Implementation of Low Cost Automatic Gear Suggestion System

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***Abstract*—** The present automatic transmission is fully mechanically controlled and costs very high. But the proposed gear suggestion mechanism design makes driving much easier and to achieve efficient driving. It is similar to other transmission system on vehicle as it allows an internal combustion engine, best suited to run at high rotational speed to provide torque outputs necessary for vehicular travel. By this system the manual mechanical gear-shifting system will remain unchanged because it suggests the gear change based on increased speed. This article touches on a PIC microcontroller and a Proximity sensor. The main advantage of using mid-range microcontroller is that it is of low-cost and reliable. This technique can also be used to identify the gear position.

***Keywords*—** *Motorcycle, Proximity, Manual, Gear-shifting, Microcontroller, Gear.*

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Introduction

An automatic transmission is a type of motor vehicle transmission they can automatically change gear ratios as the vehicle moves freeing the driver from having to shift gears manually. Gearshifts in automatic transmissions involve a change in the power flow path through the transmission. Advantages of these automatic transmissions include simplicity of mechanical design and savings in transmission weight and size, which are beneficial in terms of fuel economy and production costs. This enables gain in fuel economy while meeting drivability and performance goals, these savings become more significant.

The designed automatic transmission is done in an auto-clutch featured bike which can be applied effectively and efficiently in a clutch featured bikes with suitable control techniques. The ultimate goal is to transmit the gears without the human interference and to attain efficient, safe and easy driving in cost effective way. Microcontroller is the heart of the system which handles all the sub devices connected across it. PIC 16F877A microcontroller is used.

The purpose of this paper is to adapt the system which is prevalent in some of the present luxurious cars, apart from the safety, driver enhancements and efficiency it supports them by suggesting the gear change based on RPM. It uses the hydraulic pressure for changing the gears.

This paper is designed to give a suggestion for people who have problem in figuring out the varying different gear changing based on the readings of the speedometer. The Setup uses the PIC Evaluation Kit for operation, which processes the data i.e. it receives input from the sensor and gives us the output. The initial step is that when the rider starts the vehicle the RPM is calculated or rather counted using a Hall-Effect sensor using the hall-effect mechanism and the output is LCD display suggesting to change the gear based on speed. Automatic gear changer helps us to get a clear view of gear system. The chip of 18Fseries is used in PIC evaluation board. This helps us to build a stable system for the two –wheelers.

Proposed System

The proposed system consists of a PIC microcontroller, Proximity sensor and a LCD, Amplifier, voice playback module. In this proposed work, the Proximity sensor counts the number of rotations per second and sends it to the microcontroller, if the sensor is placed in the correct position. Otherwise it would result in error. Interfacing the sensor with the microcontroller enables us to know the RPM. Then, based on the acceleration of the wheel the corresponding output is displayed. The Fig.1.gives us the broad outline of proposed system.

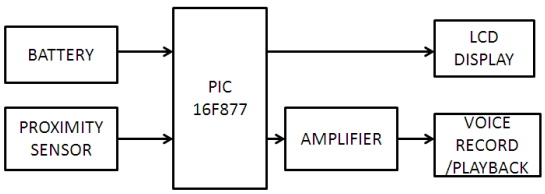

Fig.1: Block Diagram of proposed system

Proximity Sensor Fundamentals

Proximity sensor attached to the wheel counts the pulse and provides a square wave output. The magnetic flux that is created due to the permanent magnet rotation out of which the gears are made up of is also another reason. The PIC microcontroller takes the analog signal into the processor which processes the input signal and gives us an output in the form of displaying the gear change. The Fig.2 shows the proximity sensor.

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An inductive proximity sensor has four main components; The oscillator which produces the electromagnetic field, the coil which generates the magnetic field, the detection circuit which detects any change in the field when an object enters it and the output circuit which produces the output signal, either with normally closed or normally open contacts.

Inductive proximity sensors are used for sensing ferrous and non-ferrous metals at close proximity. ASI inductive proximity sensors are available in a wide variety of barrel diameters, lengths and configurations. Using high technology electronics, automated assembly and state- of-the-art test equipment insures a reliable, high quality proximity sensor.

