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AN EFFECTIVE DRIVER BEHAVIOUR AND COOPERATIVE ADAPTIVE CRUISE CONTROL MEASURES IN AUTOMATED VEHICLES

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Abstract - *Adaptive cruise control provides more throughput in current traffic scenario when compare to cruise control method, here it's not only control the speed of the vehicle without user intervention but also help in continuous manoeuvring of vehicles based on the prior vehicle condition. In this paper we are implemented an efficient way of vehicle adaptive cruise control by implementing a cooperative behaviour between vehicles here we took three main aspects of cooperative adaptive cruise control are VDTN for message passing between the vehicles ,finding solution to driving under foggy climatic conditions , distance and braking mechanism for driver assistance. By adapting these methods we can achieve the throughout closer to ideal driving scenario.*

Keywords:-VDTN, CACC, ACC, Driver Assistance, Braking mechanism, Traffic.

I.INTRODUCTION

In Indian road-traffic the problems, like congestion, unpredictable travel-time delays and road-accidents, rash driving are taking a serious shape. Road traffic conditions in India are getting worse day by day. The average number of vehicles in India is growing at the rate of 10.16 percent annually, since in the last few a years .This calls for the vital need of Intelligent Transportation Systems (ITS), which make use of communication-technology to clear traffic problems. Many such systems exist for developed countries. However, most of these systems are costly and make assumptions about road and traffic conditions like, presence of lane system, relative speed and type of vehicles, presence of freeways, orderly traffic and relative damages in road. In developing countries, like India, traffic is inherently chaotic and noisy. Spending more time in traffic jam has become part of metropolitan life style, leading to health and environmental hazards. The vehicle penetration in metropolitan cities like Mumbai is suffering from above 500 vehicles per Km of road stretch and Bangalore with around 5 millions of vehicle ply over a network that extends barely above 3000 km .Here some ways to solve this problem. First way is that the most obvious solution is which is processing with infrastructure involving wider roads, flyover, state highways and national highways this for developing countries like India, money and space are seriously concerned. Second approach is to manage existing traffic situation and driver behaviour with same infrastructure, with the use of technology and by involving a person who travels in some regular or long distance in this process. We here, are concentrating on the second approach, that is the Intelligent Transportation System (ITS) which makes use of communication technology to clear road traffic problems prior information. Different ITS techniques is to provide information like current road congestion level, predicting travel time, predicting traffic congestion. Travelling person can make use of this information to plan their travel better chance to choose less congested road if there is a choice by adjusting traveling time to avoid peak-traffic hours or choosing another lane. In short can prevent congestion from getting worse by better planning and scheduling .Traffic condition is the major problem for all big and developing cities as per the latest information the length of the traffic condition increases in our developing cities and also

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environmental pollution, and some efforts have been implemented for automated and driver behaviour characteristics were aiming to develop new technologies to control traffic and to improve traffic efficiency ,here Cooperative Adaptive Cruise Control (CACC) has been taken as one of the most important technique in intelligent transportation system and the proposed technique which is used to manage the upcoming traffic is Adaptive Cruise Control (ACC) and our information is added with transfer of information or message from one node to another node that is transfer of message from one Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) through communication. The driving person or the moving vehicle in foggy climatic condition is not easier to travel why because some rash driving can take place or else before driving vehicle can get stopped due to that accidents can take place here the failure or severe traffic can bring losses to the economic output , fog has contributed to a number of multivehicle crashes in this to reduce these kinds of demolishes here sensors make their accurate work to transfer information according distance that is visibility measurement sensor based on fog warning systems. These sensors assist drivers or else motor vehicles to control speed according distance.Forward Collision Warning: Warns drivers if a vehicle ahead is stopped or traveling slower and there is a potential risk of collision and it passes information to stopped else the travelling if vehicle will get stopped.Blind Spot Warning/Lane Change Warning: Warns drivers when changing lanes if there is a car in their blind spot.Intersection Movement Assist: Warns drivers when it is not safe to enter an intersection due to high-collision probability with other vehicles.Electronic Emergency Brake Light: Notifies the driver if there is a sudden-braking vehicle ahead (or several vehicles ahead).

