# Implementation of Thumb Controlled Braking and Acceleration in a Gearless Car for Physically Challenged Persons

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***Abstract--****Improving the life style in this sophisticated world, people push them in buying a car. Even though fully automated cars arrives the market price/cost makes people think to purchase it especially in our country (India) as the population is one of the major cause. Concentrating to modulate the car for physically challenged persons and normal persons to design a car technically is easier. But considering the expenses, it peaks to higher value when it comes to the market. This paper describes to improve the car driving further more sophisticated and easily controllable for physically challenged persons (for those without legs) and also considering the safety measures. In this ambient, a car with gearless operation has been done with a new methodology. This paper mainly emphasis on the steering wheel where the accelerator and brake are brought up and embedded into it. As a result the braking and acceleration process can be done and operated with the thumb finger while holding the steering wheel. Power steering is preferred, as the full rotation of steering wheel is not possible. H-bridge circuit is used to control the operation of acceleration and braking in the proposed car. In this circuit PIC controller is used along with variable resistor. As a result the voltage supply to the system varies and changes the performance of the system. Designing such a vehicle is made much easier and cost effective.*

**Keywords--***Gearless, Power Steering, Brake, Acceleration, Embedded, H-Bridge, Variable Resistors, Electro Magnetic Coil*

## 1. INTRODUCTION

Every single person has an inner thirst to buy a vehicle to migrate on time. While considering the cost in the market, people steps back themselves as it peaks high. Especially mostly populated and developing countries like India, people prefer easy mode of driving the car to overcome the accidents in traffic areas. Focusing on to this point, a new and a small change in a gearless car has been designed. This mainly focuses on the acceleration and braking of a gearless car. Even though a joystick system was researched and tested in japan, successful results could not be obtained. Since the joystick interface is too small and sensitive for high speed driving. Certain limitations are applicable in vehicle since recent modern cars are designed and manufactured with power steering than hydraulic ones.

## II. CONVENTIONAL MODE

### *A. HAND DRIVE SYSTEM*

Generally for handicapped persons, especially without legs, the operation of brake and acceleration which is usually operated by means of legs is altered into hand operation. The brake and acceleration initially are structured as foot pedal. This foot pedal is lengthened and is brought up near to the steering wheel, so that it can be operated by means of hand.Even though these operations are brought up, the driver cannot concentrate on every operation by means of hand alone. Because he/she has to control the steering wheel and acceleration at the same time.

### *A. GOOGLE CAR*

Recent innovation in driving a car is the Google car. It is a fully automized vehicle where it reduces the need for a driver to drive them.This prototype has no steering wheel, brake or acceleration pedals. It looks like a cross between a smart car and a Nissan Micra with two seats and acquires small amount of luggage. It ferries two people from one place to another place irrespective of any user interaction. It is controlled by smart phone for pickup at user's location with destination set.It just involves simply the start button and a big red emergency stop button. To screen out the weather condition, current speed and a small count down animation top launch. It automatically reminds the person to take his/her belongings once the journey is done.Eventhough these much innovations were implemented, it cannot be applied to every

environmental condition. The car itself is limited to 25mph which is even restricted at certain roads.It has also caused its first crash on February 14 when it changed lanes and put itself in the path of an oncoming bus.These such innovations cannot be implemented in our country (India) because of densely populated.

### *B. JOYSTICK CONTROL*

Even though joystick system was researched and tested in Japan, successful results could not be obtained. Since the joystick interface was too small and sensitive for high speed driving. Certain limitations are applicable in various cars, since recent modern cars are designed with power steering than hydraulic ones.

## III. PROPOSED SYSTEM

With the same criteria using power steering, the acceleration and brake principles can be brought up and is modified into a button like structureand are embedded into the steering wheel. These buttons actuates the process according to the pressure given by the thumb finger of the user while holding the steering.There is a power provided from the battery /gen set to actuate the electrical components. Electromagnetic braking mechanism is preferred here that uses magnetic force of attraction to engage the brake. For a gradual increase/decrease the speed and brake, variable resistor is used which is connected to the bottom of the push button. The electromagnetic brakes can be used by controlling the current supplied to produce magnetic flux.

