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Fabrication of Intelligent Braking System

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Abstract: ***The braking system was designed and applied on a car to make the driving process safety using embedded system design. Most of the accident occurs due to the delay of the driver to hit the brake, so in this project work braking system is developed such that when it is active it can apply brake depending upon the object sensed by the Proximity sensor and speed of vehicle. Currently, vehicles are often equipped with active safety systems to reduce the risk of accidents, many of which occur in the urban environments. The most popular include Antilock Braking Systems (ABS), Traction Control and Stability Control. All these systems employ different types of sensors to constantly monitor the conditions of the vehicle, and respond in an emergency situation. An intelligent mechatronic system includes an Proximity wave emitter provided on the front portion of a car producing and emitting Proximity waves frontward in a predetermined distance. An Proximity receiver is also placed on the front portion of the car operatively receiving a reflective Proximity wave signal. The reflected wave (detected pulse) gives the distance between the obstacle and the vehicle and RPM counter gives speed of vehicle. The microcontroller is used to control the braking of the vehicle based on the detection pulse information to push the brake pedal and apply brake to the car stupendously for safety purpose.***

Keywords: Proximity, Microcontroller, Arduino, Relay, Motor, Tranmitter, Receiver

I. INTRODUCTION

While we have a tendency to square measure travelling within the vehicle we should always management the break if any objects forthcoming people. For that, we've got designed this project for automatic braking system. Whenever we have a tendency to management the break, at the time what happens within the system suggests that one amongst the coil winding is placed around it. It generates the emf and it's fitted with the appropriate mechanical set. After we unleash the break the force generation is stopped and also the coil winding releases from the mechanical set.

The emergence of digital signal processor enhances the capacity and features of universal microcontroller. The overall system is designed so that the value of inter-vehicle distance from infrared laser sensor and speed of follower car from speedometer are fed into the DSP for processing, resulting in the DSP issuing commands to actuator to function appropriately. The most popular systems like Antilock Braking Systems (ABS), Traction Control and Stability Control employ different types of sensors to constantly monitor the conditions of the vehicle, and respond in an emergency situation. An intelligent mechatronic system includes an Proximity wave emitter provided on the front portion of a car producing and emitting Proximity waves frontward in a predetermined distance.

An Proximity receiver is also placed on the front portion of the car operatively receiving a reflective Proximity wave signal. The reflected wave (detected pulse) gives the distance between the obstacle and the vehicle. Then a microcontroller is used to control the speed of the vehicle based on the detection pulse information to push the brake pedal and apply brake to the car stupendously for safety purpose. Driving is a compulsory activity for most people. People use cars to move from one place to another. The number of vehicles is increasing day by day. Nowadays, the numbers of accident is so high and uncertain. Accidents occur frequently and cause worse damage, serious injury and death.

These accidents are mostly caused by delay of the driver to hit the brake. The braking system was designed and applied on a car to make the driving process safety using embedded system design. Currently, vehicles are often equipped with active safety systems to reduce the risk of accidents, many of which occur in the urban environments. The most popular include Antilock Braking Systems (ABS), Traction Control and Stability Control. All these systems employ different types of sensors to constantly monitor the conditions of the vehicle and respond in an emergency situation.

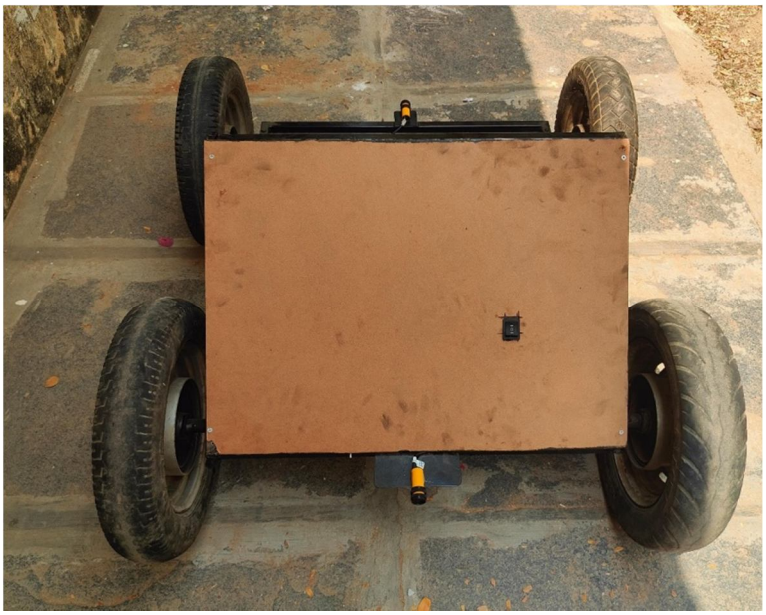

Fig. 1.1 Fabrication of Intelligent braking system

II. MATERIALS & METHODOLOGY

A. *Arduino uno Microcontroller*

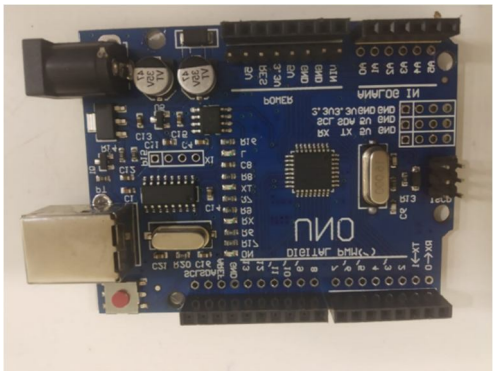

Fig2.1: Arduino

The Arduino microcontroller is an open-source electronics platform based on easy-to-use hardware and software, with various models offering different specifications for input/output, memory, and processing capabilities.

