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MAGNETIC BRAKING SYSTEM IN AUTOMOBILES A NOVEL APPROACH TO MITIGATE ROAD ACCIDENTS

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ABSTRACT

Many inventions are in the hands of human but human now facing setbacks due to these inventions. Thousands of people are being killed every year in road accidents. Avoiding collisions is a crucial issue in most transportation systems as well as in many other applications. The task of a collision avoidance system is to track objects of potential collision risk and determine any action to avoid or mitigate a collision. Now it may be possible to control accidents with new human inventions. This paper presents theory for tracking and decision making in collision avoidance systems. The main focus is how to make decisions based on uncertain estimates and in the presence of multiple obstacles. Detecting and avoiding a possible collision have been studied for several different fields of application such as air traffic control (ATC), automotive collision avoidance, robot manipulator control etc. The task of any collision avoidance system is ultimately to avoid two or more objects from colliding. The authors tried to make use of a solenoid connected to a strong battery which can produce magnetic flux and can detect the flux signals by magnet flux sensor. If it can arrange magnetic solenoid in flux sensor in any automobile, the flux signals can be detect. Using transmitter those signals will sent to the control system arranged in the automobile which in turn sends commands to the automatic or robotic brakes. By programming the system to control the robotic brake with the change in the interlinking of the flux, in this way, accidents can be prevented to maximum extent.

Keywords: Control system, Robotic brakes, Magnetic flux sensor, Transmitter, Receiver, Solenoid.

I. INTRODUCTION

Every year, thousands of people are being killed in road accidents. Many children become homeless due to these accidents. But if we go the next level of innovations, we can have many ideas to control these accidents by new technical methods.

Safe and collision-free travel is vital in today’s society. It is also an important issue in many industrial processes. In aerospace and naval applications, radar based support systems to avoid collisions have been used for several decades. Currently, collision avoidance (CA) systems are starting to emerge in automotive applications. The challenge in designing a CA system is in balancing the effectiveness of avoiding collisions versus the risk of false alarms. Automotive applications in particular present several challenges; dense traffic causing complex scenarios with many moving objects; low-cost sensors and computational units have to be used. Furthermore, the dynamic capabilities of a vehicle may change rapidly, e.g. tire-to road friction may change significantly from one moment to the next. This thesis discusses general theory for CA decision making and its application in automotive systems. The main focus is dealing with uncertainties in the decision making process and how to handle complex multiple obstacle scenarios. Specifically, a framework for dealing with uncertainty is introduced. In this framework stochastic numerical integration is used to evaluate the confidence of each decision. Furthermore, algorithms for decision making in multiple obstacle scenarios are presented. The proposed algorithms use different strategies to search the set of feasible avoidance maneuvers, to find an escape path if it exists. Some novel collision avoidance decision functions are also introduced. These functions address different issues such as brake system characteristics, finding the optimal avoidance maneuver for a constant acceleration motion model, and changing obstacle dynamics when the obstacle comes to a stop.

II. COLLISION AVOIDANCE OVERVIEW

Avoiding collisions is a crucial issue in most transportation systems as well as many other applications. Detecting and avoiding a possible collision have been studied for several different fields of application such as air traffic control (ATC), automotive collision avoidance, robot manipulator control etc. The task of any collision avoidance system is ultimately to avoid two or more objects from colliding. However, in this thesis the notion of a collision avoidance system will be extended to also include systems trying to reduce the consequence of an imminent collision i.e., collision mitigation (CM) systems. CA systems avoid collisions either by performing an autonomous avoidance maneuver or by issuing a warning to an operator. To mitigate collision consequences other actions might be taken, e.g. in an automotive application this might be to pretension the seat-belts and inflate the airbags; in a fighter aircraft one could consider ejecting the pilot if a collision is unavoidable. Any action performed by a CA system will be called an intervention. Depending on application and the type of intervention considered, the metric for measuring collision threat and the decision making algorithm might vary significantly.

