DIGITAL ELECTRONICS PROJECT REPORT

ON

BRAKE FAILURE INDICATOR

submitted by teammembers

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BRAKE FAILURE INDICATOR

ABSTRACT

Automobiles have been the primary mode of transportation for most of us and we depend on them for our day- to- day commute. Unfortunately, there are lots of mishaps that could occur while driving an automobile and Brake Failures are one such case. Of course, accidents cannot be avoided sometimes but they can sure be prevented by taking some preventive measures. In this project we will build a Circuit that can be attached to our Vehicles which will monitor the brake of our vehicle and provide us audio-visual feedback if the brake fails.

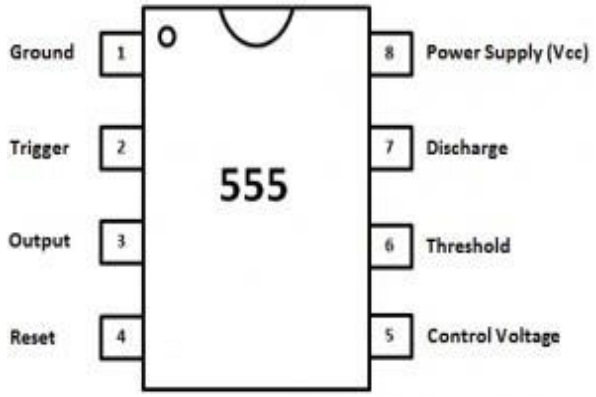
Most economical vehicles depend on **wire braking mechanism** to apply brakes on the vehicle. This mechanism involves a Brake wire which runs from the brake lever to the braking mechanism set-up of the vehicle. It is this wire that gets pulled when we apply brakes to stop our vehicle. After a long use and tear, these wires might get worn out and get cut at one point of time which eventually will cause a brake failure. So, we will build a circuit that will monitor the continuity of this wire, the circuit will glow a green color LED if everything is fine, but is the wire fails the circuit will blink a red color LED also will beep a buzzer to alert the rider. Let us see how we can build this project...

MATERIALS REQUIRED:

- BREADBOARD
- 555 TIMER IC
- BC557 NPN TRANSISTOR
- RED AND GREEN COLOR LED
- 1µF AND 0.1µF CAPACITOR
- 1K AND 440K RESISTOR
- CONNECTING WIRES
- BUZZER

555 TIMER IC PIN CONFIGURATION:

The 555 timer IC consist of 8-pins where each pin has some function. The pin configuration of this IC is shown below.



PIN CONFIGURTION OF 555 TIMER IC

GND PIN:

Pin 1 is a ground pin which is used to supply zero voltage to the IC

TRIGGER PIN:

Pin 2 is a trigger pin which is used to convert the FF from set to RST (reset). The output of the timer depends on the amplitude of the external trigger pulse that is applied to the trigger pin.

OUTPUT PIN:

Pin 3 is an output pin.

RESET PIN:

Pin 4 is an RST pin. When the negative pulse is applied to this pin to disable or reset, and false triggering can be neglected by connecting to Vcc.

CONTROL VOLTAGE PIN:

Pin-5 is the control voltage pin used to control the pulse width of the output waveform and the levels of threshold and trigger. When an external voltage is applied to this pin, then the output waveform will be modulated.

THRESHOLD PIN:

Pin-6 is the threshold pin, when the voltage is applied to threshold pin, then it

contrasts with a reference voltage. The set state of the FF can be depending on the amplitude of the pin.

DISCHARGED PIN:

