Automatic indicator cancellation for Two Wheelers

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Abstract : The objective of this project is to create a design via which the indicators in the bikes can turn off automatically when the bike or any two wheeler completes the turn. This project proposes a small model of it using a gyroscope where the tilt is handled using a potentiometer. This system exists already in four wheelers and it was also implemented in some bikes such as those of Yamaha, Bajaj and few more. A smaller model using a sensor MPU6050 is tried. The reason behind selection of this project is the safety on roads and compensate somewhere for the carelessness of the riders.

IndexTerms - Indicator, MPU-6050, accelerometer, gyroscope, tilt.

I. INTRODUCTION

As far as the traffic discipline is concerned we see many people on the roads who somehow forget to turn off the indicator after the turn which sometimes leads to minor brouhaha on the road and seldom an accident.
Motorcyclists are constantly exposed to more danger than operators of other vehicles. On a bike we are more exposed and don't have the safety net provided by doors, a roof, reinforced steel beams, and roll cages. A major factor in motorcycle safety is visibility — a bike is smaller and harder to see, and even the horn can't compare to the ones found on cars. As a result, it is even more important for riders to signal their intent on the road, especially with the use of turn signals. But sometimes because we don't have proper traffic rules and people don't follow the existing few rules, we end up triggering the off sensor even before the turn. [1]

A great number of riders often forget to turn off their turn-signals after a maneuver – some of them are even reluctant to use them in the first place, fearing that they might forget to cancel them afterwards. Given the generally bad visibility of a motorcyclist in traffic, inappropriate use of turn-signals can even further increase the danger they are in. [1]
On several occasions we have indicated to exit the roundabout, forgotten to switch off the indicator and queued traffic waiting to exit the shopping center has driven straight out in front.

II. RELATED WORK

The Yamaha did try it in the 70's but then it was not for all the products.The system used a time/distance calculation to decide when the indicator was likely to be no longer needed. The switch would move to the appropriate side then self-center to start the sequence. [3]
Unlike cars, motorcycles do not always come with self-cancelling signals, especially when it comes to older models. The danger is compounded when even veteran motorcyclists occasionally forget to switch off their signals or are not aware they are even on. It does happen. For bikes that do come with self-cancelling signals, they are usually set to switch off after a certain distance or time has passed, which may not always be ideal. The Smart Turn System from Slovenia-based company ABCS System is designed to mitigate these risks. [3]
The Smart Turn System uses motion sensor technology to determine when a rider has changed a lane, exited a freeway, or simply taken a turn. The new Smart Turn System uses an advanced algorithm that analyses collected data on direction, inclination, acceleration and vibration of the vehicle in order to reliably switch the turn-signals off after the completion of a maneuver. A patented system collects movement data (300 elements per second), including acceleration, inclination, heading, and vibration. It then uses an algorithm to determine what the rider is doing and, at the completion of the maneuver, switches off the motorcycle's turn signal. It is integrated into the bike's electronics to use its stock lights. [4]
Several systems that monitor a particular aspect of the vehicle dynamics have been developed and patented. As input signal, they use the angle of the handlebar [6]- [8], the vehicle speed [9], the vehicle balance (roll angle) [10], or the gyroscopic effect (the yaw) [11].

III. MAIN BODY OF THE PAPER

Components Used-

1. MPU-6050
MPU6050 sensor module is a 6-axis Motion Tracking Device. It combines 3-axis Gyroscope, 3-axis Accelerometer and Digital Motion Processor all in small package. It also has additional feature of on-chip Temperature sensor. It has I2C bus interface to

communicate with the microcontrollers.

The MPU6050 consist of 3-axis Gyroscope with Micro Electro Mechanical System (MEMS) technology. It is used to detect rotational velocity along the X, Y, Z axes.