### *A. POWER SYSTEM*

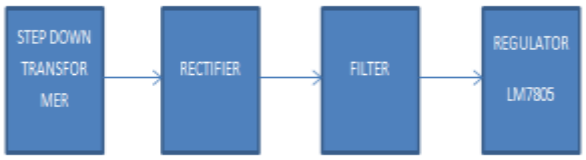


***Fig.1: Block Diagram for Power System***

For the power supply system,the circuit is supplied with 230v which is stepped down by the transformer. The output from the transformer is then given to the rectifier. The purpose of rectifier is to convert AC(which is periodically in reverse direction) to direct current and is a compulsory for the controller. This process isknown as the rectification.This dc current is sent to the filter block where the capacitor plays a main role as a filter that removes the unwanted components i.e noise and disturbing signals.Now the filtered DC signal is passed to the regulatorto regulate the voltage.IC7805 is a 5v regulatorthat restricts the voltage output to 5v and draws 5vregulated power supply. The maximum value for the input to voltage regulator is 35v. It can provide a constant steady voltage flow of 5v for higher voltage input till the limit of 35v.

### *A. CONTROLLER SYSTEM*

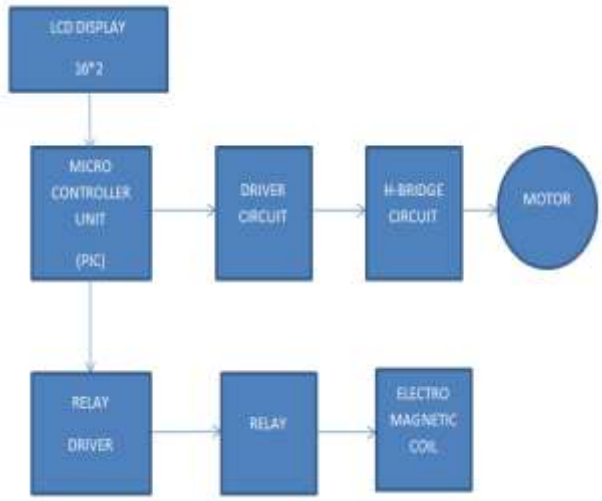


***Fig.2: Block Diagram for Controller Circuit***

Power from the power system is fed to the micro controller unit PIC 16f877A. The PIC controller is a powerful and easy programmable device with a 40-44 pin package. It also has 256 bytes of EEPROM data memory along with 8channels of 10bit ADC. The driver circuit is connected to the I/O ports of controller, added to it the H-bridge circuit is connected. The main function of the driver circuit is to receive the signal from the controller and send to the H-bridge circuitfor activation.The H-bridge consists of transistors that get activated when supply is given. It has 4transistors where 2 transistors getactivated at a time that makes a motor to rotate at forward direction. The other two transistors when gets activated,the motor runs in reverse direction. Thus it paves the way for forward and reversedriving of the proposed system.The speed of the DC motor can be varied by varying the gate pulse given to the transistor gate pin usingPotentiometer. Linear type potentiometer (100k) is preferred. Now for the braking system relay is connected to anotheroutput port of PIC controller by means of relay driver circuit. When the relay driver circuit gets the signal from the controller,the relay driver sends an inputsignal to the relay thus to operate the brake. For this brake system,variable resistor is used in the linear type.When relay gets switched ON, current flows from the battery and reaches the electromagnetic coil. Due to the circulating current in the coil,an attractive magnetic force is created around the coil. A conductor is placed near to the coilwhich is connected to the wheel. Due to the attractive force, the brake gets applied and wheel stops.The amount of voltage passing through the coil

and acceleration is displayed in the LCD display which is programmed and interfaced with PIC controller.

### *A. SECURED VEHICLE AUTO PILOT MODE*

There might be some situation where the IC may fail to proceed its work or some connections may get dispatched and cause short circuitry. In that case, a technique called automatic continuity checking method is implemented using the sensor. When any wires get damaged, the LCD displays a warning message and stops the car immediately.But if the car stops immediately in a mid of the road becomes more dangerous. To overcome this drawback is, to design a controller board similar to the original and connect it to the circuit. A relay has been connected in between these two controller boards. When primary board fails, the relay switches to secondary controller board and thus the continuity is maintained.

## IV. CONCLUSION

The project carried out by us made an impressing task in the field of production and manufacturing industries. It is very useful for having the scrap collecting vehicle, because they need not take any risk for park the vehicle. This project will reduce the cost involved in the concern. Project has been designed to perform the entire requirement task at the shortest time available.Handi-car reduces the fuel economy and will not under go any physical activities. Battery power supply will neglect the usage of fuel through the IC Engine. Thumb controlled vehicle make it possible for a group of disabled persons to drive a car. Until quite recently, this group had absolutely no opportunity to drive a car.