Traffic accidents are one of the major causes of death and injuries in today's society. Automotive manufactures have started to introduce more and more driver support systems to help prevent accidents. The first step in CA systems for automotive applications is adaptive cruise control (ACC), which is currently available as an option for several car models. ACC systems adapt the speed to any in-path vehicle, should it travel slower than the set speed of the host vehicle. The cruise control system is only allowed to exert limited deceleration (typically −3 m/s2); some systems also issue a warning to the driver when this acceleration is not sufficient to avoid collision. Current ACC systems are sold as a comfort system and can be switched on and off by the driver; they also disengage at low speeds (below 40 km/h). The next step in automotive CA is to introduce systems that are always active and perform autonomous braking and/or give warning when a collision is imminent. Such systems

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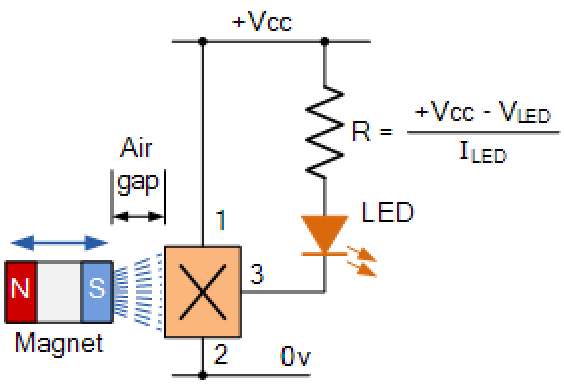
are starting to emerge on the market. A big challenge in automotive collision avoidance is that even in normal driving, the traffic situation might be very complex from a sensing view point, with numerous obstacles to be detected and classified. In addition to this, sensors and computational resources must be low-cost. Another issue is that often the tire-to-road friction is unknown and might change rapidly.

III. WORKING

Electromagnetic brake works on the principle of electromagnetism. They are totally friction-less. Due to this they have longer life-span and durable. Less maintenance is required in these brakes. It can be used as supplementary brakes and can also use to stops rotating shafts of high-grade machines in industries.

Magnetic braking works because of induced currents and Lenz's law. If a metal plate is attached to the end of a pendulum and it is allowed to swing, its speed will greatly decrease when it passes between the poles of a magnet. When the plate enters the magnetic field, an electric field is induced in metal and circulating eddy currents are generated. These currents act to oppose the change in flux through the plate, in accordance with Lenz's Law. The currents in turn heat the plate, thereby reducing its kinetic energy. A flux sensor adapted to sense the direction of magnetic flux in the yoke portion located on the same side of the coil means axis as the relatively small magnet.

A solenoid comprising a coil or coils of electrical wire, a plug nut and movable core within the coil(s). A magnetic yoke surrounds the coil(s), the axis of the latter extending across the magnetic circuit defined by the yoke. Relatively large and small permanent magnets are associated with the yoke on opposite sides of the axis, the magnets producing flux in opposite directions. A flux sensor, closer to the small magnet, senses changes in direction of the flux. Thus, the sensor can be used to indicate of the core. Therefore the intensity of flux can be detected and can be used to control the automobile.



It starts with two solenoids which can produce magnetic flux. These solenoids are arranged in automobiles such that one is connected in front of it and the other at the back side. These solenoids are connected to the transmitter and the receiver. The receiver is connected to the control system arranged in that automobile which in turn connected to the robotic brakes. When an automobile come nearer to the other one, the net flux changes and the sensor senses the changes and transmits it to the receiver which is followed by sending it to the control unit. The control unit then controls the robotic brakes and applies the brake without any fault. When there is a small change in the flux according to it the intensity of brakes are controlled by the control unit. By default there is a limit fixed for the flux that will help to recognize the distance of other vehicle and simultaneously applies the brakes when needed, by the automated braking system.

IV. ADVANTAGES

• No friction loss.
• Less heat loss.
• Less wear of components.
• Fully electronically controlled.
• Great braking efficiency potential to regain energy lost in braking.
• Potential to regain energy lost in braking.
• Potential hazard of tire deterioration and bursts due to friction is eliminated.
• No need to change brake oils regularly.
• No oil leakage.
• Problem of brake fluid vaporization and freezing is eliminated.
• Less maintenance cost.
• Longer life span compared to conventional brakes.
• Can be used in industry to stop or decelerate rotating parts.
• No need of abs

V. CONCLUSION

Electromagnetic brakes have many advantages over frictional braking system. The combination of eddy current and magnetic forces makes this brake more effective. This brake can be used as auxiliary brake system in vehicle. The usage of ABS can be neglected by using a micro controlled electromagnetic system. it can be used in rail coaches to decelerate the train moving in high-speed. Combination of these brakes increases the brake life and act like fully loaded brakes. These brakes can be used in wet condition, so there is no use of anti-skidding instrument. It is fully electrically controlled which results in less accidents. The braking force produced in this brake is less than the disc brakes. Hence, it can be used as a secondary or emergency braking system in the automobiles.

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