Abstract

The development of the transmission systems is to provide a better driving experience. The continued demand for reduced fuel consumption, emissions, weight and installation space, along with enhanced comfort, safety, and driving dynamics, is pushing engineers to their limits to achieve these goals. Automated manual transmission (AMT) has been the focal point of research in recent years. One of the main blocks of the automated manual transmission is the automated manual gearbox (AMG), in which the manual gearbox was modified to house actuators to perform the gearshift operations.

In this thesis, a control design for an automated manual gearbox is presented. A manual gearbox was modified to house the pneumatic actuators and the shifting stick is removed. A mathematical model for the automated manual gearbox (AMG) gearshift controller is developed and simulated using Adaptive Neuro-Fuzzy Inference System approaches. Adaptive Neuro-Fuzzy Inference System is used for training our shifting map which used for the shift decision making at maximum torque, which will be correspond to the best shift. The mathematical and the control logic for the model have been developed using Matlab/Simulink software tool.

The experimental work is carried out using the developed test rig, which consists of a manual four speed gearbox, five pneumatic double acting cylinders, five pneumatic two position five-ways directional control valve, Arduino controller unit, an internal combustion engine(Honda single piston engine), dry clutch and speed sensors. This removes the need for the clutch pedal while the driver is still able to decide when to perform the gearshift manually.

The system determines the shift points automatically; this is achieved by implementing the adaptive neuro-fuzzy inference system to generate the shifting map. This shifting map will be used for shift decision-making at maximum torque Experimental tests were carried out to validate the system model with the developed test-rig.