When a car or other road vehicle passes over this inductive loop, the metallic body of the vehicle changes the loops inductance and activates the sensor thereby alerting the traffic lights controller that there is a vehicle waiting.

Fig.2: Proximity Sensor

PIC Microcontroller

The PIC 16F877A 40-Pin Enhanced Flash Microcontrollers are essential for low cost operations but also with better efficiency. It consists of four crystal modes up to 40MHz.It also has a built-in oscillator block.

Working of the System

Automatic gear changer suggestion system based on Proximity sensor, microcontroller and LCD display is given already in the fig.1. In this system initially the power supply is provided to the microcontroller. As the first step when the motorcycle is started and the accelerometer is raised there would be an increase in RPM gradually from 0 to some range of values.

The Proximity sensor attached to the wheel counts the pulse and provides a square wave output. The magnetic flux that is created due to the permanent magnet rotation out of which the gears are made up of is also another reason.

The PIC microcontroller takes the analog signal into the processor which processes the input signal and gives us an output in the form of displaying the gear change. The below Fig.4 shows us the working model.

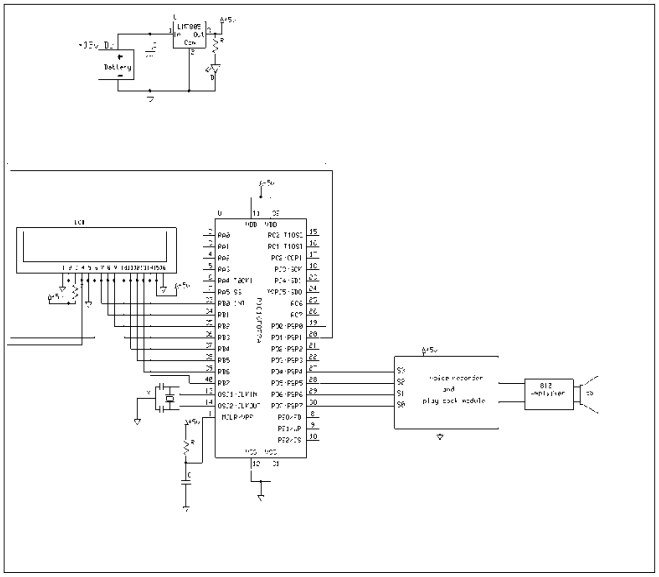

Fig.3: Simulation in Proteus

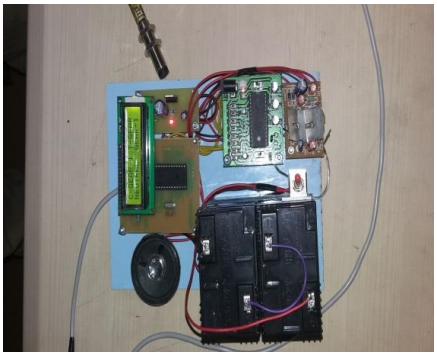

Fig.4: Working model

The circuit diagram explains about how the connections can be made in real time. The setup consists of Proximity sensor which is connected to one of the analog pins preferably for his circuit RA0/AN0 which is 2nd pin.

For the display function, in the LCD display pins 4-reset, 5-read/write, 6-enable are connected to corresponding pins 15, 16, 17 pins in Port C. Then the pins starting from 7 to 14 are connected to Port D pins parallel. The built in connection for the oscillator with the combination of two 33pF capacitors are given. Along with this enabling of VSS, VDD, VEE is also given for viewing. The Fig.3.gives us the simulation result in proteus.

Voice-Record And Playback

Using the voice record and playback module, we can record our voice and make it repeat it. Voice Module will playback and record up to 60 seconds of voice message. Audio output is available to drive a speaker. An Amplifier circuit is

also attached to boost up the recorded sound. It consists of four modes.

Simulation and Testing

For Software testing C language is being used in the Keil micro-vision software. After this step, compiler generates the hex code and is stored in the computer. The hex code of the program is loaded into the PIC 16F877A through the WinPIC800 device programmer. Real time simulation is done using Proteus software.

Conclusion

The Future work of this paper is planned to develop the system with compatible features inheriting it from those of the four-wheelers. This setup is cost efficient and also gives better efficiency.

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