ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE) Vol. 3, Special Issue 12, March 2017

Autonomous ECU Monitored Automatic Cruise Control System For Bikes And Motorcycles

C.Thiagarajan,[1]Dr.T.Muthumanikam,[2]

Student[1], Professor[2]
Department of Electronics &Communication Engineering
V.M.K.V Engineering College
Vinayaka Mission University,Salem,India

Abstract

Cruise control system is a quite famous and successful technological advancement in the field of motored vehicles especially cars. It allows the user to let the vehicle control the speed and the throttle on its own. It could maintain in a particular speed relieving the driver from his/her burden. This has many advantages like mileage saving, safer transport etc. and hence we thought why not we bring this technology to the two wheeler lovers so that they too get benefited from this technology? Hence we did this study on how the cruise control system can be implemented into the two wheelers with help of its ECU (Engine Control Unit / Electronic Control Unit).

Keywords: - Cruise Control system. Two-Wheelers, Mileage efficient, safer transport, ECU.

I. Introduction

Many cars have cruise control system which helps them to have a safe driving, to maintain a constant speed, to save fuel, to have a better and comfortable transport. And to bring all these to the bikers who makes the long travels on the highways would surely find these as a boon. Cruise control system in a bike can be as similar as of a car with a little alteration of its own. It would surely help the riders to maintain on the same speed and by which they will be rewarded with fuel consumption and a comfortable and safer journey. Cruise control is brought to the motorcycles with the help of their ECUs. Electronic or Engine Control Unit automatically controls the speed, throttle of the bikes so that the vehicle is maintained in the As there is static increase in bikers of our country who are willing to make long distance trips and journeys on the highways the accidents for the two wheelers on the highway is also increasing. Cruise control system could eventually reduce the percentage of accidents occurring by a good margin. It can help the bikes to maintain in a constant speed and keep the vehicle under the speed limit. By this the drivers will not be tempted to over speed and if

All Rights Reserved © 2017 IJARMATE

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE) Vol. 3, Special Issue 12, March 2017

over speeding is reduced surely accidents will be reduced since it is one of the major cause.

