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A Dissertation Report on

Bike Stand Automation

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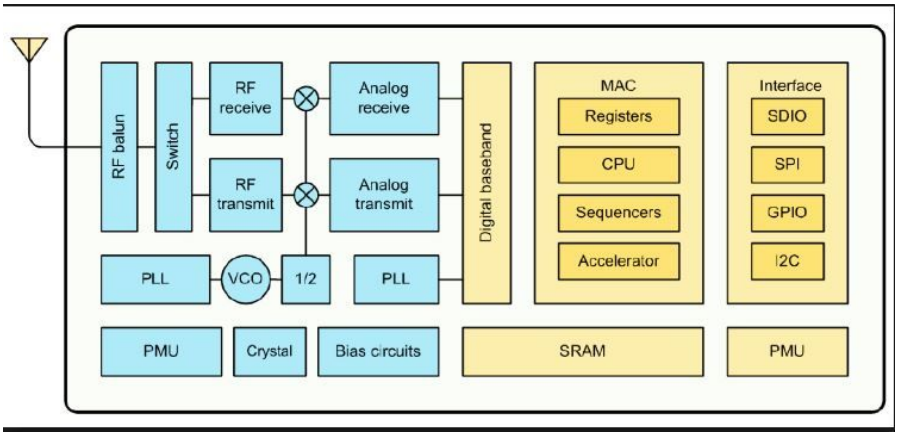
Abstract

Today's generation is smarter and faster and the people rarely find time for anything. As the technology keeps growing the lives of people get busier and hectic. Today about 40% of the population own automobiles and one in three households in India own a two-wheeler. Due to the absence of mind or lack of self-awareness, people usually forget to close their bike stands and just ride away unknowing about the accidents awaiting them. To help all those busy and subconscious people out there we have made an attempt at making the side stands of two-wheelers automated using some simple sensors.

Hardware Components:

1. NodeMcu Wifi Development Board - ESP8266

- Wi-Fi Module: ESP-12E module similar to ESP-12 module but with 6 extra GPIOs
- USB: Micro USB port for power, programming and debugging
- Headers: 2x 2.54mm 15-pin header with access to GPIOs, SPI, UART, ADC and power pins
- Miscellaneous: Reset and flash buttons
- Dimensions: 49 x 24.5 x 13mm



2. Rolling Ball Tilt Sensor Vibration switch module - KG095

Tilt sensors allow you to detect orientation or inclination. They are small, inexpensive, low-power and easy-to-use.

They are usually made of a cavity of some sort (cylindrical) and a conductive free mass inside, such as a rolling ball. One end of the cavity has two conductive elements (poles). When the sensor is oriented so that that end is downwards, the mass rolls onto the poles and shorts them, acting as a switch.

Technical Specifications

1. PCB board size: 16*14mm
2. location hole diam: 3.1mm
3. with Free 20cm Dupont cable
4. Working Voltage: 3.3-12V

3. Servo Motor

Servo Motor is a self contained electrical device, that rotate parts of a machine with high efficiency and great precision. The output shaft of this motor can be moved to a particular angle. Servo motors are mainly used in home electronics, toys, cars, airplanes, etc

Technical Specifications

1. 3 pole ferrite, all nylon gear
2. Top ball bearing
3. Operating Voltage: 4.8V~6.0V
4. Operating speed: 0.12sec/60 degree
5. Output torque: 1.6kg/cm 4.8V
6. Dimension: 21.5 x 11.8 x 22.7mm
7. Weight: 9g

Software Components:

Arduino IDE

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them

Implementation:

The tilt sensor and the servo motor are connected to Nodemcu using jumper wires. The tilt sensor is attached to body of the bike. It is capable of detecting the inclination of bike. NodeMcu reads the state of the tilt sensor as low and high based on the angle of inclination of the sensor and sends it NodeMcu. The NodeMcu sends signal to servo motor. The servo motor is embedded into the side-stand of the bike which opens / closes the stand based on the signal received from NodeMcu.

Result:

The tilt sensor on the bike helps to detect and measure the inclination of bike. When the bike is inclined at an angle more than 30 degree the signal is raised and the servo motor opens the side stand. When the rider straightens the bike the signal is raised and the servo motor closes the side stand.

Code:

```
#include <Servo.h>
Servo myservo;
int sensor = 4;              // tilt sensor as input pin
int LED = 13;                 // led as output pin

boolean switchState = false;
int sensorState=0;// current state
```

```
void openStand()
{

   myservo.write(110);

}

void closeStand()
{
   myservo.write(20);
}

void setup()
{
          pinMode(sensor, INPUT);
          digitalWrite(sensor, HIGH);      //set the sensor as HIGH
          pinMode(LED, OUTPUT);
          myservo.attach(LED);
          myservo.write(15);
}

void loop()
{
  sensorState=digitalRead(sensor); //read value of the sensor either high or low

  if(sensorState==LOW)           //when tilt switch lays flat
  {
    //digitalWrite(LED,HIGH);
    closeStand();
  }
  else
  {
    //digitalWrite(LED, LOW);      //when switch tilt on some angle
    openStand();
  }
}
```

Conclusion:

The side stand automation based on the inclination of bike helps in avoiding accidents that are very common due to the open stands and also saves little time in the parking lots. With the help of other sensors

in the bike like speedometers along with the tilt sensor it is possible to have real time implementation of this simple application in the traffic.