LINEAR INTEGRATED CIRCUITS PROJECT REPORT
On
Brake Failure Indicator

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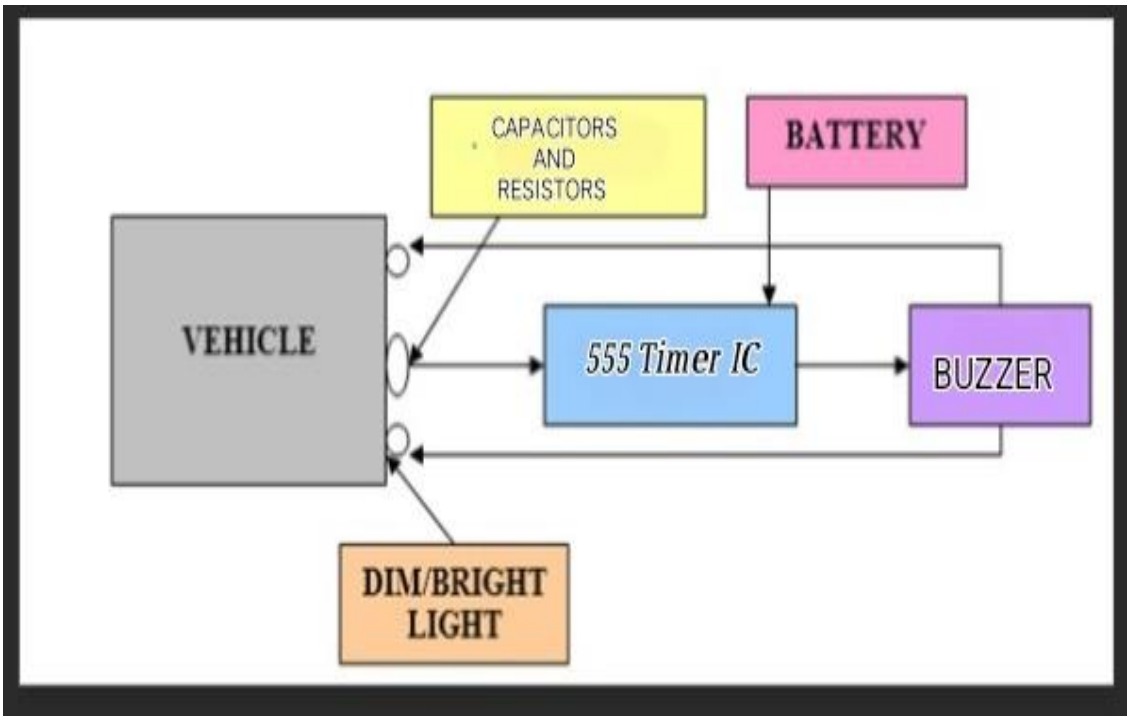
BRAKE FAILURE INDICATOR

Abstract:

Now a days, Machines are widely controlled by automated control system. To meet the need of growing population economic, effective and reliable control of machines as well as their control system is necessary. The main objective of this project is to continuously monitor the braking system at each and every time during the operation of the vehicle. Now a days, accidents are occurring due to lot of reasons, the one of the main reasons is brake failure, it caused to due to poor maintenance, improper use and product defect, in order to safe guard the valuable human for accident the accident monitoring of brake is very important issue in automobile. The brake failure indicator circuit is a circuit that monitors constantly of the condition of brakes and provides an audio-visual indication. When the brake is applied in order to slow down or to stop the vehicle the green LED blinks and the piezo buzzer beeps for about one second if the brake system is accurate and working properly. If brake system fails the red LED glows and the buzzer do not beep when the brakes are applied. The emergency brake that we provide in the car will be applied gradually to prevent the accidents of the vehicles.

Aim: Brake Failure Indicator Circuit Using a 555 Timer.

