Review on Automatic Gear Shifting Systems

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Abstract: The transmission of gear system of the motorcycle is manual gear system. Motorcycles are assisting in all countries mostly in India.In the present world of vehicle of automobile, transmission of gear system are automatic and manual. Gear shifting method is important in automobile vehicle to alter the speed and vehicle move easily one place to another place with the assist of process of shifting of gear .Manual gear shifting methods are easy use and cost of this method is low as compare to the automatic shifting of gear in vehicle .Manual shifting of gear method is complicated to follow people for physically maimed or it's take physical endeavour to change of gear. In this article eleven papers has been reviewed Investigator are trying to focus on operating parameter and design constraints of automatic gear transmission system

Keywords: Automatic Gear Transmission System, Similitude between AT and AMT, Strategy of Shifting of gear.

I. INTRODUCTION

A system alter gears at diverse speeds in that vehicle without direct control by the person this system is called automatic transmission of gear. Modern automatic shifting can trace their fountainhead to an early "horseless carriage" gearbox that was invented in 1904 by the Sturtevant brothers of Sturtevant from Boston, Massachusetts. When engine speeds increase that time top gear was engaged in engine, the vehicle speed decrease and engine Revolution per minute reduce, the gearbox would shift back to gear. Unfortunately, the metallurgy of the time was not up to the task and owing to the abruptness of the gear alters. The transmission of gear would be continually failure without warning. The first automatic shifting of gear system usage hydraulic fluid was developed in 1932 by Brazilian engineers, Fernando Lehly Lemos Later and José BrazAraripe, the project were sold to (GM) General Motors& the prototype. The introduced the technology in the 1940 Olds mobile model like a "Hydra Matic" transmission In 1934, both General Motors and REO developed semiautomatic transmissions shifting of gear system that were, less hard to operate than a manual shifting of gear system. These design, continued to usage a clutch to engage gear in engine with the transmission. The General Motors staff, dubbed the " (AST) Automatic Safety Transmission," was notable that in it employed a shifting power to planetary gearbox was hydraulically controlled and sensitive to anticipating future development road speed.

Though the automatic transmission gear shifting won't provide the same feeling of vehicle control that manual gear transmission drivers experience, automatic transmission gear method vehicles offer a simple interface that new drivers may feel more comfortable with, In a manual gear transmission vehicle, new drivers does not only need to understand to drive, but how to usage a stick shift. In an automatic transmission of gear vehicle, the learned curve was simplified by the remove of the stick shift. An automatic gear transmission allowed a new driver to pay attention to the road, rather than becoming distracted by the extra components of a stick shift and certain driving conditions, like go and stop traffic or gone up on hills, are not difficult with an automatic gear transmission vehicle. Directness and calmness of mind are major selling points for automatic transmission of gear vehicles, making automatic gear transmissions the preferred vehicles of parents and families. A study has shown lower stress rated in drivers of automatic transmissions of gear. By variance, drivers of a stick shift or manual transmission of gear vehicles display more heart rates as compare to drivers of automatic gear transmissions. The disadvantages are that they are more expensive to buy in the place.

The best known automatic transmission system include in :General Motors — Powerglide, Dyna flow, Hydra-Matic, Dual Range Hydra-Matic, Turbo glide,Whirl a way Hydra-Matic, Roto Hydra Matic,"Turbo-Hydramatic" TH350, Jetway Hydra-Matic, 4L60-E, 4L80-E, TH400 and 700R4, Trimatic,[Holden] Powerglide.

Ford - C4, C6,Cruise-O-Matic, AOD/AODE, E4OD, ATX, AXOD/AX4S/AX4N,O-Matic, CD4E.

II. METHODS OF AUTOMATIC GEAR SHIFTING: Different method and modifications has been proposed to make automatic shifting of gear these methods are enlisted below.

