Accident Preventing Reverse Braking Tractor Trolley.

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ABSTRACT

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. In this project the use of ultrasonic sensors in safety systems for controlling the speed of a tractor trolley is proposed. An intelligent mechatronic system includes an ultrasonic wave emitter provided on the front portion of a car producing and emitting ultrasonic waves frontward in a predetermined distance. An ultrasonic receiver is also placed on the rear portion of the trolley operatively receiving a reflective ultrasonic wave signal. The reflected wave (detected pulse) gives the distance between the obstacle and the trolley. Then a microcontroller is used to control the speed of the trolley based on the detection pulse information to push the brake pedal and apply brake to the trolley stupendously for safety purpose.

Keywords - *Trolley, Pneumatic system, disc brake, microcontroller circuit, ultrasonic sensor etc.*

1. Introduction -

Driving is a compulsory activity for most people. People use their trolley to move from one place to other place. The number of vehicle is increasing day by day. It is produced tacked tightly and risk to accident. Nowadays, the numbers of accident is so high and uncertainly. Accident will occurs every time and everywhere and cause worst damage, serious injury and dead. These accidents are mostly cause by delay of the driver to hit the brake.

This project is designed to develop a new system that can solve this problem where drivers may not brake manually but the vehicles can stop automatically due to obstacles. This project is about a system that can control braking system for safety. Using ultrasonic as a ranging sensor, its function based on ultrasonic wave. After transmit by transmitter, the wave can reflect when obstacle detected and receive by receiver. The main target for this project is, trolley cans automatically braking due to obstacles when the sensor senses the obstacles. The braking circuit function is to brake the trolley automatically after receiving the signal from the sensor

2. Literature Review -

This chapter reviews some of the work related to the study of the ultrasonic trolley braking system. The main reviews are about sensor, ultrasonic sensor, PIC microcontroller and servo motor. Sensor is an electrical device that maps an environmental attribute to a quantitative measurement. It is created to collect information about the world. Each sensor is based on a transduction principle which is conversion of energy from one form to

another form. Ultrasonic ranging and detecting devices use high-frequency sound waves to detect the presence of an object and its range. The systems either measure the echo reflection of the sound from objects or detect the interruption of the sound beam as the objects pass between the transmitter and receiver. An ultrasonic sensor typically utilizes a transducer that produces an electrical output in response to received ultrasonic energy. The normal frequency range for human hearing is roughly 20 to 20,000 hertz. Ultrasonic sound waves are sound waves that are above the range of human hearing and, thus, have a frequency

3. General Information –

3.1 Objective -

The objectives of this project are;

i. To develop a safety trolley braking system using ultrasonic sensor
ii. To design a vehicle with less human attention to the driving

3.2 Scope of project -

i. To develop an ultrasonic sensor to detect the obstacle
ii. To process the output from the ultrasonic sensor to drive the servo motor as an actuator.

