



## “AUTOMATIC TRANSMISSION SYSTEM” BUTTON OPERATED GEAR SHIFTING MECHANISM

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**Abstract**— A gear shifting mechanism is designed and applied to make the shifting process faster and less destructible for the driver. The new device must be reliable, with small dimensions, low construction and maintenance cost. This project aims to improve gear shifting process using devices as: a manual four speed gear box, an electrical motor, a belt, pulleys, and power supply. According to suggested gear shifting method the driver can select the transmission gear ratio without moving his hands from the steering wheel by putting the gear shifting push buttons on the steering wheel. Using this method leaves to the driver the excitement of choosing the shifting moment. This study helps to Easy operating and giving a distraction less system to operators.

**Keywords**— automatic transmission, button operated gear, button operated mechanism, automatic gear box, automatic gear mechanism, shrisai college of engineering

### I. INTRODUCTION

An Automatic transmission (also called automatic gearbox) is one type of vehicle motor transmission that can automatically change gear ratios as the vehicle moves, relieving the driver from having to shift gears manually. The most automatic transmission has a defined set of gear ranges, often with a parking pawl feature that locks the output of the transmission.

Similar but larger devices are also used for heavy-duty commercial and industrial vehicles and equipment. Some machines with limited speed ranges of fixed engine speeds, such as some forklifts and lawn mowers, only use a torque converter to provide a variable gearing of the engine to the wheels.

Besides automatics, there are also other types of automated transmission such as continuous variables transmission (CVTs) and semi-automatic transmissions that free the driver from having to shift gears manually, by using the transmission's computer to change gear, if, for example, the driver was redlining the engine. Despite superficial similarity to other transmissions, automatic transmission differs significantly in internal operation and drivers feel from semi-automatics and CVT.

An automatic uses a torque converter instead of a clutch to manage the connection between the transmission gearing and the engine. In contrast, a continuous variable transmission uses a belt or other torque transmission schema to allow an “infinite number of gear ratios instead of a fixed number of gear ratios. A semiautomatic retains a clutch like a manual transmission, but controls the clutch through electro-hydraulic mean.

### II. LITERATURE REVIEW

#### A. Ferrari

Ferrari's first automated gearbox in a road car (They had used them previously in their formula one care since 1989) went on sale in 1997 in the Ferrari F355. The most recent iteration of its robotized manual came forward in the Ferrari 599 GTO which was capable of changing gear in a fraction of seconds. In the new Ferrari California & Ferrari 458 Italia, Ferrari has opted to use a double-clutch transmission.

#### B. Honda

Honda marketed both cars and motorcycles with the Hondamatic transmission in the 1970s and early 1980s. This transmission is frequently referred to as the ‘

'Bang-O-Matic' by mechanics. The design is noteworthy because it preserves engine braking by eliminating a sprig between the first and second gears.

### C. Mercedes-Benz

Mercedes used a system similar to the Volkswagen

Auto-stick, called Hydrak. Hydrak had one major flaw- the oil supply for the torque converter was sealed within the converter itself and did not circulate via a pump, and also had no oil cooler. Idling in gear for even short periods would overheat the oil and up the seals in the converter, which would then need to be replaced.

### D. Volkswagen

In later production years, the Volkswagen Beetle offered an optional "Autistic", which was essentially a clutch-less manual with three forward gears, using the Saxo-mat auto-clutch.