1. Manual Transmission:-

This method widely applied in vehicle to shift a gear with the aid of hand. This type of method is easy and oldest type of transmission still in use. Manual transmission was trusty to shifting gear. This method uses a driver-operated clutch disengaged and engaged by a clutch, foot pedal, hand lever for bike. By using torque transfer from the engine to the transmission.

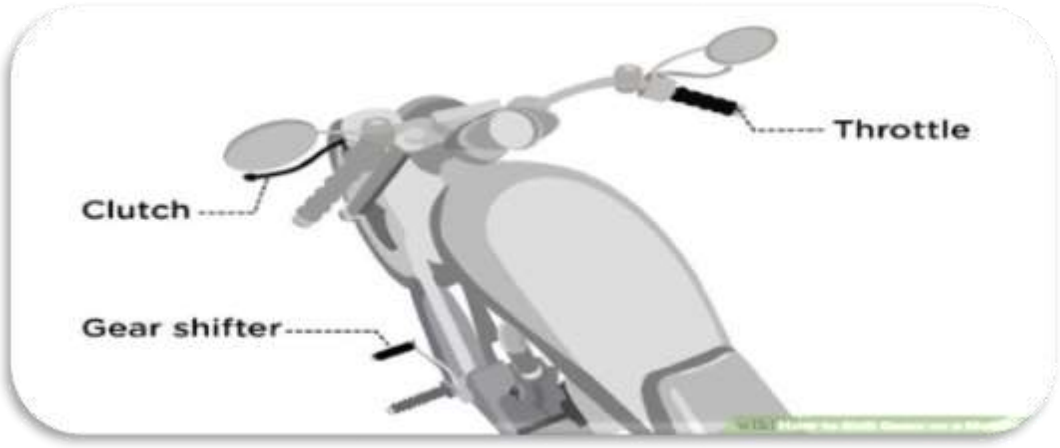

Fig 1.1 Manual transmission

2. Automatic Transmission:-

It is most common transmission system in vehicle. It usage a highly-intricate torque converter to transmit the engine's rotational power, while gear shifts. in the automatic transmission, both gear and the clutch operated automatically based on vehicle speed. Automatic transmission essentially consists of two or many epicycle gear set with a provision to fix any one member set of gear and obtain relative gear ratio. The function of this mechanism to operate gear set is control automatically by the hydraulic system.

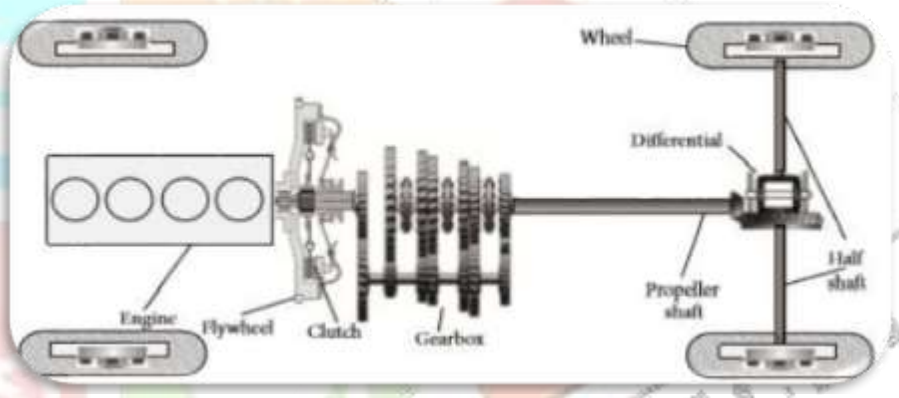

Fig 1.2 Overall structure of automatic transmission

3. Continuously variable transmission(CVT):-

The function of gear transmission is to couple engine shaft with derive wheelers all this while making effective usage of the engine torque and the driving conditions. The transmissions use a range of gear from less to high in traditional automatic transmission or manual transmission. The gear are literally gears-toothed wheel that assist modify & transmit the rotary motion. Unlike the traditional transmission continuously variable gear transmission don't have gearbox with set no of gears. This type of transmission are used pulley, that allows are infinite variable between highest gear & lowest gear shifts. A conventional variable gear transmission system is more suitable for smaller displacements engine this types of system is popular in India example conventional variable transmission system is used gearless scooter such as aviator Hondas moped bike. This system also provides has an alternative transmission on cars or luxury cars such as Mercedes, BMW.