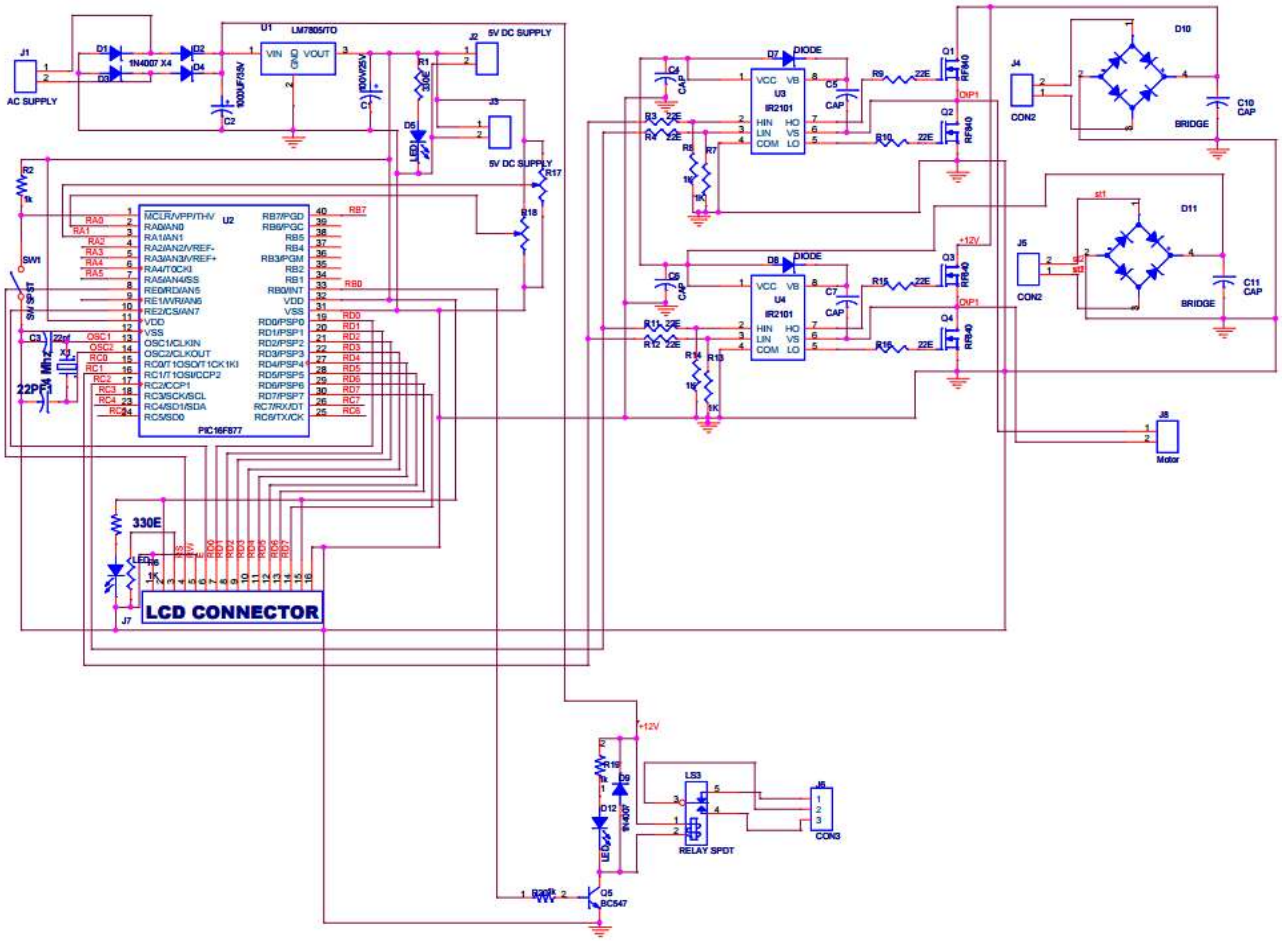


*Fig.3 Simulation Circuit for Proposed System*

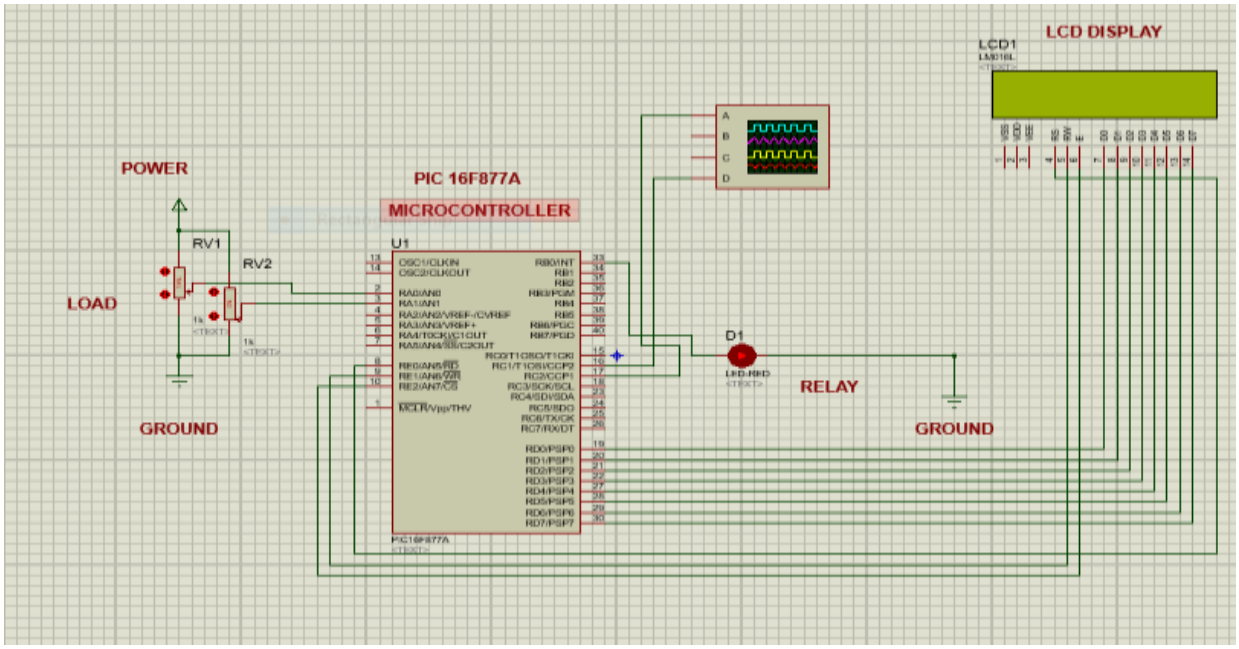


*Fig.4 General Simulation of Proposed System*