MPU-6050
Orientation & Polarity of Rotation
Figure 1
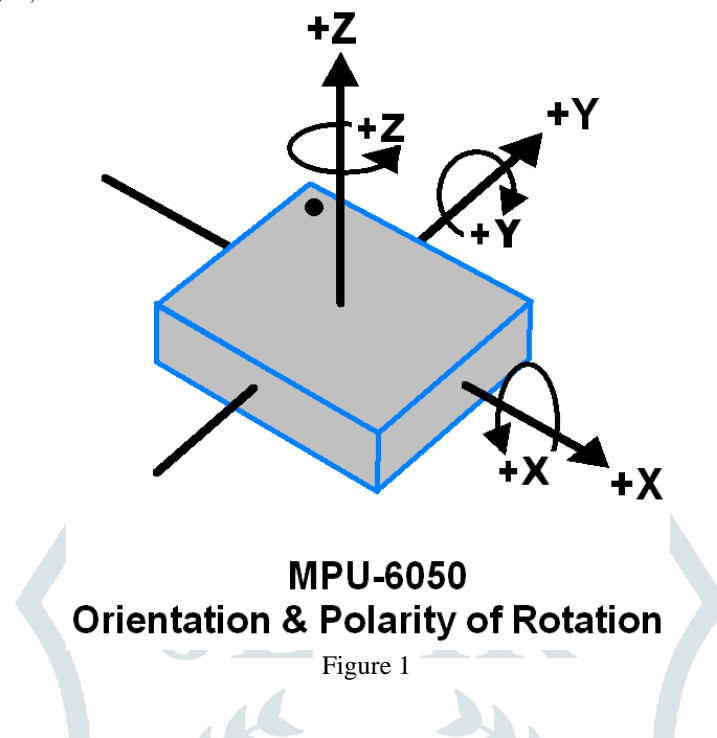
When the gyros are rotated about any of the sense axes, the Coriolis Effect causes a vibration that is detected by a MEM inside MPU6050.

- The resulting signal is amplified, demodulated, and filtered to produce a voltage that is proportional to the angular rate.

- This voltage is digitized using 16-bit ADC to sample each axis.

- The full-scale range of output are +/- 250, +/- 500, +/- 1000, +/- 2000.

- It measures the angular velocity along each axis in degree per second unit.

 Vibration gyro sensor manufacturers are using a variety of structures in an effort to devise compact, high-accuracy gyro sensors that have good characteristics, including:
• scale factor
• temperature-frequency coefficient
• compact size
• shock resistance
• stability
• noise characteristics

The MPU6050 consist 3-axis Accelerometer with Micro Electro Mechanical (MEMs) technology. It used to detect angle of tilt or inclination along the X, Y and Z axes.

- Acceleration along the axes deflects the movable mass.

- This displacement of moving plate unbalances the differential capacitor which results in sensor output. Output amplitude is proportional to acceleration.

- 16-bit ADC is used to get digitized output.

- The full-scale range of acceleration are +/- 2g, +/- 4g, +/- 8g, +/- 16g.

- It measured in g (gravity force) unit.

- When device placed on flat surface it will measure 0g on X and Y axis and +1g on Z axis.

Accelerometers measure linear acceleration (in mV/g) along one or several axis. A gyroscope measures angular velocity (in mV/deg/s). If we take our accelerometer and impose a rotation to it (i.e., a roll), the distances d1 and d2 will not change. Consequently, the accelerometer's output will not respond to change in angular velocity.
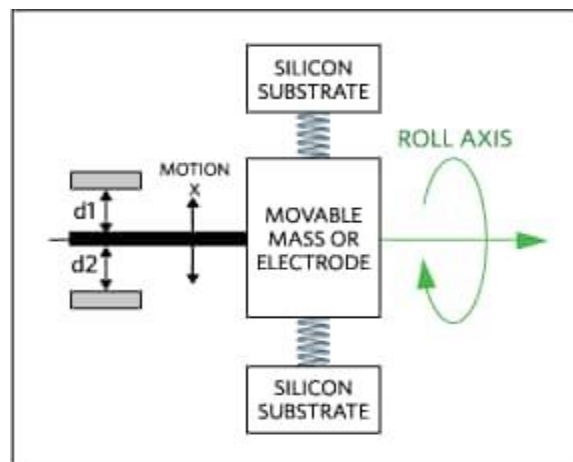