Block Diagram:



Components required :

- Breadboard
- 555 Timer IC
- BC557 PNP Transistor
- LEDs
- Resistors
- Buzzer
- Capacitor
- Connecting wires

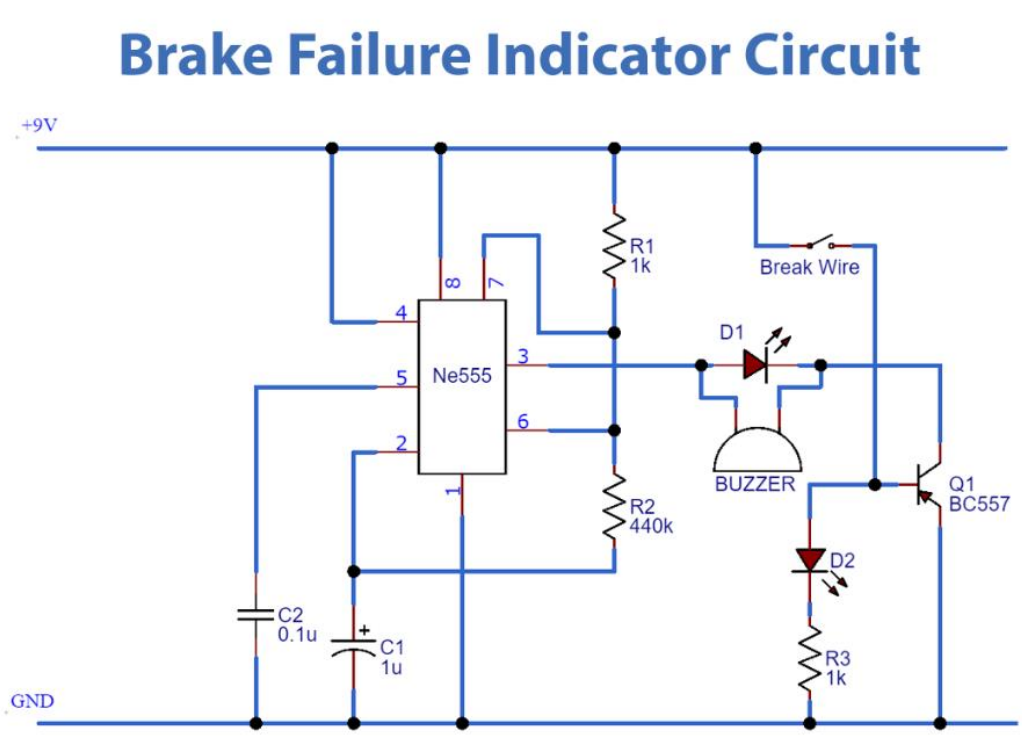
Introduction:

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.

A brake Failure Indicator is always an important need i.e. break wire does not break by letting you know I am going to break! So in many cases, we need some indication to slow down our vehicles to avoid accidents. In this project, we are going to make a **Brake Failure Indication Circuit** using a 555 Timer IC that can be attached to our Vehicles. It constantly monitors the status of the wire and gives an alarming sound when the wire breaks. The heart of this circuit is a NE555 Timer IC. The IC possesses an oscillation frequency ranging from 670 to 680 Hz. Here, this NE555 timer acts as an Astable multi-vibrator.

Circuit Diagram:



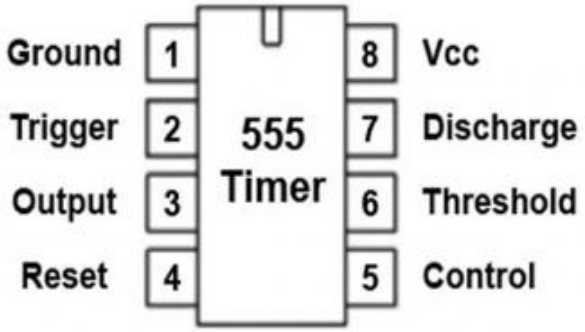
Working:

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 we 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. The BS557 PNP transistor controls the LEDs and buzzer. When the Brake wire is in proper condition the base of this transistor is provided with 5V through a current limiting Resistor. This also drives the Green LED light and disconnects the Buzzer and Red LED from ground thus keeping it turned off.

When the break wire is cut the base of the BC557 is also cut and thus the Green LED is turned off and the Buzzer and Red LED are connected to ground. Since the positive end of Buzzer and LED is connected to the 3rd pin of 555 timers which is wired in Astable mode operation, they blink/beep based on the duration set by the above calculation.

