

Button Operated Gear Shifter in Two-Wheeler Using Servo Motor Simulation and Its Experimental Setup

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Abstract - The main objective of this paper is used to bring automation in gear shifter of two wheelers using servo motor. This is the new innovative model mainly used for the vehicles to control the vehicle. Here we are concentrating to design the automatic gear changing mechanism, engine temperature sensing and break failure indication in two wheeler vehicles by using the components like servo motor, temperature sensor, break failure indicator, potentiometer and buzzer etc. This is very useful and unique method for the gear changing mechanism in two wheeler vehicles. By using this we can easily control the bike through button which will give instruction to servo motor through programming we going to achieve to control motion i.e. Clockwise or anticlockwise by some specific angle.

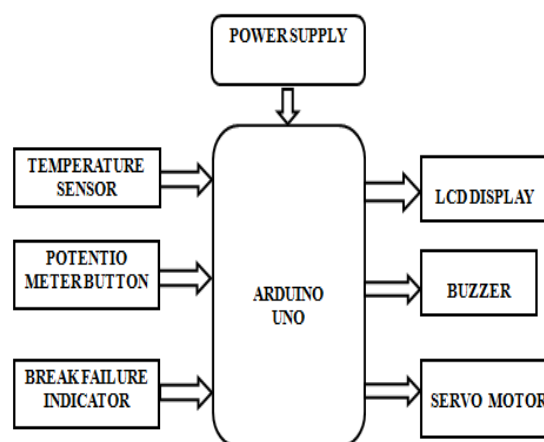
Index Terms - Servo motor, buzzer, Temperature Sensor, Potentiometer.

1. INTRODUCTION

With the advent of automated gear transmission system ease of access to vehicles has increased over last 20 years. Generally, in 2 wheelers, gear is shifted manually with the help of lever, but this technique is not suitable for handicapped people and also non handicapped people can get a maximum comfort level while riding. So we are in a process of making it more friendly and convenient to use. This can be achieved using motor. Nowadays, a manual transmission or sequential type is a type of transmission used on motorcycles and Two Wheelers, where gears are selected in order, and direct access to specific gears is not possible. With traditional manual transmissions, the driver can move from gear to gear, by moving the shifter to the appropriate position. During manual transmission, shifting between gears in order to match acceleration and deceleration needs, drivers have to learn how to use a clutch, when to shift, and the proper

timing required for operating a manual transmission effectively.

2. BLOCK DIAGRAM



2.1 DESCRIPTION

This system is advanced over manual, hydraulic, pneumatic and electromagnetic system. The gears are operated without any human interference. In this system the servo motor is used to shift the gears. The system is semi-automated. The button provided is used for changing the gear. These buttons actuate servos motor which is connected to cam operating shaft instead of pedal of gear. Servo motor is programmed to turn at specific angle which in turns shift the gear. In case, the gear is increased, automatically indicate through buzzer. Indicate the alarm when Engine temperature will increase at the same for break is failure. The engine temperature will measure with the help of temperature sensor. All the parameters will display through LCD display. This system is also useful for handicapped person. Also, the no handicapped person gets good driving comfort and superior experience.

3. HARDWARE DESCRIPTION

3.1 Power Supply

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others. Power supplies for electronic devices can be broadly divided into linear and switching power supplies. The linear supply is a relatively simple design that becomes increasingly bulky and heavy for high current devices; voltage regulation in a linear supply can result in low efficiency. A switched-mode supply of the same rating as a linear supply will be smaller, is usually more efficient, but will be more complex.

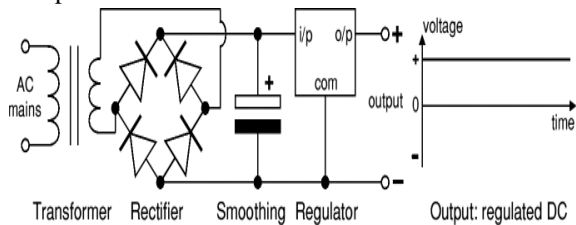


Fig-1 Power Supply

3.2 Potentiometer

A potentiometer is a three-terminal resistor with a sliding or rotating contact that forms an adjustable voltage divider. If only two terminals are used, one end and the wiper, it acts as variable resistor or rheostat. The measuring instrument called a potentiometer is essentially a voltage divider used for measuring electric potential (voltage); the component is an implementation of the same principle, hence its name.



Fig-2 Potentiometer

Potentiometers are commonly used to control electrical devices such as volume controls on audio

equipment. Potentiometers operated by a mechanism can be used as position transducers, for example, in a joystick. Potentiometers are rarely used to directly control significant power (more than a watt), since the power dissipated in the potentiometer would be comparable to the power in the controlled load.

3.3 Liquid Crystal Display (LCD)

A liquid crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements. An LCD is a small low cost display. It is easy to interface with a micro-controller because of an embedded controller (the black blob on the back of the board). This controller is standard across many displays (HD 44780) which means many micro-controllers (including the Arduino) have libraries that make displaying messages as easy as a single line of code.



Fig-3 LCD Display

LCDs are used in a wide range of applications including computer monitors, televisions, instrument panels, aircraft cockpit displays, and signage. They are common in consumer devices such as video players, gaming devices, clocks, watches, calculators, and telephones, and have replaced cathode ray tube (CRT) displays in most applications. They are available in a wider range of screen sizes than CRT and plasma displays, and since they do not use phosphors, they do not suffer image burn-in. LCDs are, however, susceptible to image persistence.