II .RELATED WORKS

Liu [1] et.al.proposed system employs a breaking control at low speed and it controls the moving vehicles ,this process have been proposed between inter vehicle wireless communication to develop braking control at low speed traffic condition. Sancar [2] et.al. this system focused on a modified CACC control and it has some capabilities to control the collision in end of the roads that is dead zone areas .The corresponding control task is to maintain desired spacing between consequent vehicles moving front and back and also particularly between the rash vehicles. Dey [3] et.al.the current intelligent transportation system based solution for minimizing for weather impact and road management systems in this concept here the connected vehicles equipped with weather sensors . Ahmed [4] et.al.provide some detailed study of recently proposed routing schemes for VDTNs. We also perform comparative analysis on the basis of unique criterion such as forwarding metrics with their implementations. Zheng et.al.studies the influence of information flow topology on the closed-loop stability of homogeneous vehicular platoon moving in a rigid formation including both radar-based sensors and V2V communications.available information to each controller is often limited to a neighboring region because of the range limitation of sensing and communication systems . Gomez [6] et.al. this concept deals with connected cruise control CCC where vehicles relay on ad-hoc wireless vehicle to vehicle V2V communication to control their motion and to move through traffic environment here such sensors and controllers were expected to have positive impact on the overall traffic behaviours. Kim [7] et.al. Cooperative Adaptive Cruise Control (CACC) algorithms that use information communicated via other vehicles or infrastructure. Specifically, the CACC algorithms use a modified form of the General Motors' car-following model, where the driver sensitivity is a function of the size of the existing traffic jam .This enables a vehicle to follow its predecessor at a closer distance under tighter control. This paper focuses on the impact of CACC on traffic-flow characteristicsAdaptive Cruise control (ACC) systems are nowadays used to increase safety in intelligent transportation systems. It exploits the advantages of various sensors for the acquisition and interpretation of the vehicles' environment. Sophisticated ACC functionalities, like collision avoidance on highways, require a high level of reliability and accuracy in the estimation of inter-vehicular distance.

III. PROPOSED SYSYEM

Our challenging approach is to implement communication, driver characteristics and control aspects of cooperative adaptive cruise control (CACC) in automated vehicles. This Communication is used to transfer of information or connectivity between vehicles **,** Vehicular delay tolerant network (VDTN). Vehicle to vehicle communication , vehicle to infrastructure. When the vehicle moves or else driver losses its control this system performance its behaviour and control the speed here some measures have been taken place

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Driver characteristicsDistance base, speed control. Choosing side road (lane choosing). Distance measurement control to identifyNight driving (fog and other climatic conditions). Theblock shows the basic connection between vehicles to vehicles and infrastructure. It shows the characteristics behavior of driver and also tells us how to keep driver engaged in driving tasks during these related issues. The block diagram consists of sensors, microcontroller, zigbee and motors where the interconnections are connected to node architecture base. If do more vehicles are passing in the particular area at that time any disturbance occurred it will communicate before the particular distance . Cooperative adaptive cruise control (CACC) systems have the potential to increase traffic throughput by allowing smaller headway moving vehicles and moving vehicles safety in a platoon at a harmonized speed. CACC systems have been attracting significant attention from both academia and industry and we review three basic and important aspects of CACC systems: Communications, driver characteristics, and controls to identify the most challenging issues for their real world deployment. To achieve mass acceptance, the control design needs to depict real world traffic variability such as communication effects, driver behavior and traffic composition. [5] discussed about Positioning Of a Vehicle in a Combined Indoor-Outdoor Scenario, The development in technology has given us all sophistications but equal amounts of threats too. This has brought us an urge to bring a complete security system that monitors an object continuously. Consider a situation where a cargo vehicle carrying valuable material is moving in an area using GPS (an outdoor sensor) we can monitor it but the actual problem arises when its movement involves both indoor (within the industry) and outdoor because GPS has its limitations in indoor environment.

IV SYSTEM DESIGN

A. ARM CORTEX MO+

The ARM CORTEX M0+ processor is a very low gate count, highly energy efficient processor that is intended for microcontroller and deeply embedded applications that require an area optimized processor. is the energy efficient thing available thing it was developed on the very successful cortex of M0+ which retains instruction set and compatibility and hence while decreasing the consumption of energy and there will be change in performance that to will increases CORTEX M0+ cost will be high at 8 bit processor but at the same time it gives its performance to 32 bit RISC ARM processor .CORTEX M0+ is the highest efficiency to cost sensitive devices and it is suitable for wide variety of applications such as environment, sensor fusion, identity in tracking, internet of things, farming, smart city etc.

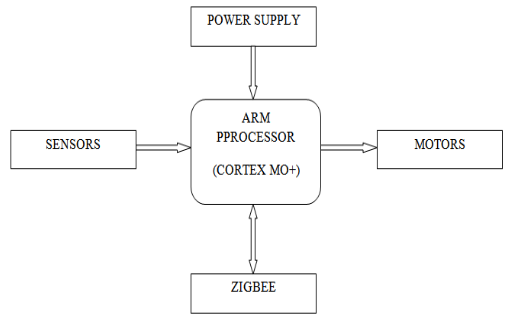

Figure 1 Block diagram of Cooperative Cruise Control

B.GPIOS

The general-purpose input and output (GPIO) module communicates to the processor core via a zero wait state interface for maximum pin performance. The GPIO registers support 8-bit, 16-bit or 32-bit accesses.The GPIO data direction and output data registers control the direction and output data of each pin when the pin is configured for the GPIO function. The GPIO input data register displays the logic value on each pin when the pin is configured for any digital function, provided the corresponding Port Control and Interrupt module for that pin is enabled. Efficient bit manipulation of the general-purpose outputs is supported through the addition of set, clear, and toggle write-only registers for each port output data register.