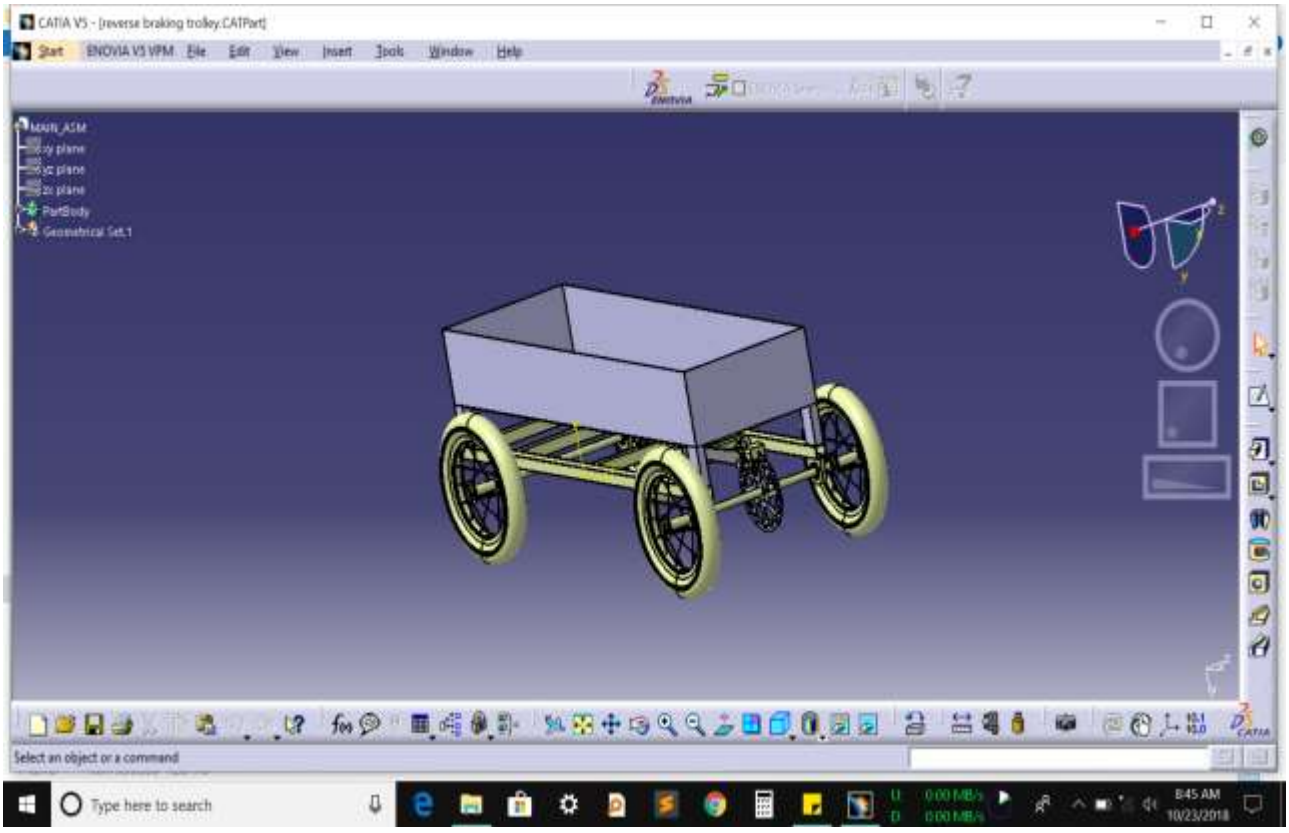