## III. CONCEPT

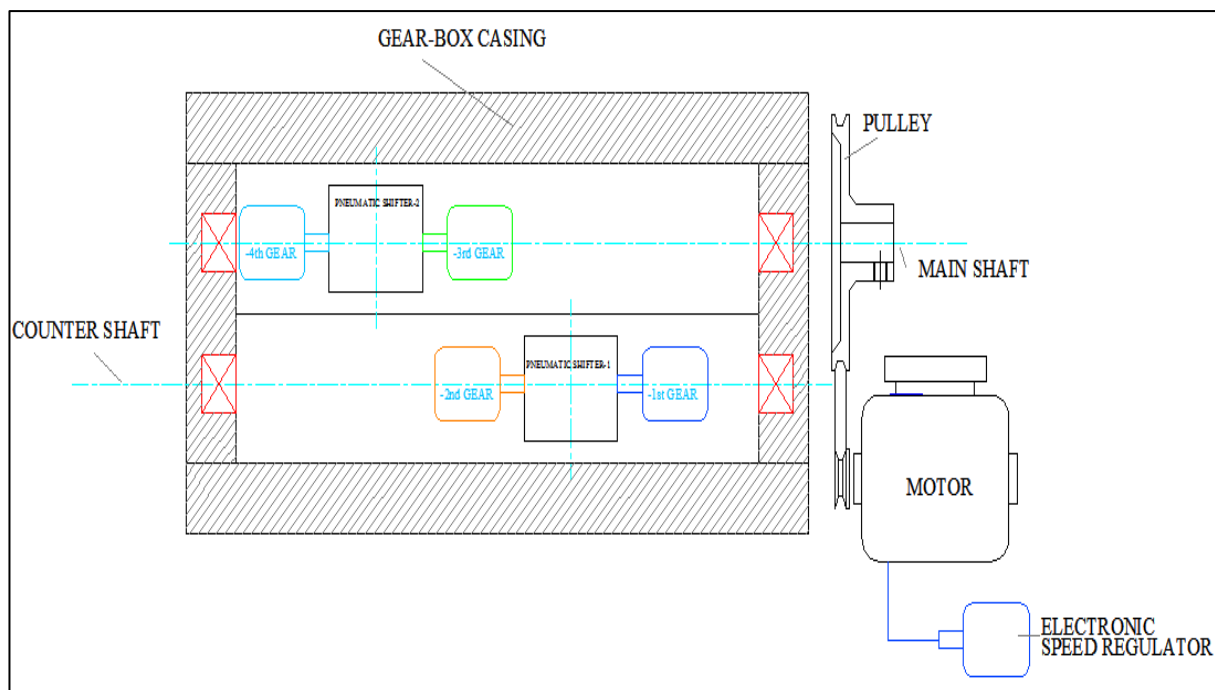


Fig. 1) Schematic Layout of Automatic Gearbox

## IV. RESEARCH METHODOLOGY

### A. Conventional Automatic Transmission vs. Continuously Variable Transmission: -

The conventional automatic transmission, maximum 6 ratio's (gears) are available, but mostly even less. When the transmission up shifts, it has to follow the bold or dotted lines of the first image depending of the amount of throttle.

With the CVT, the whole range of ration between the low and overdrive lines is available for shifting as shown in the second image. The shift point of both transmissions is related to the amount of throttle.

As more throttles are applied, the transmission up shifts at a higher engine speed. With the conventional transmission it is clear that the engine speed drops back when shifting to a higher gear. This is not the case with the CVT.

The CVT will up shift at a constant engine speed, by moving the pulleys as explained in the next part However, alternative shifting strategies are also possible. This can help to create a quicker acceptance by new CVT drivers.

### B. Basic Principles of Continuously Variable Transmission:

1. Input from the engine
2. Output to the wheels
3. Drive pulley at maximum diameter (overdrive)
4. Driven pulley at minimum diameter (overdrive)

Unlike conventional planetary automatic transmissions that provide a limited number of gear ratios, usually four, five or six, the CVT, as its name suggests, continuously varies the gear ratio. A low gear (low ratio) makes it easier to pull away from a rest position, the drive pulley diameter being relatively small, while the driven pulley diameter is large by comparison. The drive belt is used to transmit power and torque. As acceleration takes place it becomes possible to select a higher ratio by increasing the diameter of the drive pulley while, at the same time, decreasing the diameter of the driven pulley. This degree of change can be

controlled to ensure that the most suitable ratio is provided. The CVT uses a primary pulley and a secondary pulley. Both pulleys have one fixed half and one mobile half, controlled by hydraulic pressure. The position of the drive belt on the pulleys will determine the ratio. If the mobile half of the pulley is close to its opposite half, then the drive belt is forced to travel around the outer circumference. When then pulley is open wide then this circumference is reduced. The primary and secondary pulley mobile halves are diagonally opposed so when the drive belt diameter is reduced on the primary pulley, it increases on the secondary pulley. To pull away, a low ratio is required. To provide this, the primary pulley is open, allowing the drive belt to sit down into the pulley and forcing it to run around the outer of the closed secondary pulley. As vehicle speed increases, a higher gear ratio is required. To do this, the primary pulley gradually moves towards its fixed partner, increasing the pulley circumference. At the same time the secondary pulley is forced apart reducing pulley diameter, therefore creating a higher gear ratio. An overdrive ratio is obtained when the primary pulley is fully closed and the secondary pulley is fully open. The secondary pulley is now forced to rotate approximately two and a half time for every turn of the primary pulley.

#### C. Semi-automatic transmission: -

A semi-automatic transmission is a transmission that does not change gears automatically, but rather facilitates manual gear changes by dispensing with the need to press a clutch pedal at the same time as changing gears.