Fig 1.3 Continuously variable transmissions

4. Electronic control transmission:-

   A convectional transmission involves manual pressing the clutch shifting of gears and accelerator it depends on the driver to interpret the condition of engine load, choose of gear, speed, and position throttle. These types of power transmission programs are greats in recent year with an electronic control automatic transmission. The driver start engine select a gear and operate breaks and accelerator. The usually perform by the clutch and manual gear transmission are accomplish automatically.

5. Hydraulic transmission system:-

   The basic arrangement of hydraulic transmission consists of a pump (oil pump) for converting mechanical power into hydraulic pressure and Motor for converting the hydraulic pressure back into mechanical device power for output. A swash plate & Distributor valve for cylindrical piston operation, while the cylinders are integrated into output shaft. A swash plate most event full part in this system. The swash plate of angle is change to provide continuously gear ratios. This transmission gear system also includes lockup mechanism and start clutch for an infinitely variable hydraulic mechanical transmission. When cruising, this lock up mechanism works to decrease transmission efficiency losses, improved fuel economy.

III. LITERATURE REVIEW

Vishnu P. R. et.al(2016)[1]This technique takes time for shifting of gear and sometimes the gear don't mesh properly due to which life span of gears were reduced. To avoid this automatic transmission has been done with the help of pneumatic gear transmission. This includes manual five speed gear box, pneumatic double acting cylinders, which is mounted on gear paddle and transmitted power to gear paddle to operated gear forward and reverse. Its required compressor, PLC system, electric motor, push button, limit switch.

Fig 1.4 Pneumatic, PLC Controlled, Automatic Gear Shift, Vishnu P.R., et.al

Shivaprasad N et.al(2015)[2] In this paper the author using the simplest PIC µ-controller and Essential hardware able to change the old gear shift system to more suitable hybrid power transmission of gear shift system. The main purpose of this mechanism system leads to create the drive easy and reduces the tens of destabilizing the car. PLC and pneumatic actuator to change the gear of two-wheeler as the speed increases the sensor sense the speed and change the gear of bike. Automatic gear system provides superior driving comfort over manual gearbox. Both system have been used in this study that's why name given is hybrid gear shifting.

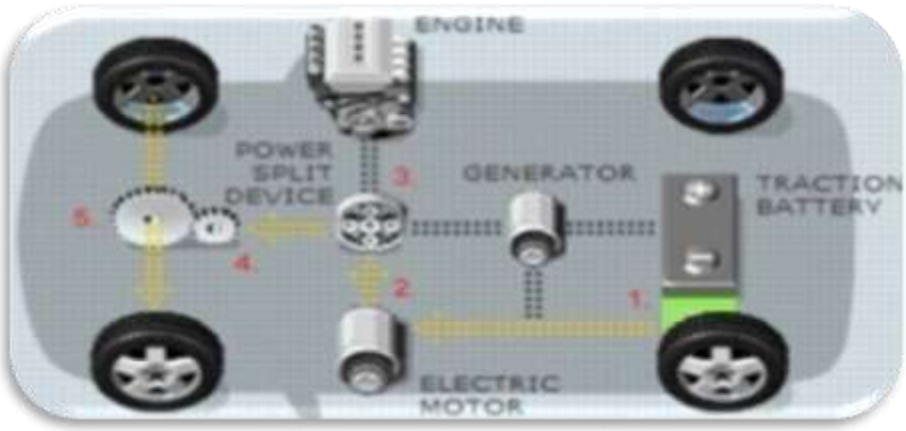

Fig 1.5 Hybrid power transmission of gear shifting, Shivaprasad N., et.al

M. S. Kumbhar, et.al (2014)[3] According to authors in this review paper automatic manual operated transmission done by using gear and clutch, these are operating automatic with the help of pneumatic as well as hydraulic system. In this review paper sensor are used to shift gear and increasing speed also these gear are change as per speed of vehicle. This will help in reduction of energy consumption of car or bike. It's provides comfort to person vehicle give better performance of system.