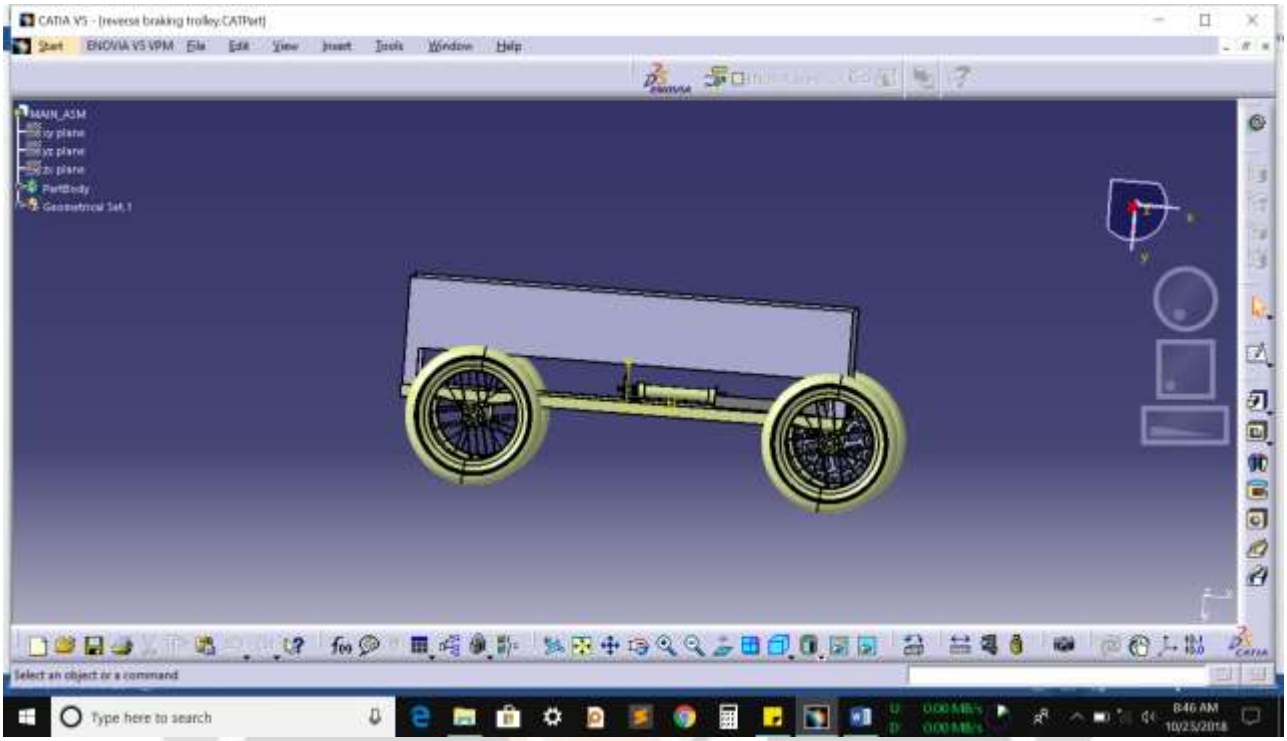