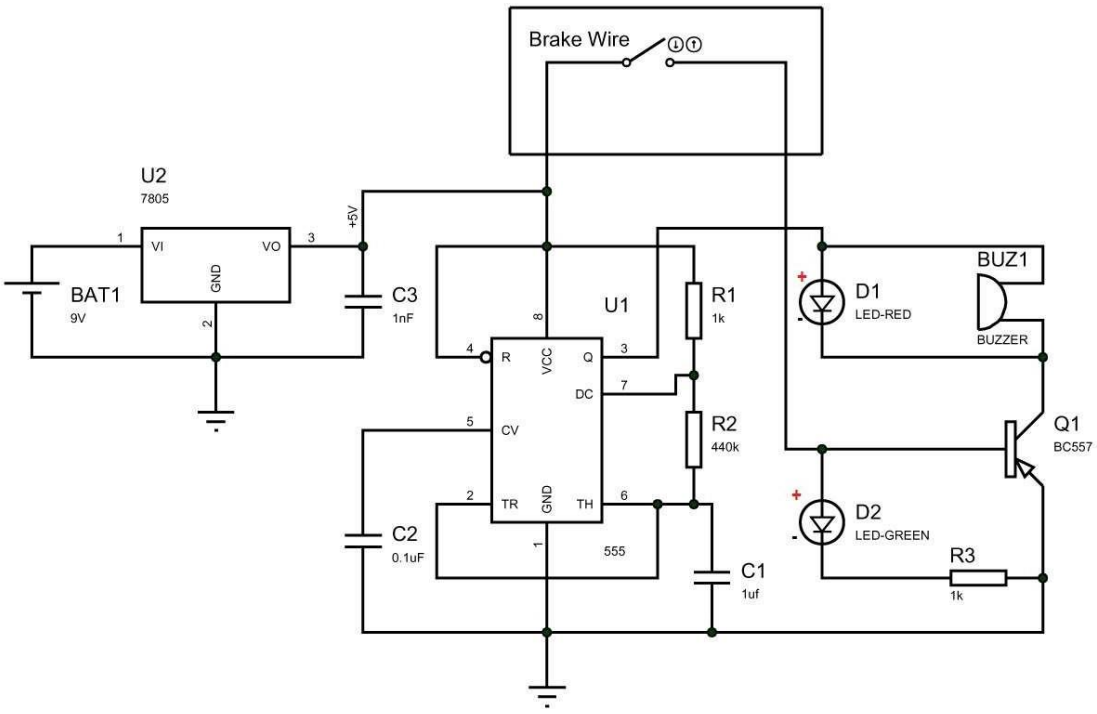
Pin-7 is the discharge pin, when the output of the open collector discharges a capacitor between the intervals, then it toggles the output from high to low.

SUPPLY TERMINALS:

Pin – 8 is the voltage supply pin which is used to supply the voltage to the IC with respect to the ground terminal.

CIRCUIT DIAGRAM

As you can see this **brake failure indicator circuit** is very simple and can be easily built on a breadboard. The main components in this project are the 555 Timer and the BC557 PNP transistor. The 555 Timer operates in A stable mode to produce clock pulse and the BC557 PNP Transistor monitors the Brake wire and decides which led should glow.



BRAKE FAILURE INDICATOR DIAGRAM

WORKING OF THIS BRAKE FAILURE CIRCUIT:

Once the connection is made power the circuit, make sure the Brake cable (here I have used a normal green wire to represent the brake cable) is connected across the +5V and base of BC557 through a resistor as shown in the circuit.

If everything works as expected you should see the Green LED turned on and the Buzzer and Red Light Turned Off. Now, cut/remove the brake cable the Red LED and the Buzzer should start flashing along with the green led.

PURPOSE OF BREAK FAILURE INDICATOR:

The circuit will work only in vehicles with negative grounding. It also gives an indication of brake switch failure.

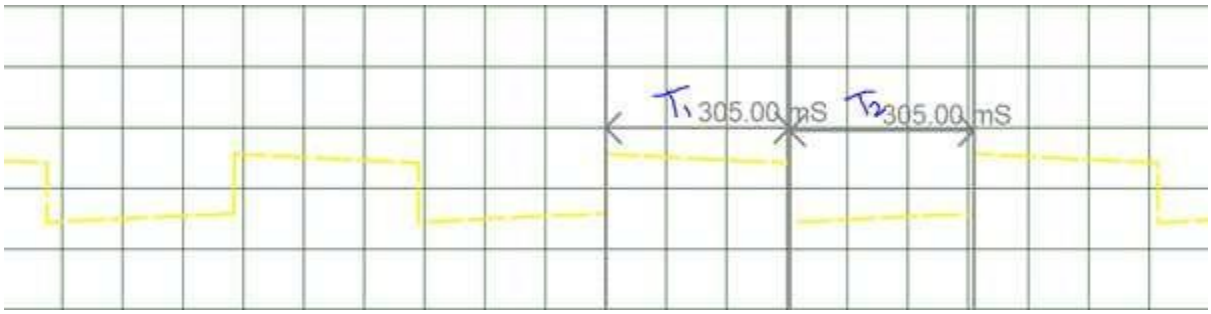
In hydraulic brake systems of vehicles, a brake switch is mounted on the brake cylinder to operate the rear brake lamps. The brake switch is fluid-operated and doesn't function if the