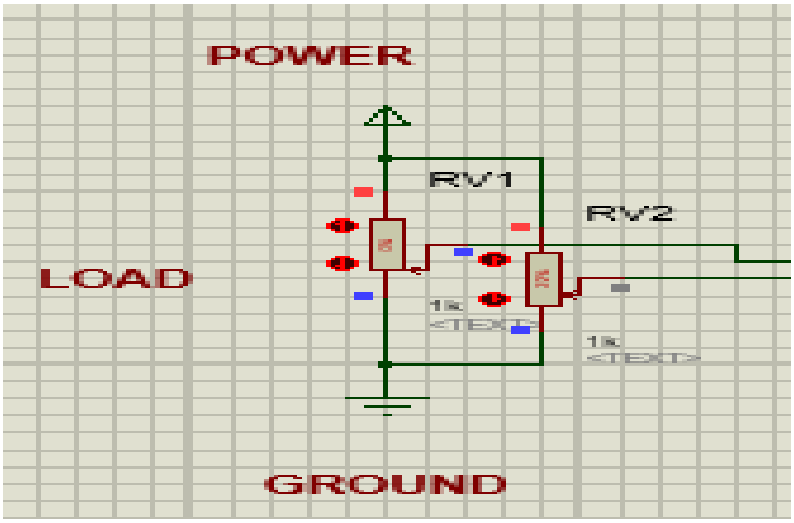


*Fig.5: Simulation Circuit for Linear Potentiometer*

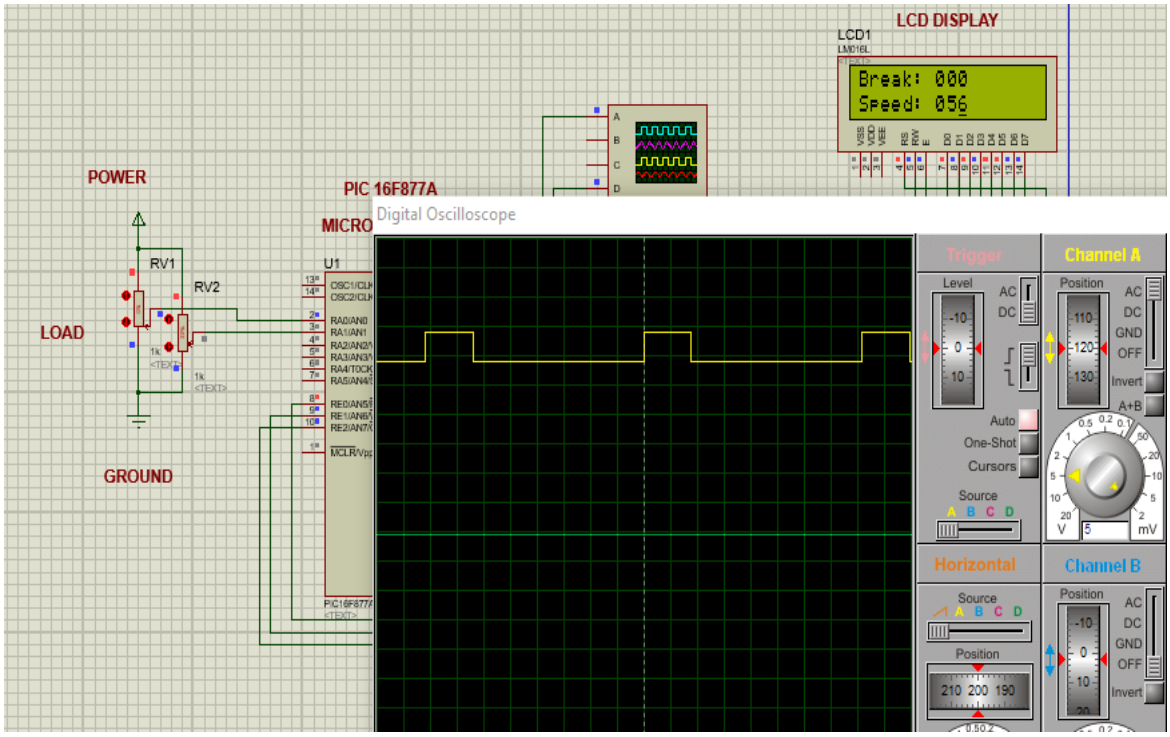


*Fig.6: Output Waveform for Speed Variation Using Potentiometer*