B. *Proximity Sensor*

Fig2.2: E18D80NK Proximity Sensor

Proximity sensor transmits Proximity waves from its sensor head and again receives the Proximity waves reflected from an obstacle. By measuring the length of time from the transmission to reception of the Proximity wave, it detects the distance and hence the position of the object. Proximity signals are like audible sound waves, except that the frequencies are much higher than them. Our Proximity transducers have piezoelectric crystals which resonate to a desired frequency and convert electric energy into acoustic energy and vice versa. The below illustration shows how sound waves, transmitted in a conical shape, are reflected from a target back to the transducer.

C. Servo Drive Motor

Fig2.3: Servo Drive motor

In a car, the primary motor responsible for motion is the internal combustion engine (ICE) in traditional gasoline or diesel-powered vehicles. The engine generates power by burning fuel and converting the resulting energy into mechanical motion. This motion is then transmitted to the wheels via a transmission system, which typically includes a gearbox, driveshaft, differential, and axles. In electric vehicles (EVs), the motor responsible for motion is an electric motor powered by a battery pack. Electric motors convert electrical energy stored in the battery into mechanical motion to propel the vehicle. Electric motors in EVs can vary in type, including brushed DC motors, brushless DC motors, and AC induction motors, each offering different performance characteristics.

D. Relay

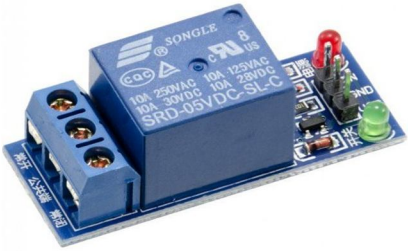

Fig2.4: Relay

A relay is an electromagnetic switch that is used to turn on and turn off a circuit by a low power signal, or where several circuits must be controlled by one signal.
Most of the high-end industrial application devices have relays for their effective working. Relays are simple switches which are operated both electrically and mechanically. Relays consist of an electromagnet and a set of contacts.

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III. WORKING PRINCIPLE

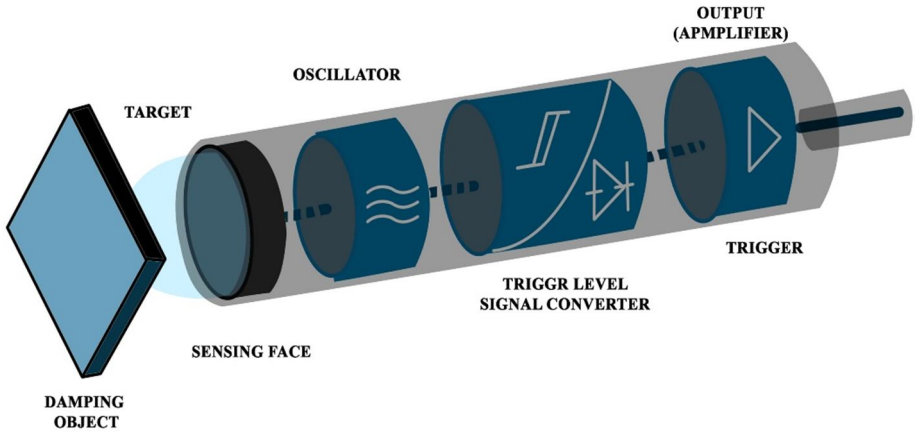

Fig. 3.1 Working Priciple

Proximity sensor transmits Proximity waves from its sensor head and again receives the Proximity waves reflected from an obstacle. By measuring the length of time from the transmission to reception of the Proximity wave, it detects the distance and hence the position of the object. Proximity signals are like audible sound waves, except that the frequencies are much higher than them. Our Proximity transducers have piezoelectric crystals which resonate to a desired frequency and convert electric energy into acoustic energy and vice versa. The below illustration shows how sound waves, transmitted in a conical shape, are reflected from a target back to the transducer. Accordingly, an output signal is produced to perform some kind of indicating or control function. A certain minimum distance from the sensor is required to provide a time delay so that the "echoes" can be interpreted. Some variables which can affect the operation of Proximity. sensing include, target surface angle, reflective surface roughness or changes in temperature or humidity. Targets can have any kind of reflective form. Even round objects can be targets.

