
Basic Electronics Lab Project

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Force-Based Acceleration Braking System (FABS)

OVERVIEW

The field of automobile and automation have seen tremendous growth in the past few years. Many classical features in vintage automobiles have been replaced by the innovative ones which have helped driving become easy and safe.

But still, the world is stuck with the mechanical accelerator and brake pedals. As they are mechanical in nature they carry the risk of mechanical failure, Also some objects, like a bottle, shoe etc, may get stuck under the pedal thereby blocking the pedal. These may lead to many accidents.

Taking a step towards innovation, the mechanical pedals can be replaced by electric pedals. The mechanical gear system can be replaced by programmable weight sensors where the pedal action is achieved by applying a variable amount of force applied on the sensor.

These sensors can also be placed on the steering wheels where the force is applied by the palms, especially for differently abled people.

PROJECT DESCRIPTION

In this project weight sensors are used to replicate the action of mechanical pedals. There are 2 Arduinos. One to control the motors of the vehicle and other to get inputs from the weight sensors. This data is transferred through Bluetooth modules.

There are four additional different modes available. Each mode has a different scaling factor for acceleration and braking. This mode is also shown on the serial monitor on the vehicle so that the neighbouring automobiles are aware of the mode the vehicle is in. The following is the description for each mode:

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- **Traffic:** Less Acceleration, Faster Braking
 - **Highway:** More Acceleration, Faster Braking
 - **Rain:** Normal Acceleration with a limit, Medium Braking so the vehicle doesn't skid.
 - **Learner:** Slower Acceleration with a limit, Faster Braking

COMPONENTS

The tentative list of components required for building the prototype is as follows:

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|----------------------------------|---------------------------------|
| 1. 2 x Weight Sensors HX711 | 7. Serial LED Monitor |
| 2. 2 x Arduino UNO/Nano | 8. Breadboards and Jumper Wires |
| 3. 2 x Bluetooth Module HC-05 | 9. LEDs |
| 4. Motors 300 RPM | 10. Toggle Switches |
| 5. Motor Driver | 11. Batteries |
| 6. Chassis, Wheels, Castor Wheel | |

BUDGET

Tentative budget list of items:

1. Weight Sensor - $2 \times ₹400 = ₹800$

MILESTONES

1. 5th November 2018:
 - a. Establish connection between the Bluetooth modules
 - b. Test the weight sensors
 - c. Work on Algorithm and pseudo code.
2. 12th November 2018:
 - a. Assemble the prototype
 - b. Test run
3. 19th November 2018:
 - a. Demonstration
 - b. Poster Submission