Fig. Assembly of trolley



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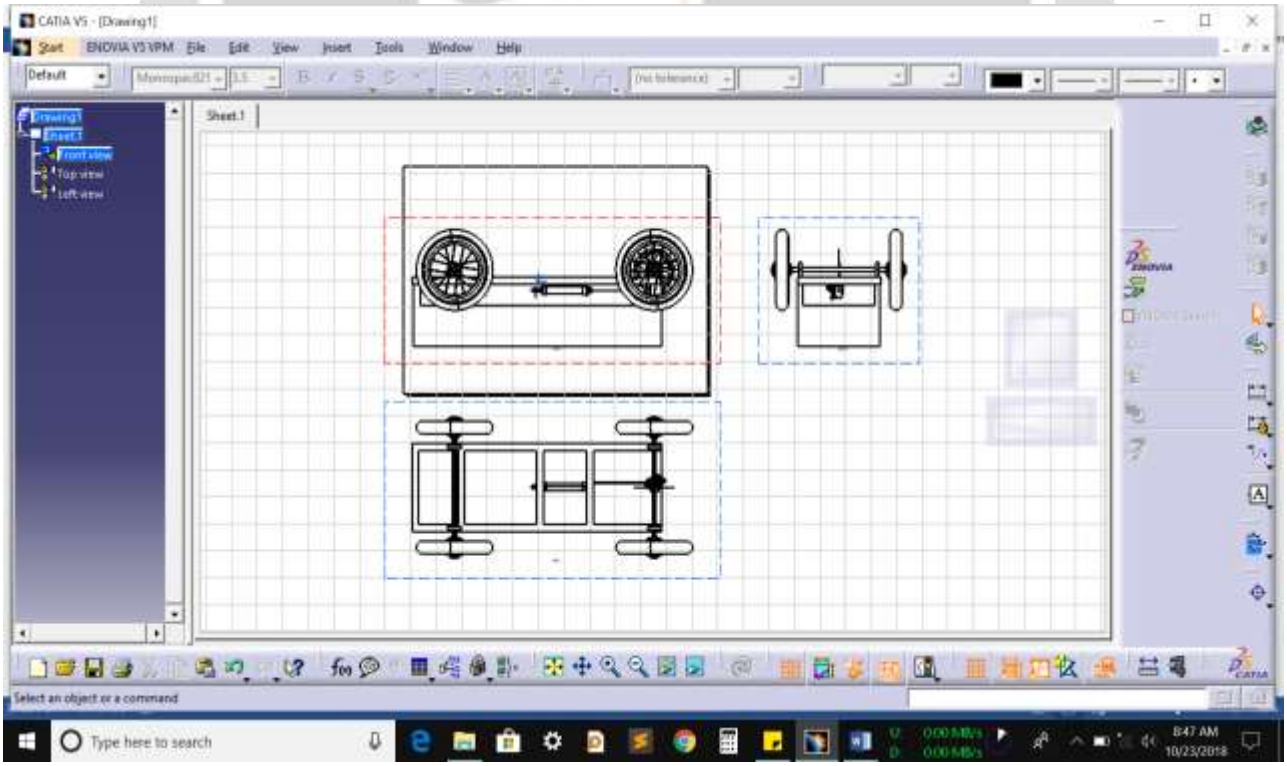

