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Design and Manufacturing of Smart Braking System

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ABSTRACT:

Now a days, vehicles have been developed a lot and reach its new margin; but yet accidents are mostly occurred by retard of the driver to stomp the brake or by the sloppiness of the driver or over speed or due to unpleasant weather. So our project points to emerge a system which can actuate the braking system automatically with the aid of high profile sensors with relay circuit and some more changes in conventional braking system which can actuate the brake automatically in emergency state. The brain of this entire set-up is Arduino microcontroller. The ultrasonic sensors are the vision of this system and stepper motor utilised for actuation. This system has been composed to depict the technological improvement in further. In future the actual model may be evolved based on its viability.

Keywords: *Arduino, obstacle detection, ultrasonic sensor, stepper motor*

1. INTRODUCTION:

In modern days, Automobile technology has been improved enormously, specifically on the braking and vision systems. Safety systems are being examined and progressed to suppress accidents and easing of target. The project designed to make differentiation on the systems recently in use like Engine management system (EMS), Friction control, Anti-lock braking

system (ABS), electronic brake force distribution (EBD), and further techniques that are recently in expansion. Braking set-up plays a vital role and a part which is mandatory when a vehicle is studied. It depletes the dynamic energy of the vehicle in situation, which deceleration occursoritmight be immobilized. Thus ensuring the vehicle and the individuals inside it were secured. This new set-up is made to crack the problem where motorist can't able to operate the brake at the needed time, which enable the self-operated braking system by sensing the barriers to keep away from unusual incident.

In ourproject, we have made some changes in actuation of Braking System over traditional method. The system has an effect of Arduino Microcontroller, which act as a mastery of this system. The main idea of our project is to self-actuation of Braking System. This is a user and eco-friendly system.

2. PROBLEM IDENTIFICATION:

a) Collision occurs, due to the unpleasant weather condition.
b) Not many systems are in place to warn the driver about nearing frontal collision.
c) Driving while fuddle.
d) Inexperienced driving.
e) Frontal collision on highways, due to slow reaction of motorist.
f) Aggressive or fast driving.