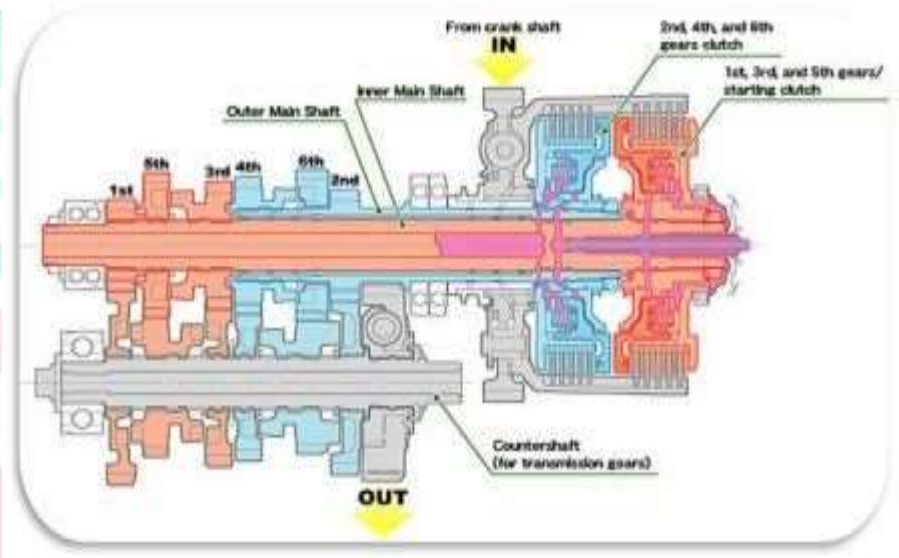

Fig 1.6 Automatic manual transmission, M.S. Kumbhar, et.al

Ramesh Makwana, et.al (2014)[4]Stepper motors were electromechanical devices which converts electrical energy into mechanical movements. This work relates to application of micro steeper motor and controlling system for two phase steeper motor to improve the accuracy. The current in each pole of this motor is adjusted by sine cosine micro stepping method. Authors explain before this running of motor at different speed changing the number of samples per rotation and position control by number of samples. The experimental review show result that the control system used for controlling the stepper motor is reliable.

Fig 1.7 automatic manual gear shift transmission, Ramesh Makwana, et.al

S. Vijay Kumar and P. Nithesh Reddy (2014)[5] In this research gear shifting transmission device was to make the shifting gear process faster and less perishable for the operator. This improvement is possible with devices such as manual four speed gear box, pneumatic cylinders, Programmable Logic Controller (PLC), an electric motor, push switch , LED light , for power supply a external battery . According to suggested method the control is operated with optimum gear shifting ratio for an automatic transmission.

ZaiminZhong et.al (2012)[6] Introduced a new selector of gear for automatic manual transmissions. The invention which is able to the automation of shift by DC motors and it's also used on manual transmission vehicle. Evidently, the good purpose of this invention that the automation of manual transmission could be easily realized by replacing the shift lever with motors cables.

B. Mashadi et.al (2007) [7] An Auto transmission of gear strategy for Manual. This Transmissions is based on up to two different steps, namely the condition of working engine and the driver's goal, the parameters required for gear shifting of an automated manual transmission were enlisted. The shifting of gear strategy was designed to improve the affects by using these parameters, with the application of a fuzzy control method.

R. P. G. Heath and A. J. Child (2007) [8] Automated Manual Transmission (AMT) by shows that Zero shift technology permitted a manual transmission to alter the gear minimum means zero second. This invention was patented for transmission. The Zeroshift 'means shifting gear in zero second Automated Manual Transmission (AMT) it's easy to design and manufacture and allows to the traditional torque converter for using automatic transmission. When driver operating this gear shift in zero second technology offer fuel economy to develop the efficiency and the best result for acceleration of vehicle.