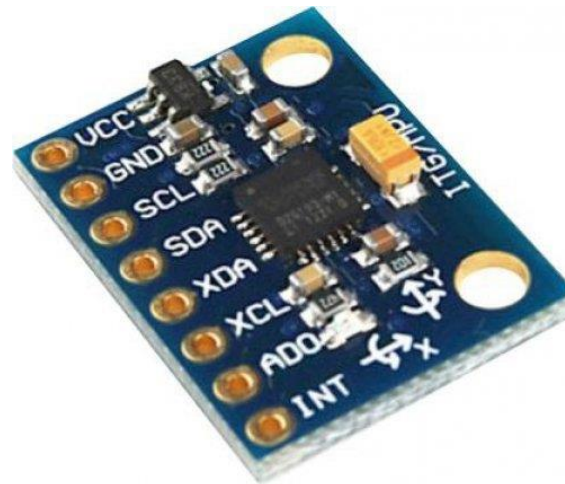Figure 2: Accelerometer immunity to rotation.

Figure 3: MPU6050 Module

2. The second component used is a potentiometer which is used to measure the angle of the bike handle.

    Experimentation- For deciding the threshold values we actually went on bikes and measured the tilt of the bike so that we get realistic values. SD card was used to store these values in it and then a mean threshold was decided and according values were written in code.

    Principle and Working -
    It works on the simple principle of the tilt measurement of the bike and angle of the handle which is detected by the MPU-6050. We predefine the values for the tilt and if it goes beyond that the indicator is turned off.
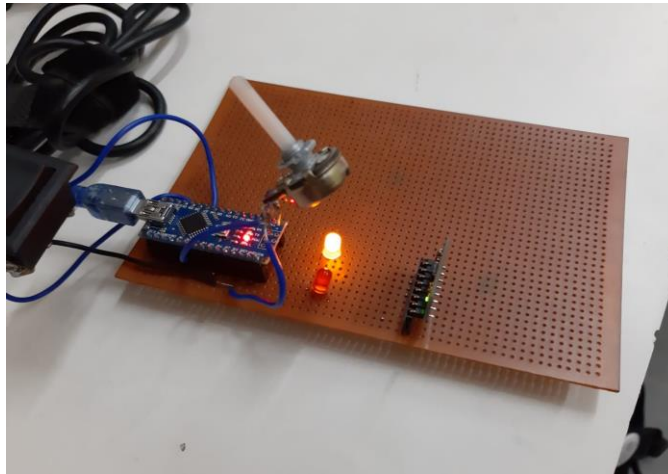
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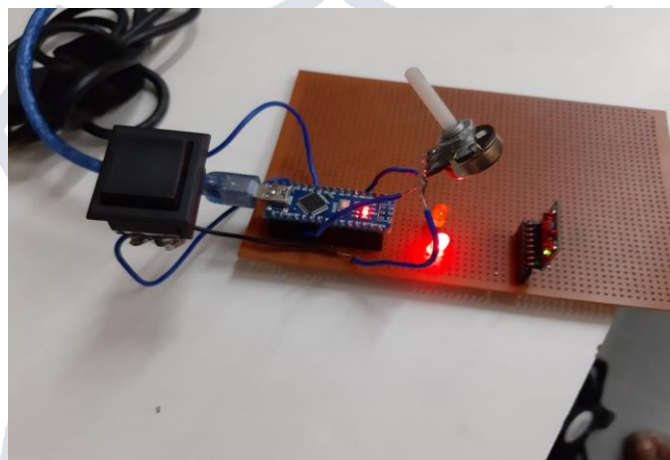Figure 4: Yellow LED indicating left indicator is ON

Figure 5: Red LED indicating right indicator is ON

IV. CONCLUSION

There had been attempts to device some self-cancelling turn indicator systems. Some were but with respect to time and some with respect to the distance travelled. But they were not near approximation. Hence a system which auto turns off the indicator considering the factor of the tilt is always a better option.

Also considering the safety measurements for the road this is an innovative idea for two wheelers. We have always been designing systems and objects using the smarter technologies for our convenience and for easier plus safer living. This contributes to it. It compensates for human errors and prevents any material or life loss.

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