fluid pressure drops due to leakage. The fluid leakage cannot be detected easily unless there is a severe pressure drop in the brake pedal. This circuit senses the chance of a brake failure by monitoring the brake switch and reminds you of the condition of the brake every time the brake is applied.

APPLICATIONS

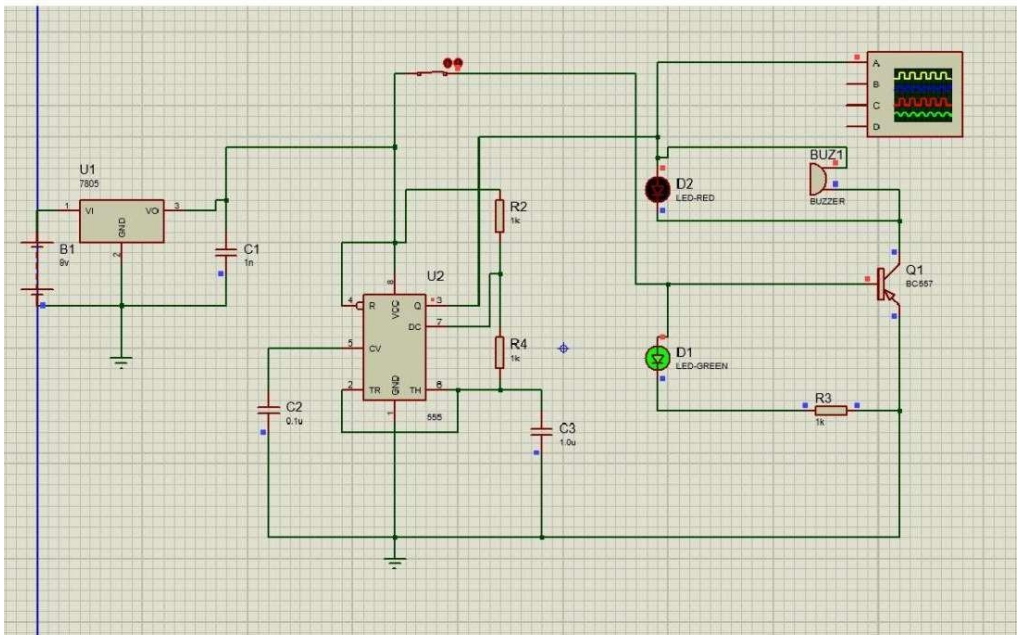
- Four-wheeler application
- Two-wheeler application
- Mechanical crane
- Mechanical machine

