vehicle speed.

Step 9: Set the Host vehicle speed = Lead vehicle speed.

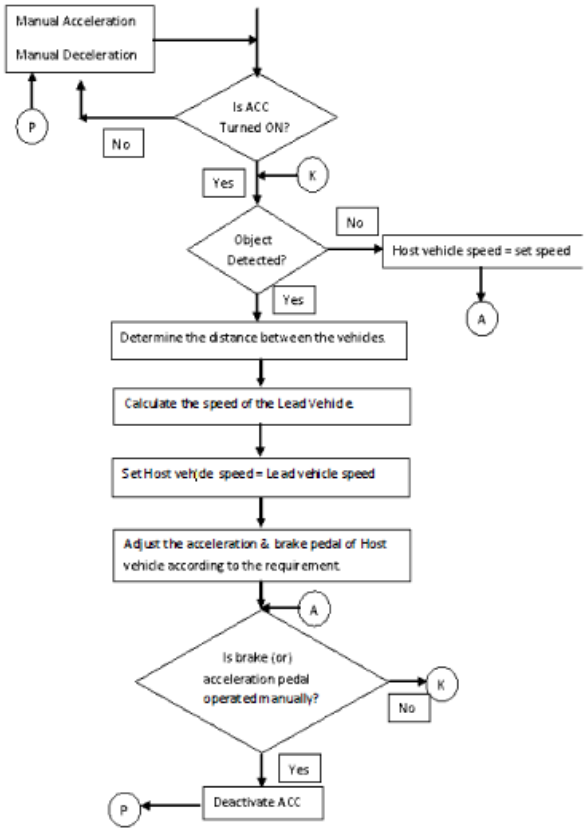
Step 10: Adjust the acceleration & brake pedals in order to achieve the safe speed required.

Step 11: If user manually presses the acceleration or brake pedal, then deactivate the ACe.

Step 12 : Display user that ACC is deactivated

Step 13: Repeat process continuously.

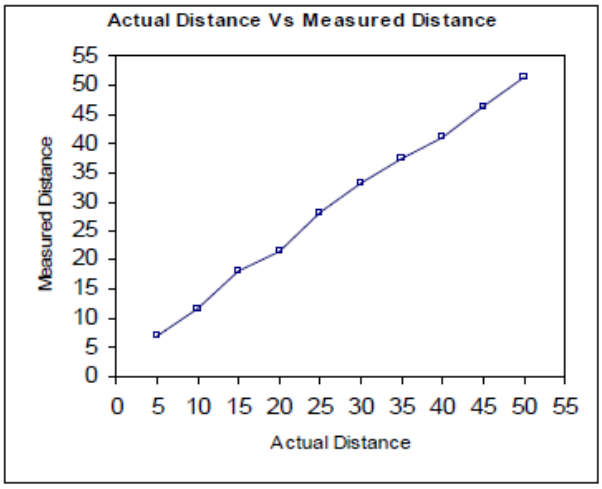
VI. FLOWCHART



VII RESULTS

S.No.	Actual Distance (cm)	Travel Time (µSec)	Measured Distance (cm)	% Error
1	5	400	6.86	37.20
2	10	690	11.83	18.34
3	15	1050	18.01	20.05
4	20	1250	21.44	7.19
5	25	1650	28.30	13.19
6	30	1930	33.10	10.33
7	35	2180	37.39	6.82
8	40	2400	41.16	2.90
9	45	2700	46.31	2.90
10	50	3000	51.45	2.90

VIII GRAPH



IX. CONCLUSION

The paper demonstrates the longitudinal vehicle model. Using the distance between the vehicles, the speed can be calculated. Different modes of driving are also shown. The paper is finally concluded by combining all the blocks into a single major block.

X. FUTURE ENHANCEMENTS

Safety features can be incorporated in the system design by including ABS (Anti-Braking system) and automatic airbag inflation during failure of cruise control mode of operation. These features can be activated depending upon the distance between the vehicles

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