II. Block Diagram

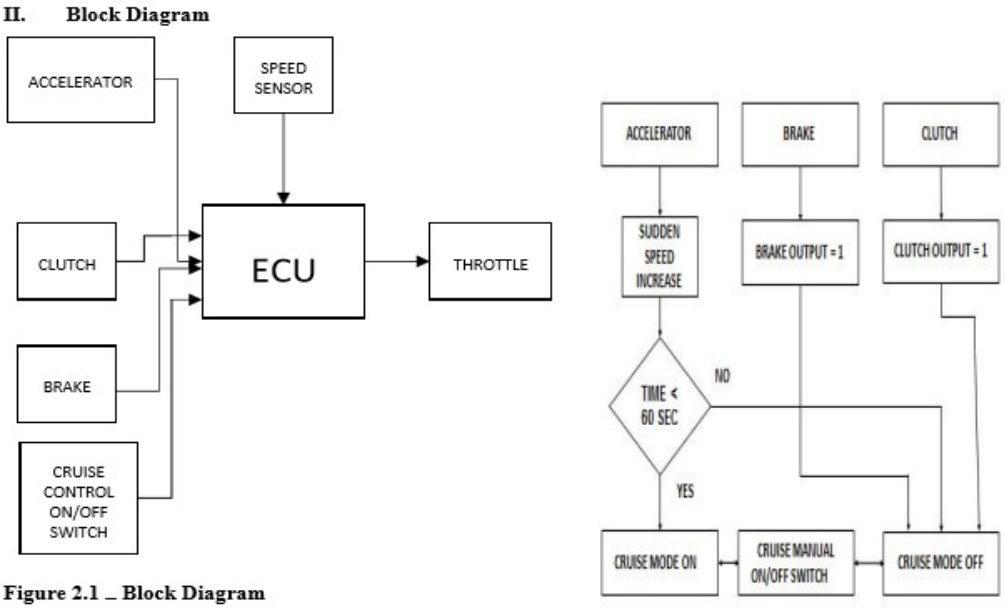

Figure 2.1 – Block Diagram

III. ECU

Flow Diagram of Cruise Control

An engine control unit (ECU), is also commonly called an engine control module (ECM), is a type of electronic control unit that controls a series of actuators like fuel injector and other sensors which includes air sensor, fuel sensor, etc. on an internal combustion engine to ensure optimal engine performance. It does this by reading values from a multitude of sensors within the engine bay, interpreting the data using multidimensional performance maps (called lookup tables), and adjusting the engine actuators accordingly. Before ECUs, air-fuel mixture, ignition timing, and idle speed were mechanically set and dynamically controlled by mechanical and pneumatic means. It also gets inputs from other sensors like speed sensor, tire pressure, sensor, clutch throttletc. And act accordingly. And in this study we are adding an algorithm or program into the Engine Control Unit to perform the tasks that we require to obtain the cruise control system. As the biker starts the bike and rides in a good speed something between 60 Kmph to 120 kmph he/she could turn the Cruise Control Switch ON. This initiates the Engine Control Unit to change to Cruise mode to Manual Mode. In cruise mode the vehicle will move in a constant speed (surely less than the speed limit) with taking complete control over the throttle leaving the riders to breathe for a while. During the cruise mode the biker doesn't need to hold the accelerator or throttle since the ECU is taking care of it.As the rider turns the Cruise control switch ON. As per the program the ECU gets the inputs of the current speed from the

All Rights Reserved © 2017 IJARMATE

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE) Vol. 3, Special Issue 12, March 2017

speed sensor. According to the input it varies the fuel injection, throttle which in turn haves a check on the speed of the vehicle.

IV Emergency Mechanism

If suppose the rider needs to stop the vehicle for some emergency purpose the algorithm must be structured in such a way that it gives smooth outcome and does not leave the rider in panic.

Emergency conditions like

- Obstacle or other vehicle on path
- Sharp Turn ahead
- Necessity of overtaking
- Other purposes when the riders need to slow down or stop the vehicle.

In every condition mentioned above except Overtaking condition (explained clearly later) the system follows the below process.

The system acts in such a way that once either the CLUTCH or BRAKE or ACCELERATOR is pressed or altered (Their output values will become 1 instead of 0) the ECU identifies that and changes vehicle turn off the cruise mode and the vehicle will act under Manual mode.

V Overtaking Issue

In case if there is a need to overtake the rider can accelerate manually and once he leaves the throttle the Cruise control mode will bring the speed back to the programmed speed level. These tasks function only within a time interval. The average time taken to make an overtake will be 30 – 60 seconds. If the vehicle speed is noted to be increasing for more than a minute, the cruise mode will be turned off. If the vehicle is acceleration is reduced gradually after a sudden increase the cruise control identifies this situation as Overtake done and keeps the cruise mode ON. Which means the ECU will eventually slow down the vehicle back to the set speed after overtake.

VI Conclusion

In this paper we presented a concept of automatic cruise control in bikes controlled and monitored by the Engine Control Unit. By which the speed of the bikes can be controlled, fuel efficiency can be increased, and safety and comfort journey can be made possible. This system can be implemented in any bike which already has an ECU and it can be implemented on newly manufactured bikes with ECU.

Reference

[1] A. Szadkowski and R. B. Morford, “Clutch engagement simulation: Engagement without throttle,” SAE Technical Paper Series, no. 920766,1992.

[2] J. Slicker and R. N. K. Loh, “Design of robust vehicle launch control system,” IEEE Trans. on Control System Technology, vol. 4, no. 4, pp. 326–335, 1996.

[3] White Paper—‘European Transport Policy for 2010: Time to Decide’; European Commission: Brussels, Belgium, December 9, 2001.

[4] Ioannou, P.A.; Chien, C.C. Autonomous Intelligent Cruise Control. IEEE Trans. Veh. Technol. 1993, 42, 657–672.

All Rights Reserved © 2017 IJARMATE

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE) Vol. 3, Special Issue 12, March 2017

[5] Milanés, V.; Onieva, E.; Pérez, J.; de Pedro, T.; González, C. Control de Velocidad Adaptativo Para Entornos Urbanos Congestionados. Rev. Iberoam. Automát. Informát. Ind. 2009, 6, 66–73

[6] Lusetti, B.; Nouveliere, L.; Glaser, S.; Mammar, S.Experimental Strategy for A System Based Curve Warning System for A Safe Governed Speed of A Vehicle.

[7] International Journal of Computer Applications (0975 – 8887) Volume 35– No.9, December 2011 In Proceedings of IEEE Intelligent Vehicles Symposium. Eindhoven, Netherlands, June 2008; pp. 660–665.

[8]http://www.harristechnical.com/downloads/ECM_ Field_G uide.pdf this link refers to tutorial on ECU.

[9]http://en.wikipedia.org/wiki/Electronic_control_un it this link refers to page that gives basics of ECU and other related information.

[10]http://members.rennlist.com/pbanders/ecu.htm. this link refers to technical document that contains information about Electronic control Unit .

All Rights Reserved © 2017 IJARMATE