Fig. 3.2 Block Diagram of Sensor

These sensors work based on different principles depending on their type, including inductive, capacitive, ultrasonic, and photoelectric sensors. For example, inductive proximity sensors use electromagnetic induction to detect objects, while capacitive sensors detect changes in capacitance caused by the presence of objects.

IV. CONCLUSION

In this report the innovative idea of implementing intelligent braking system is discussed and thereby analyzed its various parameters for regular realistic application. Intelligent braking is one of the smart options which can be implemented in various applications for stopping a moving body without jerky motion. The previous research study clearly explains that Proximity sensor and microcontroller action plays vital role in determining intelligent braking torque generated by brake actuation assembly.

The entire report offers a short discus of “Proximity sensing element Distance Controller”. several benefits square measure there in comparison to alternative automatic braking system. The planned system supported ATMEL microcontroller is found to be a lot of compact, user friendly and fewer advanced, which might promptly be employed in order to perform many complex tasks. Though it's designed keeping in mind regarding the necessity for business, it will extended for alternative functions like business applications. because of the chance of engineering (Atmel microcontroller) used this “Proximity device Distance Controller” system is totally package controlled with less hardware circuit. This feature makes that this technique can be the platform for future systems.

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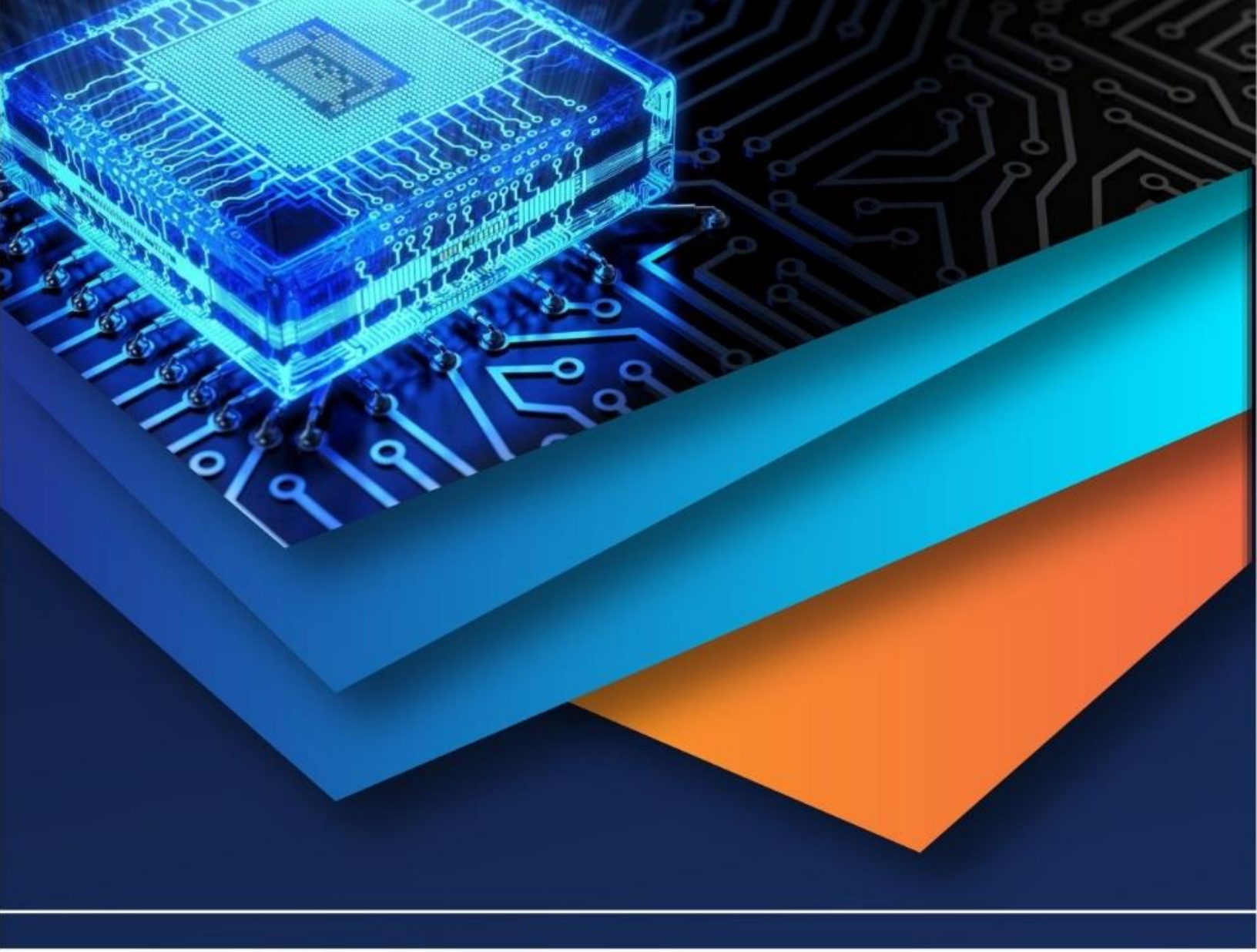

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