Introduction to 555Timer IC used:



The **555 timer IC** is a versatile component that can be used in various electronic projects, including a brake failure indicator. This type of circuit typically uses the 555 timers in **Astable mode** to generate a clock pulse. IC 555 timer is a one of the most widely used IC in electronics and is used in various electronic circuits for its robust and stable properties. It works as square-wave form generator with duty cycle varying from 50% to 100%, Oscillator and can also provide time delay in circuits. The IC 55 timer is used in many circuits, for example One-shot pulse generator in Monostable mode as an Oscillator in Astable Mode or in Bistable mode to produce a flip/flop type action. It is also used in many types of other circuit for achievement of various purposes for instance Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM) etc.

Advantages:

1) Enhanced safety
2) Accident prevention
3) Rapid response
4) Proactive alert
5) Reduced collision risk
6) Enhanced passenger protection

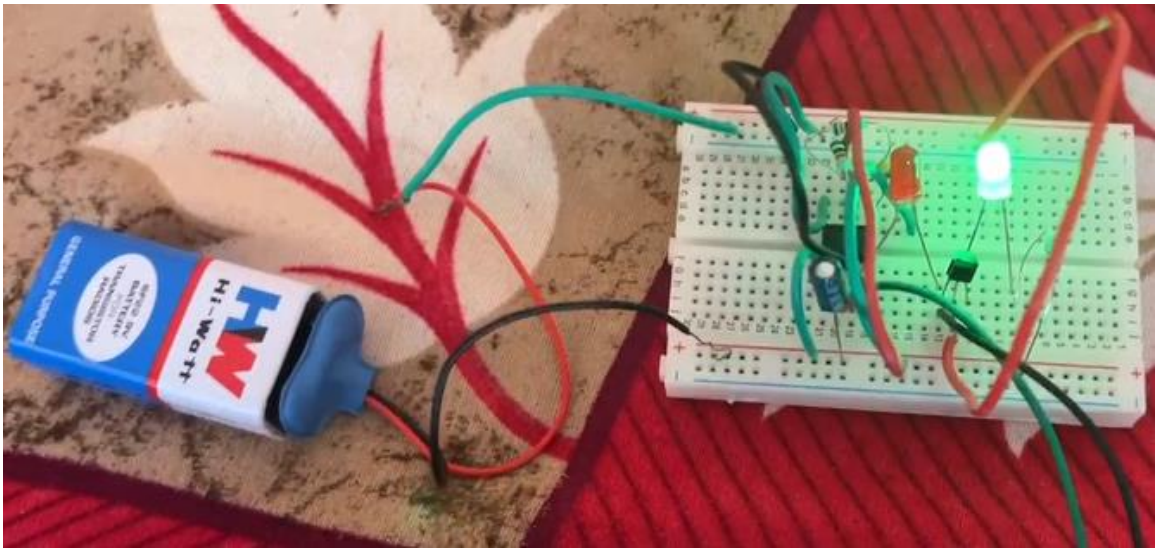
Disadvantages:

1. **Increased maintenance cost**: Adding a brake failure indicator system may lead to higher maintenance expenses to ensure its proper functioning.
2. **Increased vehicle weight**: Installing an auxiliary braking system can add to the dry weight of the vehicle.
3. **Limited functionality:** Some systems may not work effectively in certain conditions, such as low rainfall or if there is a disconnection or damage to the brake wire.

Applications:

- **Fail-safe mechanism** in vehicles like cars, buses, and bikes to prevent accidents.
- Monitoring mechanical cranes to avoid operational errors.
- Checking for internal wire damage in mechanical machines.
- Detecting **broken wires** in houses or offices.

Output:



CONCLUSION:

In conclusion, brake failure indicators play a crucial role in vehicle safety by alerting drivers to potential brake system malfunctions or failures. While they provide important warnings, there are challenges such as false alarms and sensor reliability that need to be addressed. Ultimately, as technology evolves and safety standards continue to advance, the goal is to ensure that brake failure indicators become even more effective in protecting lives and reducing the risk of accidents caused by brake system failures.