

Design and Development of an Automobile Clutch-by-Wire Control System



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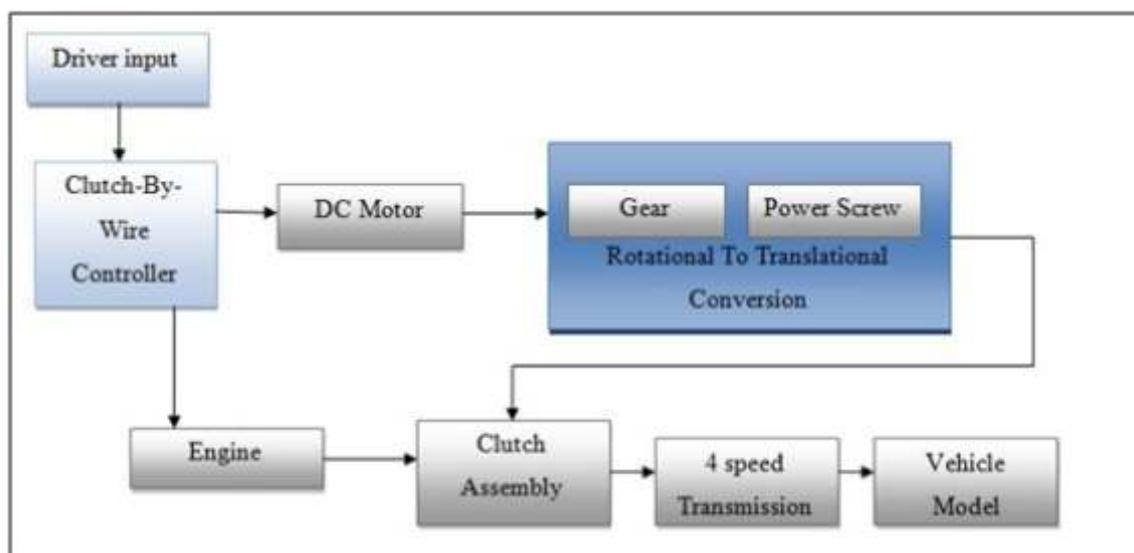
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Abstract:

Automotive electronics is one of the fastest growing sectors. Due to the exponential development in automotive electronics efforts are being undertaken to make automobile safe and comfortable, with a minimum amount of capital being spent on it. The pre existing automotive hydraulic clutch system has disadvantages of slow response time, making it less efficient. It also has a major disadvantage of causing stress on the driver in stop and go traffic, in which the driver has to take care of the clutch operation. Clutch-by-wire technology eliminates the mechanical linkage by more efficient electronic components making the clutch system faster, comfortable and makes the clutch operation independent of driver. Auto coding is being adopted in the automotive industry for quite some time now, due to its numerous advantages, such as avoiding numerous development cycles resulting in less cost at much desired efficiency.

In this project two main things are addressed. The first part deals with design and development of a model based Clutch-By-Wire system using MATLAB/Simulink and to control it with a well designed Stateflow controller. Individual subsystems are designed and developed using Simscape toolbox and integrated. Second part of the thesis addresses the work involved in generating an embedded code from the Simulink coder using the developed Stateflow controller chart and porting it onto a 32 bit TIF28335 controller with the help of CCS.

Test cases are generated for different drive cycles, verified and validated against the performance of hydraulic systems. It was found that the response time of the designed clutch-by-wire system was instantaneous and that of the transmission synchroniser was found to be below 0.5 s, which is better than the pre-existing hydraulic clutch system. The work done can be used as benchmark for future work for developing real time Clutch-By-Wire prototype.



Clutch-by-wire system block diagram