Fig. Drafting sheet

3.3 Working Principle -

This application is based upon the reflection of sound waves. Sound waves are defined as longitudinal pressure waves in the medium in which they are travelling. Subjects whose dimensions are larger than the wavelength of the impinging sound waves reflect them; the reflected waves are called the echo. If the speed of sound in the medium is known and the time taken for the sound waves to travel the distance from the source to the subject and back to the source is measured, the distance from the source to the subject can be computed accurately. This is the measurement principle of this application. Here the medium for the sound waves is air, and the sound waves used are ultrasonic, since it is inaudible to humans.

Assuming that the speed of sound in air is 1100 feet/second at room temperature and that the measured time taken for the sound waves to travel the distance from the source to the subject and back to the source is t seconds, the distance d is computed by the formula d=1100 X 12 X t inches. Since the sound waves travel twice the distance between the source and the subject, the actual distance between the source and the subject will be d/2.

4. Methodology -

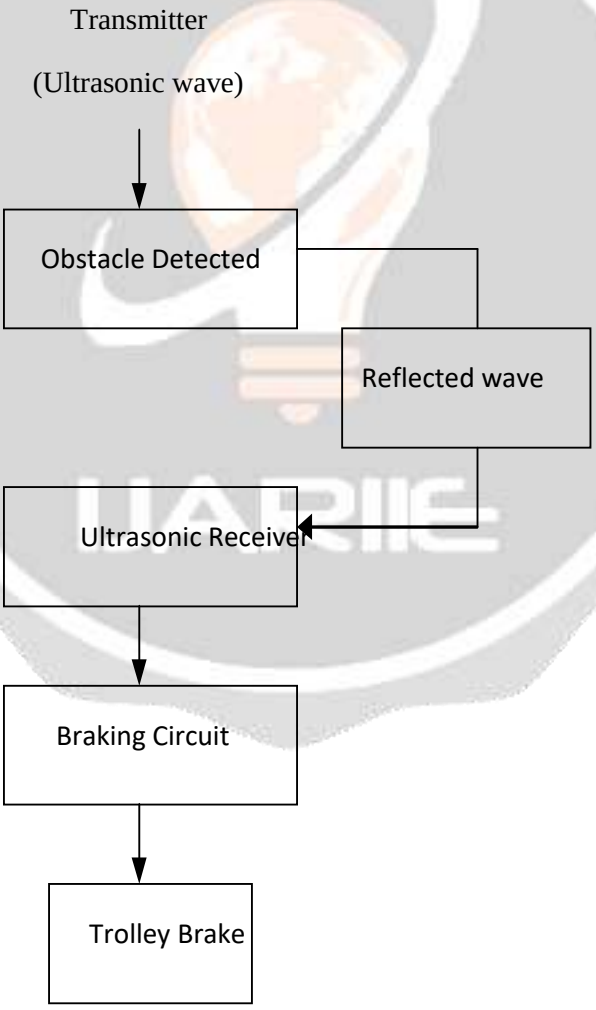

Fig. Block diagram of the system

4.1 Ultrasonic Transmitter -

Before transmit the ultrasonic wave, there is a part which is ultrasonic wave generator that function to generate ultrasonic wave. In that part, there is timing instruction means for generating an instruction signal for intermittently providing ultrasonic waves. This signal will send to an ultrasonic wave generator for generating ultrasonic waves based on the instruction signal from said timing instruction means (transform electrical energy into sound wave). After ultrasonic wave was produced, ultrasonic transmitter transmits the ultrasonic waves toward a road surface to find out the obstacle. The range that obstacle detected is depends on the range of ultrasonic sensors that used.

4.2 Ultrasonic Receiver -

If the ultrasonic wave detect the obstacle, its will produce a reflected wave. An ultrasonic receiver is used for receiving the ultrasonic waves reflected from the road surface to generate a reception signal. There is ultrasonic transducer that will transform back the sound wave to electrical energy. This signal amplified by an amplifier. The amplified signal is compared with reference signal to detect components in the amplified signal due to obstacles on the road surface. The magnitude of the reference signal amplification factor of the amplifier is controlled to maintain a constant ratio between the average of the reference signal and the average of the amplified signal.

4.3 Braking Circuit -

The processed signal will be send to the braking circuit. At the braking circuit, there is a controller that can process the signal and give the instruction to the output based on condition of the signal. For this project, controller that used is PIC 16F84A microcontroller (8-bit microcontroller). PIC 16F84A microcontroller use the high language and easy to do the programming.