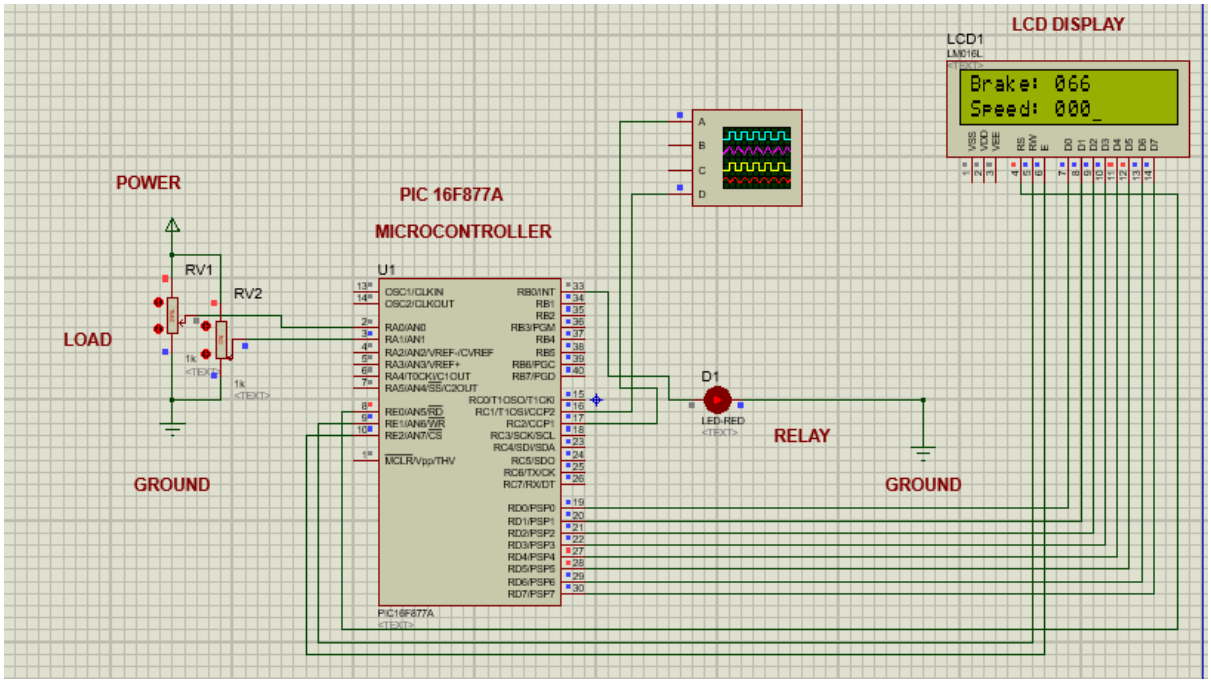


*Fig.7: Simulation for Application of Brake Using Potentiometer*

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