DESIGN AND FABRICATION OF AUTOMATED MANUAL GEAR TRANSMISSION IN MOTOR BIKES

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INTRODUCTION:

The recent survey shows that continuous variable transmission (CVT) are in demand compared to the gear featured bikes. CVT’s do not have the concept of meshing of gears which enhances a smooth ride, but the fuel efficiency is comparatively lesser when compared to the gear featured vehicles.

The main objective of our project is to automate the gear transmission in a gear featured bike to ease the driving and also to maintain the efficiency of the bike. This mechanism is used in auto-clutch featured bike to smoothen the gear meshing and can be implemented in clutch featured bike. The aim is to develop of automatic transmission system which shifts the gears with respect to the speed of the wheel. Simplifying the transmission and improving the fuel economy are the major objectives of our project. This technology is implemented in an auto-clutch featured bike which shifts the gears to eliminate the human interference and results in easy driving. Automation of gears transmission can be achieved by embedded system. Embedded system is a special purpose computer system. Embedded system is preferable because it can reduce the number of electrical components and probability of failure is minimum. It has easy interfacing. Either a microprocessor or a microcontroller is used in all the embedded systems. Microcontroller Atmel 89S52 is used in our project. Suitable software is used to write the assembly level language in the microcontroller. Embedded ‘C’ Language is written and stored in the ROM of the microcontroller.

By implementing this system into an auto-clutch feature bike, automatic transmission of gears while driving the motor bike can be achieved. This automated transmission can be controlled by the acceleration, since it is with respect to the speed of the bike. The fuel efficiency can be tested after fabricating the bike according the above mechanism.

OBJECTIVE:

1. To design the gear shifting mechanism and modify the vehicle according to the designed mechanism.
2. To program the microcontroller according to the needs of the mechanism and build the electronic circuit.
3. To calibrate the gear shifting mechanism and also to check for the improvements in the efficiency if any.
METHODOLOGY:

Methodology for objective-1:
The chain drive mechanism between the geared DC motor and gear pedal is designed using Catia V5 software. The geared DC motor is fitted about the pedal with calculated offset. A gear is welded on to the pedal of the vehicle. The timing chain is attached as the driving medium.

Methodology for objective-2:
Atmel 89S52 microcontroller is programmed using Keil V5 and burnt using Willar software. Electric circuit is built using some of the components like proximity sensor, microcontroller, LCD display unit, relays and DC geared motor.

Methodology for objective-3:
The calibration of automatic gear shifting, with is respect to rear wheel speed, in the C program by trial and error method. The efficiency of the gear vehicle in terms of mileage is tested; it has to be more than the normal CVT vehicles.

CONCLUSION:
After achieving the desired gear shifting technology, we ever able to get a smooth ride in all city conditions. We have found that there is an improvement in the fuel efficiency. This gear shifting technology has improvised the auto-clutch featured bike into automatic transmission vehicle. The complete gear changing mechanism has been controlled by the acceleration of the bike. The vehicle can be used in manual mode by switching off the power supply to the electrical components. A switch has been provided for this optional mode.

The programmed embedded ‘C’ codes, in the microcontroller, were optimized and were the key source for changing gears in city limits as well as highways. Maintaining a proper pulse range, as in the program, or a constant speed of the vehicle resulted in better fuel efficiency. Fuel efficiency has been improved by 2km to 4km. After implementing this technology we have come to a conclusion that no human operation is necessary, other than accelerating, to ride the motor bike.

FUTURE WORK:
Implementing in all gear featured bikes
The automated gear shifting mechanism can be obtained in any auto-clutch featured bike by installing the necessary electrical circuit and by fabricating. Also this mechanism can be achieved in clutch featured bikes by automating the clutch initially. The cost of installation will be comparatively high in clutch featured to wheelers. Automobile companies can manufacture bikes with this new concept on customs’ demand.

Using Torque sensor
Our concept of automatic gear shifting, in bikes, was with respect to the speed of the wheel. The proximity sensors can be replaced by the torque sensor as another approach. Minor changes are required in the electrical circuit and in the embedded ‘C’ program when torque sensor is used. The torque produced in the wheels is takes as input source for the microcontroller to decide the gear positions. This sensor is costlier compared to the proximity sensor.