3. PRINCIPLE COMPONENTS:

1. Ultrasonic sensor
2. Dc motor
3. Arduino board
4. Battery
5. Stepper motor
6. Conventional braking system

4. LAYOUT OF PROPOSED WORKING MODEL (3D MODELING):

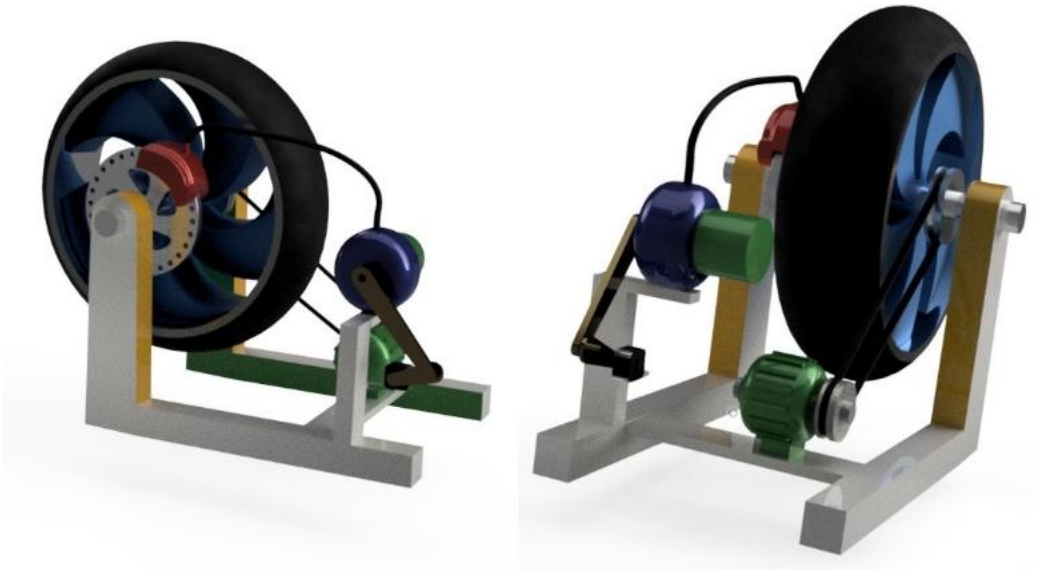

Fig. 1. CAD modelling experimental setup

4.1. FABRICATION PROCESS:

Fig. 1.2. Fabrication Process

4.2. EXPERIMENTAL SETUP:

Fig. 1.3. Experimental Setup

4.3. SIDE VIEW &TOP VIEW OF BRAKING SYSTEM:

Fig. 1.4.Side & top of Braking System

4.4. BRAKING SYSTEM CIRCUIT SETUP:

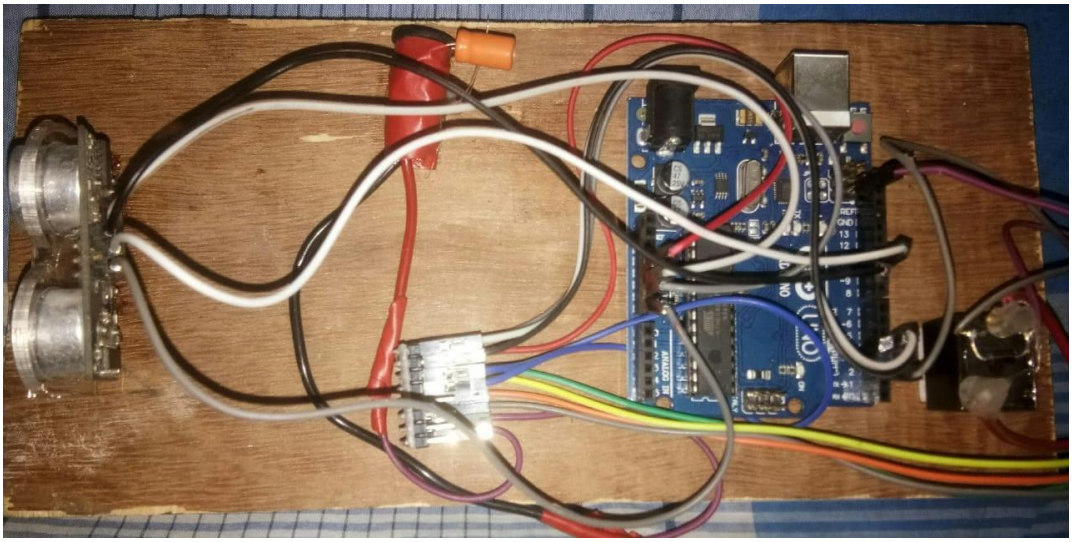

Fig. 1.5. Circuit Setup

4.5. METHODOLOGY:

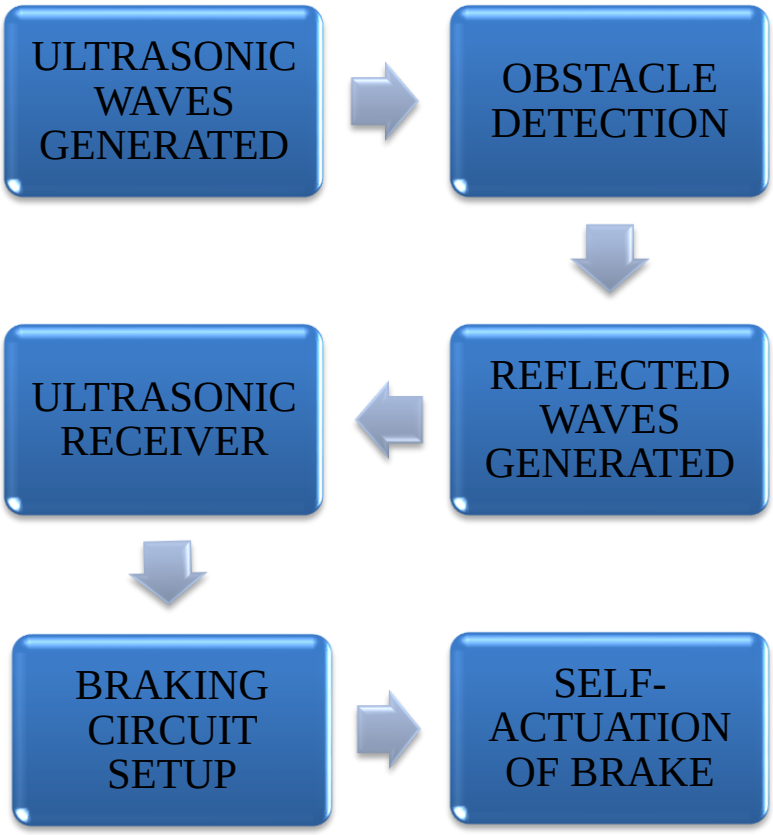

Fig. 1.6. Methodology Process

5. OBJECTIVES:

The main motive of this project is to compose the Smart Breaking System in order to reduce the unusual incident. To make sure in safety, the system has been enclosed with sophisticated components, where the process occurs with less human attention while driving.

This system is mandatory to be binding up in every vehicle. Mostly it will used while driving the vehicles on night time. Most of the accidentsoccurred in the night time travel because the motorist may get tired sometimes. So there will be a chance of motorist may bang with opposite vehicles or side-way trees. By utilizing this project the vehicle might immobilize through Smart Breaking System. So we can ignore the accident.

6. WORKING PROCEDURE:

The ultrasonic sensor is used to sense the obstruction in front of the vehicle while driving. The ultrasonic sensor detects the obstacle by emitting the sound waves with a maximum distance of 1m to the minimum distance of 2cm. The ultrasonic transmitter sends the sound waves and it travels up to a certain distance and gets reflected back. The reflected sound waves generated are acquired by an ultrasonic receiver. The received sound waves are then converted into electric signals.

Then, these electrical signals were transmitted to the Arduino board which is a pre-programmed one. All the data were received, collected and processed by the Arduino board. The relay switch is connected to the Arduino board to control the power of the main motor. The A4 Drive is connected with the Arduino, which controls the power and rotation of the stepper motor. The NEMA17 stepper motor is used to actuate the brake lever which is connected to the disc of the wheel.

