SMART TRAFFIC BARRICADE SYSTEM

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Abstract - — *India is the second largest road network in the world. The everyday struggle and effort of dodging traffic is the biggest cause of chronic stress and many physiological problems. Traffic jams occur due to drivers violating traffic rules. One of the major reasons of accidents is violation traffic signals. Till date traffic controlling system was based on traffic police and electronic signals. Hence it necessary to implement the smart traffic barricade system for the purpose of reducing accidents and smooth moving of traffic. Implementation of the smart traffic barricade system will ensure that driver will have to compulsorily follow traffic signals and violation of traffic signals will not be possible. Smart traffic barricade system is a simple mechanism consisting of rack and pinons, rods, DC battery supply, motor, L298 Motor driver and programmed with help of Arduino Uno. To satisfy the above purpose, we have introduced this project of Smart Traffic Barricade System.*

Key Words: Traffic jams, Arduino Uno, DC Motor, L298 DC Motor Driver, Rack and Pinion

INTRODUCTION

In recent past there has been considerable rise in transport facilities. In Metro cities like Pune, Mumbai, Delhi due to plenty of availability of road transportation there is always a problem of traffic jamming. Hence it is necessary to reduce the traffic problems. We have come up with a project that can manage traffic systems. Drivers violate traffic signals and that is the main cause of traffic jams and accidents. The traffic barricade system will smartly manage the working the traffic signals and will not driver to violate traffic signals at any cost. On the other hand, it is practically not possible for traffic police to control the smooth moving of vehicles at each and every signal. As the number of traffic police as compared to traffic signals is very less. This smart traffic barricade system will significantly reduce the workload of the traffic police and approve more efficiency in road transportation. This is a systematic way to manage traffic. In traffic barricade system the barricades will be elevated from beneath the road using rack and pinion when signals are red which restricts the driver from overcoming high speed. Hence the driver will have to stop their vehicle at signal and signal jumping will not take place. This will also help in reducing accidents. This traffic barricade system can be included in traffic controlling unit to increase safety measures for drivers.

COMPONENTS

1. **Rack and Pinion**:

A rack and pinion is a type of linear actuator that comprises a pair of gears which convert rotational motion into linear motion. A circular gear called "the pinion" engages teeth on a linear "gear" bar called "the rack"; rotational motion applied to the pinion causes the rack to move relative to the pinion, thereby translating the rotational motion of the pinion into linear motion. In Smart Barricade system rack and pinion is used for raising and lowering of the barricade.

2. **Arduino(Uno):**

The Arduino Uno is a microcontroller board based on the ATmega328. It has 20 digital Input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs), a 16 MHz resonator, a USB connection, a power jack, an in-circuit system programming (ICSP) header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer (or appropriate wall power adapter) with a USB cable or power it with a AC-to-DC adapter or battery to get started. Here we have modified the coding of Arduino such that it will give the motion in time interval to pinion and the motion will be transmitted to rack in forward and backward direction.

3. DC Motor:

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor. DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. 12V DC Series motor is used in this experiment, which converts electrical energy into mechanical energy. Its location is based on the principal that when current carrying Conductor is placed in the magnetic field, it experiences a mechanical force whose direction is given by Fleming's left-hand rule. Fleming's left-hand rule states that If we stretch the first finger, second finger and thumb of our left hand to be perpendicular to each other AND direction of magnetic field is represented by the first finger, direction of the current is represented by second finger then the thumb represents the direction of the force experienced by the current carrying conductor.

4. L298 DC Motor Driver

A motor controller is a device that acts as intermediate between your robot's microcontroller, batteries and motors. A motor controller is necessary because a microcontroller can usually only provide roughly 0.1 amps of current whereas most actuators (DC motors, DC gear Motors, servo motors) require several Amps. The features of L298 DC Motor Driver are-

1) High operating voltage, which can be up to 40 volts;

2) Large output current, the instantaneous peak current can be up to 3A;

3) With 25W rated power;

4) Two built in H-bridge, high voltage, large current, full bridge driver, which can be used to drive DC motors, stepper motors, relay coils and other inductive loads.

5) Using standard logic level signal to control.

6) Able to drive a two-phase stepper motor or four-phase stepper motor and two-phase DC motors.

7) adopt a high-capacity filter capacitor and a freewheeling diode that protects devices in the circuit from being damaged by the reverse current of an inductive load, enhancing reliability

8) The module can utilize the built-in stabile tube 78M05 to obtain 5v from the power supply. But to protect the chip of the 78M05 from damage, when the drive voltage is greater than 12v, an external 5v logic supply should be used.

9)Drive voltage: 5-35V; logic voltage: 5V

10) PCB size: 4.2 x 4.2 cm

WORKING

The main idea behind the working of smart traffic barricade system is that in 5 seconds the barricade will raise up to the a desired height and then will hold the position for 10 seconds and further the barricade will lower down in 5 seconds. This periodic arrangement is obtained with the help of arduino unit. The initial step is to upload the code into the arduino board. The output of arduino board is around 5V, hence L289 Motor Driver is connected to arduino board in order to raise the voltage to 12V. Also the use of L298 Motor Driver is because the output obtained from arduino board is DC source. Arduino provides signal to L298 Motor Driver, then further this signal is increase to 12V and then fed to DC motor. Pinion is attached to DC motor while the rack is connected to pinion. Thereby rotational motion is converted to linear motion. Graphically output obtained from arduino is basically a square curve of voltage vs. time graph.
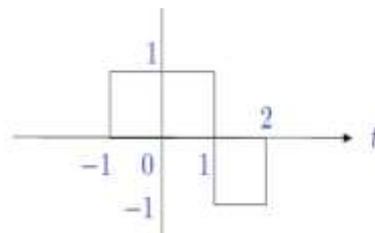
ADVANTAGES

1. The prime advantage of barricade system is the transportation safety. The barricade system will reduce accidents and stop signal jumping.
2. The Smart traffic barricade system will also boost the mission of "Smart City".
3. Traffic will be managed by the Smart barricade system hence will reduce traffic police work load.
4. The installation of the Smart traffic barricade system will to control traffic easily during emergency cases.
5. The Smart barricade system is a one-time investment with low maintenance cost and utmost efficiency.

This system will bring the culture of strictly following traffic rules especially in India

CONCLUSION

The traffic barricade system is very effective in controlling traffic. The whole setup of Smart Traffic barricade system can be implemented in cities with increasing traffic problems. This will help in betterment of smooth moving traffic. The whole setup can be implemented at signals.

The Smart barricade system will ensure that drivers will not face traffic jams and enjoy the drive.

By implementing this system, the issues of accident can be reduced drastically.

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