3.4 Buzzer

A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household

appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise). Often these units were anchored to a wall or ceiling and used the ceiling or wall as a sounding board.



Fig-4 Buzzer

Another implementation with some AC-connected devices was to implement a circuit to make the AC current into a noise loud enough to drive a loudspeaker and hook this circuit up to a cheap 8-ohm speaker. Nowadays, it is more popular to use a ceramic-based piezoelectric sounder like a Son alert which makes a high-pitched tone. Usually these were hooked up to "driver" circuits which varied the pitch of the sound or pulsed the sound on and off. In game shows it is also known as a "lockout system," because when one person signals ("buzzes in"), all others are locked out from signaling. Several game shows have large buzzer buttons which are identified as "plungers". The word "buzzer" comes from the rasping noise that buzzers made when they were electromechanical devices, operated from stepped-down AC line voltage at 50 or 60 cycles. Other sounds commonly used to indicate that a button has been pressed are a ring or a beep.

3.5 Servo Motor

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. Servomotors are

not a specific class of motor, although the term servomotor is often used to refer to a motor suitable for use in a closed-loop control system.



Fig-5 Servo motor

4. SOFTWARE DESCRIPTION

4.1 Arduino IDE

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo.

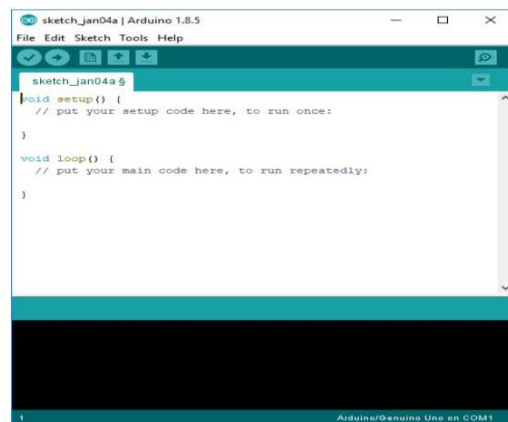


Fig-6 Arduino IDE

4.2 Proteus Design

The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for

manufacturing printed circuit boards. Proteus is a simulation and design software tool developed by Lab center Electronics for Electrical and Electronic circuit design. It also possess 2D CAD drawing feature. It deserves to bear the tagline “From concept to completion”. It is a software suite containing schematic, simulation as well as PCB designing. ISIS is the software used to draw schematics and simulate the circuits in real time. The simulation allows human access during run time, thus providing real time simulation. ARES is used for PCB designing. It has the feature of viewing output in 3D view of the designed PCB along with components .The designer can also develop 2D drawings for the product.

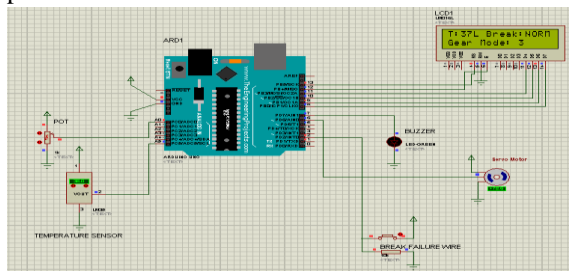


Fig-7 Proteus design

5. FINAL OUTPUT IN HARDWARE

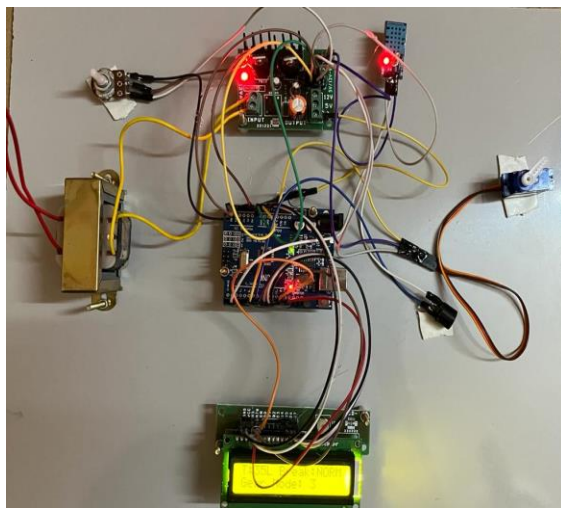


Fig-8 Experimental Output

6. CONCLUSION

After developing this project, we conclude following points. This project is most useful for handicap persons those who cannot drive the two wheelers because due to gear shifting problem. Hence the gear

shifting mechanism is developed and modified according to their requirement. The application of this gear shifting mechanism leads to make the driving process for driver easier, reduces the risk of destabilizing, the chance of miss shifting. Due to this mechanism driver can concentrate on road rather giving concentration of gear shifting and easily drive in traffic areas. The system is cheap and can be implemented in any bikes available in market. Smooth rides in all city conditions. No need for internal modification in bikes. Less human intervention in riding bike. Gear limits can be changed by optimizing the program in microcontroller. The vehicle can be switched to automated as well as manual by easy switch. Due to its low cost and easy manufacturing, companies can implement this system and increase their sales.

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