Now, when the obstacle is detected by the sensor in front of the vehicle and it sends the electric signals to the Arduino. When the signals were received by the Arduino, it might cut-off the power supply to the main motor to reduce the RPM,at the same time it gives power to the stepper motor. The stepper motor is connected to the lever through aconnecting link, which might actuate the brake lever and vehicle stops. After the few seconds the relay circuit is again triggered to supply power to the main motorand wheels starts rotating again. The delay timing

and the speed of the stepper motor can be easily varied through program as required. The number of revolutions of the stepper motor can also varied by the program.

RESULTS:

As a result of this Smart Braking System, the activity of each component is working goodand the entire system is successfully executed. When the safest distance is identified, where the vehicle tensed to stop, during the obstruction. The range of accuracy in ultrasonic sensor over this set-up is about 2cm to 1m and works efficiently within the limit determined.

CONCLUSION:

We have made the fabrication of Smart Braking System prototype successfully and this project depict the execution of a Smart Braking System for frontal collision avoidance, insisted to use in vehicles where the motorist may not ableto actuate the brake manually at required situation, but the kinetic energy of the vehicle can be turn down automatically by the sensing of hurdles. It minimizes the accident levels and tends to save the lives of so many individuals. By doing this project practically we gained lot of knowledge about actuation Automatic braking system and its future study and examination, we hope to improve this system into an even more advanced one for vehicle safety, while realizing that it obviously needs tons of work and learning, like programming and function of microcontrollers and the automobile construction. Hence we trust that the implementation of this Smart Braking System will maximize safety and also give such system a enormous market opening and a competitive one among other vehicles.

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