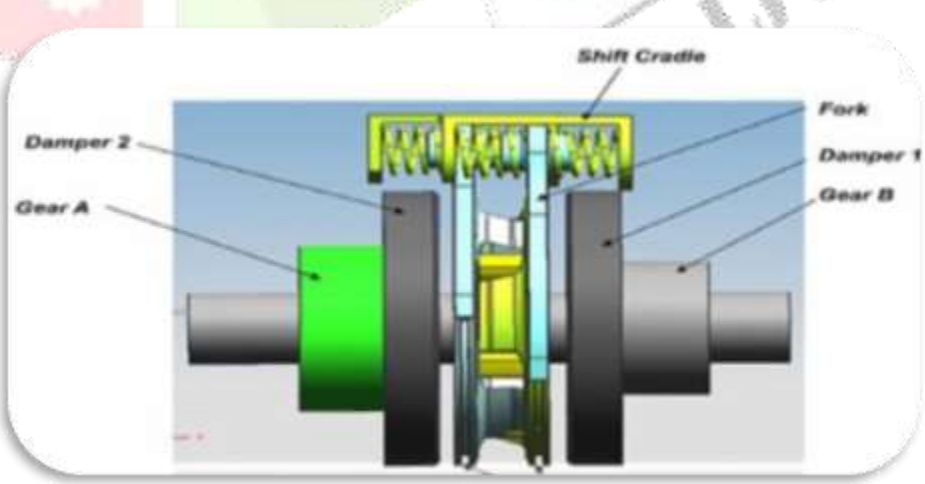

Fig 1.8 Zero shift automatic manual transmission, R.P.G. Heath and A.J.Child

E. Galvagno, et.al (2003)[9] The research paper must be latest , first six authors are ok but change the rest of authors .required power generate during gearshifts were computed for various engine and ACL interventions, thus allowing drawing considerations useful for developing system.. According to E. Galvagno improved the gearshift quality and ride comfort of the analyzed transmission. From this study the AMT ACL transmission it was possible to show that the assist clutch is required during gear shifting operation,

Yoshinori Taguchi et.al (2003)[10] this system is represented by Convention transmission system. The main outcome of this system was to neglect the manual errors in operating the gear shifting system with help of automatic transmission. It's of various type of system such as mechanical systems, hydraulic systems, systems and computer controls all working are together in this research paper.
Magnus Pettersson and Lars Nielsen (2000),[11]In this study Internal driveline torque control was a fresh idea for handling to increasing sifting and give better result by this system. By calculating the transmitted torque and controlling it to end of position by engine control, the gear are engage and disengage with the help of clutch due to this neglected the disturbance of driver .when the trail field show neutral gear ,disdain disturbance and dive line to swing to start of the gear shifting . The control scheme was simple against variations among different gears. A model of manual transmission with engine, clutch, gearbox, and drive-shaft and vehicle body is constructed.