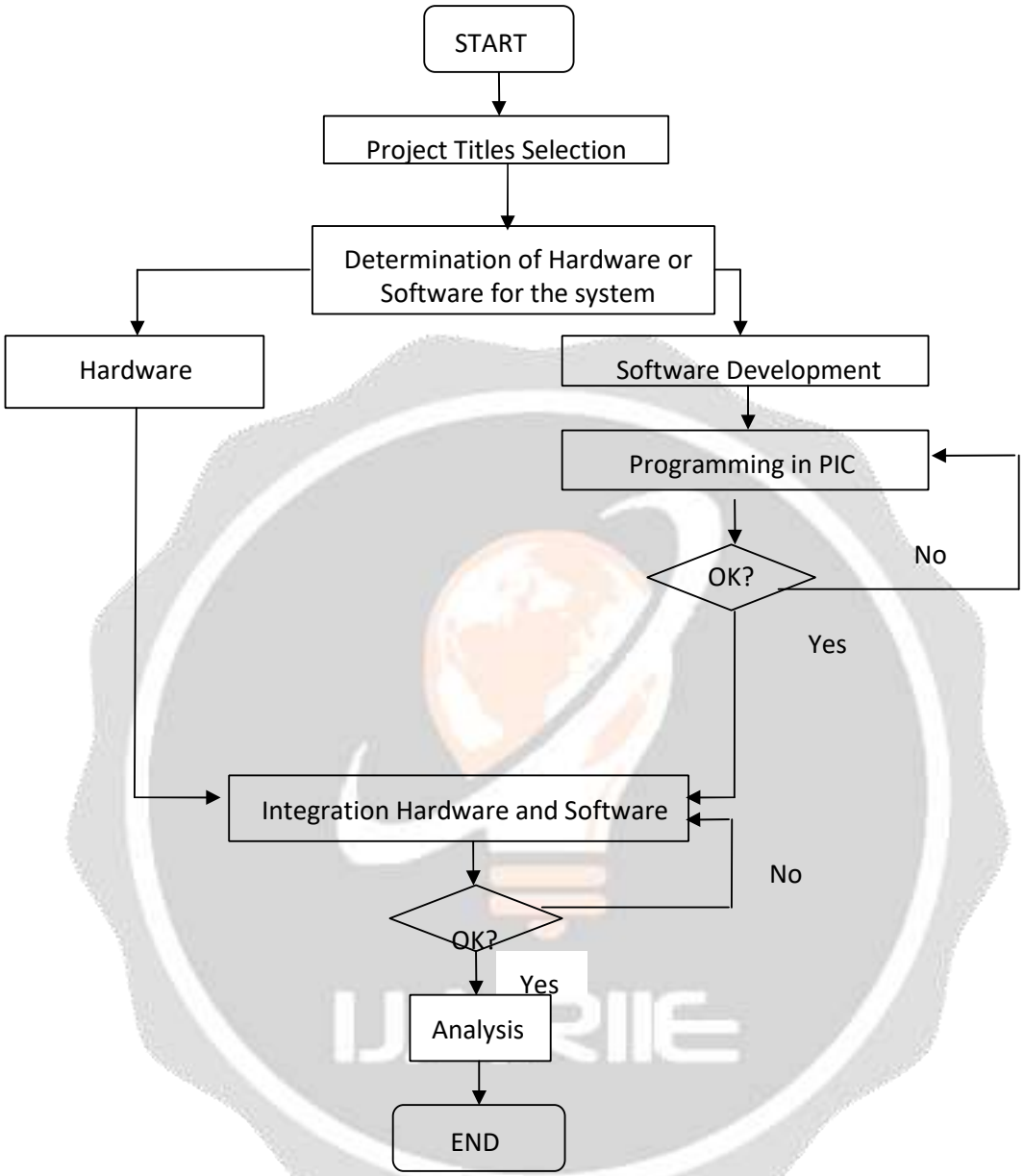

Fig. Flow chart of development

Figure above is shown about Flow Chart of Development of this project. Once, the title of this project Ultrasonic Trolley Braking System is selected. The identifying and understanding process was done. In this process, I found out all notes and information related to the project. The process was divided into two main groups which are software and hardware development. For the software development, the controller that prefers is PIC16F84A microcontroller (8-bit microcontroller). Therefore all programming must suitable and match with this controller. The process of software development is continuously done until get the perfect resulted.

For the hardware development, the focus is to develop the circuit and board for PIC16F84A microcontroller. Besides, focus is to develop ultrasonic circuit to implement to this project. After that, we must do the connection between ultrasonic sensor (transmitter & receiver), PIC16F84A microcontroller and lastly motor for the output. The process of Integration Hardware and Software is very important because to interface the software

and hardware is so hard. Although, the simulations will right output, it is not perfect for the real situation. The problem will exist after we try to interface both. So, doing analysis is compulsory to correct the software or hardware so that we can get the right result.

5. Advantages-

Ultrasonic have a lot of advantages for using in real application. The advantages of ultrasonic sensor are:

i. Discrete distances to moving objects can be detected and measured.
ii. Less affected by target materials and surfaces, and not affected by color. Solid-state units have virtually unlimited, maintenance free life. Ultrasonic can detect small objects over long operating distances.
iii. Resistance to external disturbances such as vibration, infrared radiation, ambient noise, and EMI radiation.
iv. Measures and detects distances to moving objects.
v. Impervious to target materials, surface and color.
vi. Solid-state units have virtually unlimited, maintenance free lifespan.
vii. Detects small objects over long operating distance.
viii. Ultrasonic sensors are not affected by dust, dirt or high moisture environments.

6. Disadvantages –

i. Overheating of a wave emitter precludes the energy of ultrasonic waves emitted there from being enhanced to a practical level.
ii. Interference between the projected waves and the reflected waves takes place, and development of standing waves provides adverse effects.
iii. It is impossible to discern between reflected waves from the road surface and reflected waves from other places or objects.

7. Application –

i. This system also applicable for car, trucks.
ii. In industrial weight lifting and transportation vehicle also can use this system.
iii. Army's vehicle can also can use of this braking system.

8. Conclusion –

As per the study of the project we understand that the reverse braking system is very important for the agriculture tractor trolley. We found that the so many accidents are happened at the time of reverse parking. So in our project we will reduce the accident which happens in reverse condition of tractor trolley.

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