**AUTOMATIC TRANSMISSION CONTROLLER**

Automatic transmission controller is a part of the drivetrain module. This helps in controlling the speed of the vehicle using effective gear shifting. The figure below shows the power flow in an automotive drivetrain.

*Throttle*

**Engine**

**Vehicle**

**Dynamics**

**Transmission Gear Ratio**

**Torque**

**Converter**

*Brake*

**Transmission**

**Control Unit (Stateflow**)

We implement the model as per the basic block diagram above. We will be going for a 4 speed automatic transmission. Here we implemented the model as per the block diagram. Transmission Control unit alone does not go well with differential equations hence we use stateflow representation to implement the gear shifting action.

The rest of the blocks are modelled with Non-linear ordinary differential equations.

1. The throttle opening is one of the inputs to the engine. The engine is connected to the impeller of the torque converter which couples it to the transmission.

**Equation 1:**

1. The input-output characteristics of the torque converter can be expressed as functions of the engine speed and the turbine speed.

**Equation 2:**

1. The transmission model is implemented via static gear ratios, assuming small shift times.

**Equation 3:**

1. The final drive, inertia, and a dynamically varying load constitute the vehicle dynamics.

**Equation 4:**

1. The load torque includes both the road load and brake torque. The road load is the sum of frictional and aerodynamic losses.

**Equation 5:**