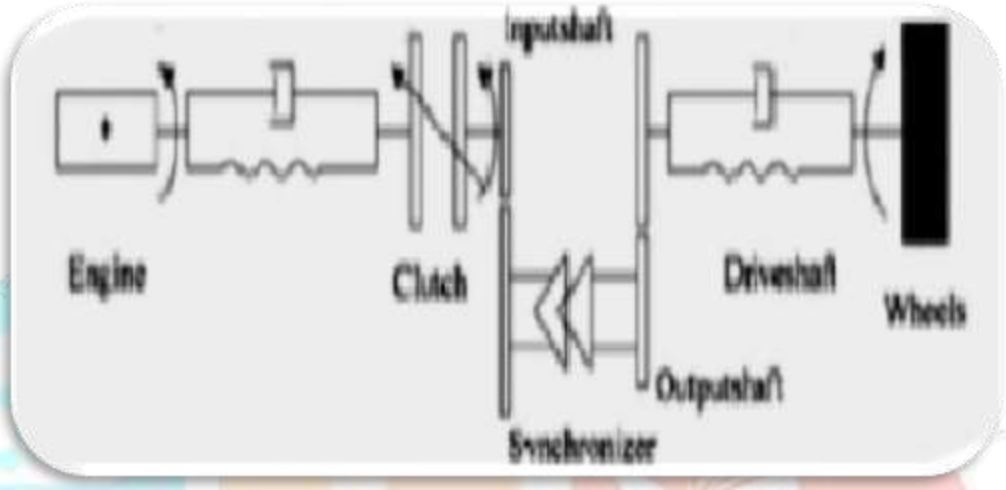

Fig 1.9 Automatic manual transmission block diagram, Magnus Pettersson and Lars Nielsen.

IV. CONCLUSION

1) Design this gear transmission system for fast shift gearing process and minimize disturbance of person
2) Varies type of parameter affected in the system such as teeth wear out is more while meshing,
3) Since all the gears are in continuous mesh, some amount of power is wasted in overcoming friction across all engaged gear pairs, leakage of oil result in stand till of the system.
4) In literature review it is found that some methods were applied for automatic gear transmission in order to reduce the noise, wear of the engine parts and fuel consumption.
5) Improve the avoiding noisy and wear less operation by using Conventional variable transmission system which is more suitable for smaller displacements engine. example of Honda, Activa, Pleasure, Aviator etc.

REFERENCE

[1] Vishnu P R ,Vishnu R. RatishR,Vinothkumar G, "Pneumatic *Gear Transmission for Two Wheeler*", International Journal of Emerging Technology in Computer Science & Electronics ,(2016), Vol. 2 , Issue 1.

[2] ShivaprasadN,Dr A N Hari Rao ," Power assisted hybrid gear shifting System in automobile", International journal of advances in production and mechanical engineering,(2015), Vol.1 , Issue 5.

[3] M. S. Kumbhar,Prof., D. R Panchagade,"*A Literature Review on Automated Manual Transmission (AMT)*", International Journal for Scientific Research & Development, (2014),Vol. 2 , Issue 3.

[4] RomeshMakwana, Prof.RajnishKatarne," *Analysis of Auto-Gear Shifting Mechanism on different Load Conditions*", International journal of engineering sciences & research technology,(2014), Vol. 3, Issue 8.

[5] S. Vijay Kumar, P. Nithesh Reddy, P., *Journal of Mechanical and Civil Engineering*, (2014) 11(3), pp. 53-63.

[6] ZaiminZhong, GuolingKong, ZhuopingYu, XinboChen, XueingChen, XiangyanXin, '*Concept civilization a new invention selector of gear for automated manual transmissions',* Mechanical Systems and Signal Processing, (2012) volume 31, pp. 316–331

[7] B Mashadi, A Kazemkhani, R BaghaeiLakeh, *'An automatic gear-shifting strategy for manual transmissions',* Mechanical, device and Control Engineering,(2007) volume 221, pp.757-758.

[8] R. P. G. Heath and A. J. Child, *'Zero shift means gear shift in zero second his technique used for Automated Manual Transmission (AMT);*(2007), SAE Paper No. 200726-061, pp.693-696.

[9] E Galvagno, M. Velardocchia, A. Vigliani, *'Analysis and replica of a torque assist of automated transmission',* Mechanical Systems and Signal Processing,(91877–1886),volume 25, (2003), pp.

[10] Yoshinori Taguchi, Yoshitaka Soga, Akira Mineno, *'Development of an Automated manual Transmission mechanism base on sturdy Design'*,(2003) SAE Paper No. 200301- 0592, SAE World Congress, Detroit, Michigan, March 3-6,

[11] Magnus Pettersson and Lars Nielsen, *'Gear Shifting by vehicle Engine Control', IEEE transactions on control systems technology*, (2000) volume 8 , pp. 495-507.