GRAPHS

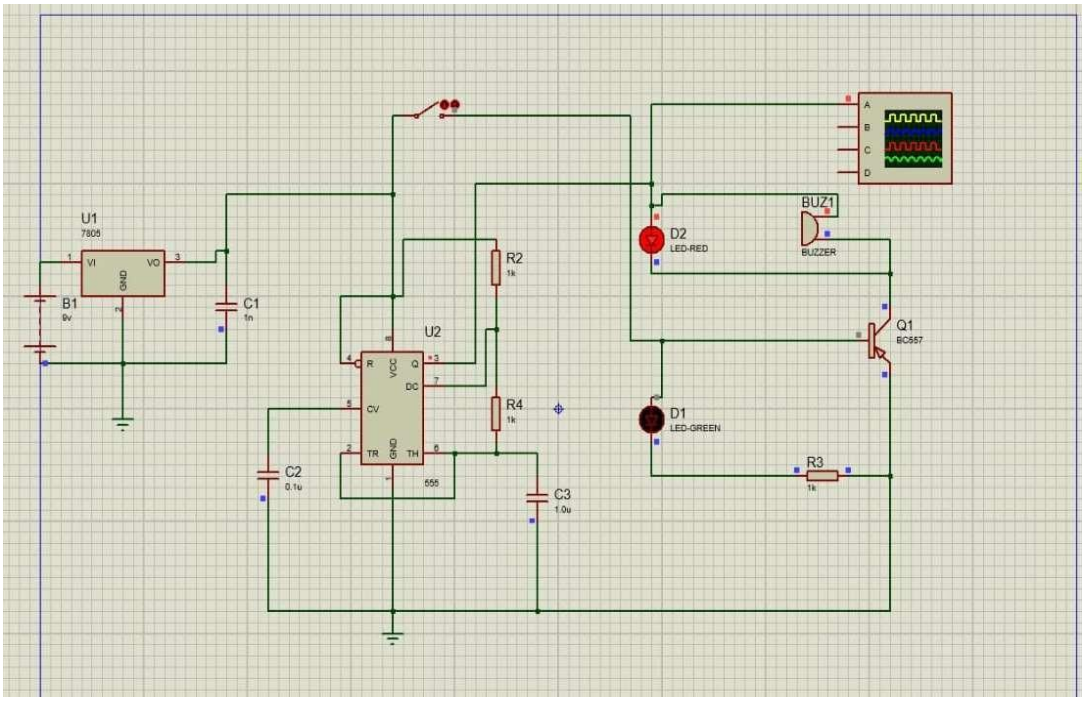


SOFTWARE SIMULATION

CASE 1: When there is no brake failure, green led glows.

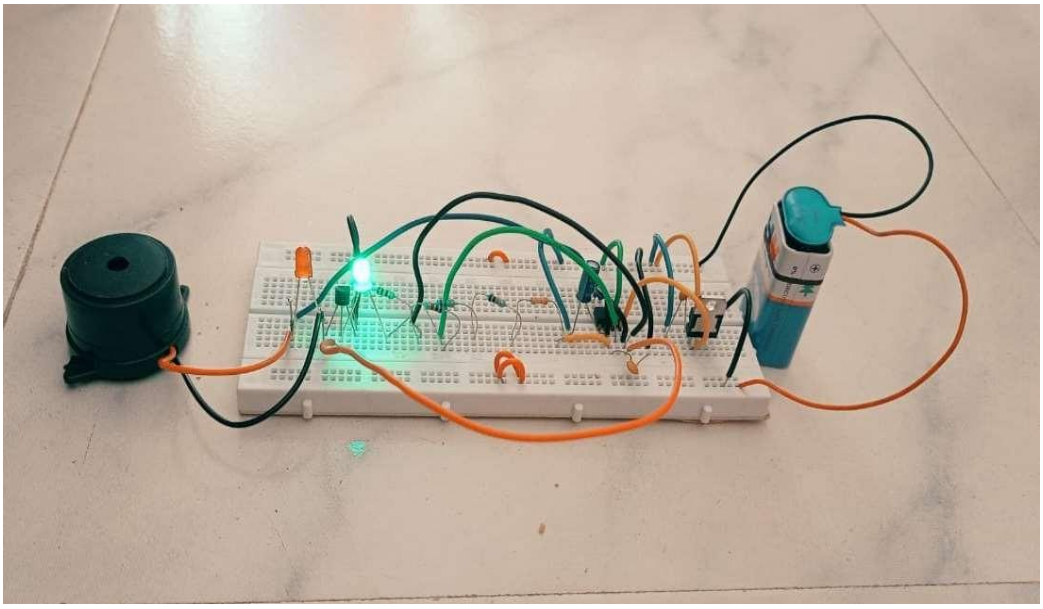


CASE 2: When there is a brake failure, red led glows and buzzer starts beeping.



CASE STUDIES:

CASE 1: When there is no brake failure, green light glows.



CASE 2: When there is a brake failure red led glows and buzzer starts beeping. Green LED will blinks.