An automated transmission (also known as self-changing transmission, clutch-less manual transmission, automated manual transmission, floppy- paddle gearbox, or paddle-shift gearbox) is a system which uses electronic sensors, pneumatics, processors and actuators to execute gear shifts on the command of the driver or by a computer.

This removes the need for a clutch pedal which the driver otherwise needs to depress before making a gear change, since the clutch itself is actuated by electronic equipment which can synchronise the timing and torque to make gear shifts quick and smooth.

#### D. Comparison to other automated transmissions: -

Many modern automated transmissions can also operate in the same manner as a conventional type of automatic transmission by allowing the transmission's computer to automatically change gear if, for example, the driver was redlining the engine.

The ability to shift gears manually, often via paddle shifters, can also be found on certain automatic transmissions (Manumatic such as Tiptronic) and continuous variable transmission (CVTs) (such as Lineartronic).

In spite superficial similarity to other automated transmission, automated transmissions differ significantly in internal operation and driver's "feel" from manumatic and CVTs. A manumatic, like a standard automatic transmission, uses a torque converter instead of clutch to manage the link between the transmission and the engine, while a CVT uses a belt instead of a fixed number of gears.

A semi- automatic transmission offers a more direct connection between the engine and wheels than a manumatic and is preferred in high performance driving applications, while a manumatic is often preferred for street use because its fluid coupling makes it easier for the transmission to consistently perform smooth shifts, and CVTs are generally found in gasoline-electric hybrid engine applications.

Typically, semi-automatic transmissions are more expensive than manumatic and CVTs, for instance BMW's 7-speed Double Clutch Transmission is a \$3900CAD upgrade to the standard 6-speed manual, while the 6-speed Steptronic Automatic was only a \$1600CAD option.

In a given market, very few models have two choices of automated transmission; for instance, the BMW 645Ci/650i (E63/64) (standard 6-speed manual) had an optional speed automatic "Steptronic" or 7-speed Get rage SMG 111 single-clutch semi-automatic transmission unit after the 2008 model year, when the SMG 111 was dropped.

Many sport luxury manufacturers such as BMW offer the manumatic for their mainstream lineup (such as the BMW 328i and BMW 535i) and the semi-automatic for their high-performance models (the BMW M3 and BMW M5).

The automated transmission may be derived from a conventional automatic; for instance, Mercedes-Benz's AMG SPEEDSHIFT MCT automated transmission is based on the 7G-Tronic manumatic, however the latter's torque converter has been replaced with a wet, multi-plate launch. Other automated have their roots in a conventional manual; the SMG 11 drive logic (found in the BMW M3 (E46) is a Get rag 6-speed manual transmission, but with an electro hydraulically actuated clutch pedal, similar to a Formula One style transmission.

## V. INPUT DATA:

Input power = 0.05kw

Input speed =1000 rpm

Center distance = 210 mm

Max belt speed = 1600 m/min = 26.67 m/sec

Groove angle ( $2\beta$ ) =  $40^\circ$

Coefficient of friction = 0.25

Between belt and pulley Allowable tensile stress =  $8 \text{ n/mm}^2$

## VI. RESULT:

1) *Belt selected*

$$FZ \ 6 \times 600$$

2) *Tight side Tension*

$$T_1 = 124.24 \text{ N}$$

3) *Slack side Tension*

$$T_2 = 16 \text{ N}$$

4) *Motor pulley dia. ( $\phi D_1$ )*

$$D_1 = 20 \text{ MM}$$

5) *Pulley (a) diameter ( $\phi D_2$ )*

$$D_2 = 100 \text{ MM}$$

## VII. CONCLUSION:

The project presented has involved the development and implementation of automatic transmissions for bikes and cars. The motivation of this work is to implement this idea in clutch featured bikes with suitable clutch control. And hence, this project is most useful for handicapped persons who cannot drive the two-wheelers due to gear shifting problems, so the gear shifting mechanism is developed and modified according to their requirements. Moreover, the application of this gear shifting mechanism leads to making the driving process for the driver easier and reduces the risk of destabilizing, and the chance of miss shifting. Due to this mechanism, the driver can concentrate on the road rather than concentrating on gear shifting and easily driving in traffic areas. Additionally, the automatic transmission can be also used in 5 and 6-speed versions by altering a few changes in the program. According to the achieved results the mechanism done is reliable if it is installed in bikes and cars and very helpful for the handicapped because the gear is changed with the help of a button, not by a lever.

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