Features

• Features of the GPIO module include:

• Pin input data register visible in all digital pin-multiplexing modes, Pin output data register with corresponding set/clear/toggle registers, Zero wait state access to GPIO registers through IOPORT.

c.UART.

Full-duplex, standard non-return-to-zero (NRZ) format, Double-buffered transmitter and receiver with separate enables, Programmable baud rates (13-bit modulo divider), Transmit and receive baud rate can operate asynchronous to the bus clock. Baud rate can be configured independently of the

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bus clock frequency, Supports operation in Stop modes .

• Transmit data register empty and transmission complete, Receive data register full, Receive overrun, parity error, framing error, and noise error, Idle receiver detect, Active edge on receive pin, Break detect supporting LIN,Hardware parity generation and checking, Programmable 8-bit 10character length, Programmable 1-bit or 2-bit stop bits, Receiver wakeup by idle-line, address-mark or address match, Optional 13-bit break character generation / 11-bit break character detection ,Selectable transmitter output and receiver input polarity.The ZigBee network layer natively supports both star and tree networks, and generic mesh networking. Every network must have one

D. PWM(PULSE WIDTH MODULATION)

The PWM can perform basic 16-bit and 32-bit timer/counter functions with match outputs and external and internal capture inputs. In addition, the PWM can employ up to two different programmable states, which can change under the control of events, to provide complex timing patterns. All inputs and outputs of the PWM are movable functions and are assigned to pins through the switch matrix.

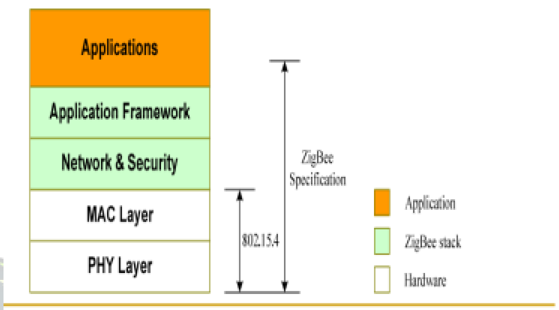
E. SENSORS

The IR Sensor-Single is a general purpose proximity sensor. Here we use it for collision detection. The module consist of a IR emitter and IR receiver pair. The high precision IR receiver always detects a IR signal. The module consists of 358 comparator IC. The output of sensor is high whenever it IR frequency and low otherwise. The on-board LED indicator helps user to check status of the sensor without using any additional hardware. The power consumption of this module is low. It gives a digital output.

i) SHARP IR (Infra Red) SENSOR

Sharp infrared detectors and rangers boast a small package, very low power consumption and a variety of output options. In order to maximize each sensor's potential, it is important to understand how these types of IR sensors work, their effective ranges, and how to interface to them. There are two major types of Sharp's infrared (IR) sensors based on their output: analog rangers and digital detectors.

coordinator device, tasked with its creation, the control of its parameters and basic maintenance. Within star networks, the coordinator must be the central node. Both trees and meshes allow the use of ZigBeerouters used to extend communication at the network level.



Analog ranges provide information about the distance to an object in the ranger's view. The incident angle of the reflected light varies based on the distance to the object .There are two major types of Sharp's infrared (IR) sensors based on their output: analog rangers and digital detectors. Analog ranges provide information about the distance to an object in the ranger's view. Digital detectors provide a digital (high or low) indication of an object at or closer than a predefined distance..These rangers all use triangulation and a small linear CCD array to compute the distance and/or presence of objects in the field of view. In order to triangular, a pulse of IR light is emitted by the emitter. The light travels out into the field of view and either hits an object or just keeps on going. In the case of no object, the light is never reflected, and the reading shows no object. If the light reflects off an object, it returns to the detector and creates a triangle between the point of reflection, the emitter and the detector.

F. ROTARY ENCODER

A rotary encoder, also called a shaft encoder, is an electro-mechanical device that converts the angular position or motion of a shaft or axle to an analog or digital code.There are two main types: absolute and incremental (relative). The output of absolute encoders indicates the current position of the shaft, making them angle transducers. The output of incremental encoders provides information about the *motion* of the shaft, which is typically further processed elsewhere into information such as speed, distance and position.

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G. DC MOTORS

Electric motors are broadly classified into two different categories: DC (Direct Current) and AC (Alternating Current). Within these categories are numerous types, each offering unique abilities that suit them well for specific applications. In most cases, regardless of type, electric motors consist of a stator (stationary field) and a rotor (the rotating field or armature) and operate through the interaction of magnetic flux and electric current to produce rotational speed and torque.

Software Used

The Kinetis Design Studio (KDS) is a complimentary integrated development environment for Kinetis MCUs that enables robust editing, compiling and debugging of your designs. Based on free, open-source software including Eclipse, GNU Compiler Collection (GCC), GNU Debugger (GDB), and others, the Kinetis Design Studio IDE offers designers a simple development tool with no code-size limitations. Furthermore, Processor Expertsoftware enables your design with its knowledge base and helps create powerful applications with a few mouse clicks.

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