chapter 4:

Recommendations on future developments and Conclusion

Chapter description:

In this chapter, subjects for future developments and improvements are presented. Recommendations on the safety approach to be followed in implementation & testing are given. And lastly, the conclusion for the project at hand is presented.

4.1 subjects for future developments

as this phase of design for the ECU at hand concluded at the successful run of the engine at the idle start condition using this as the operational control unit, future subjects can be complementary to what this initial and fundamental design phase reached. It could also greatly modify the operating mode of the engine under control (I.e. allowing for accelerations and decelerations), improve performance, fuel economy..etc.

Other subjects could be out of the engine control scope and focus other complementary sub-systems in the automobile, like: controlling the braking system, cruise control or even introducing artificially intelligent functions (i.e. autonomous drive).

Further researches could also be conducted to modify the operation of the engine from the fuel consumption aspect (i.e. turning off the fuel injectors for some pistons when high

power output is not required).

4.2. Recommendations for safety

Maintaining high safety measures is extremely necessary when it comes to controlling the operation of internal combustion engines. Some faults in the operation of internal combustion engines could lead to devastating consequences, so to avoid that, utmost care must be taken if the researcher is to modify the operation from the firing timing for example. A faulty early firing angle of the fuel raises the possibility for the development of knocks at the piston head, while retarding the firing angle reduces the power output of the engine.

So, when working on the introduction of new functions or the modification of the initially created ECU, pre-work researches must be conducted in the field of concern in order to obtain a strong background of nature of the work to be done.

4.3. Conclusion

The designed ECU presented in its initial design phase that is capable of operating the engine under its control in the idle start run condition, forms the fundamental base for the designation of a fully operational, student-scale ECU. This ECU is an open-source, easily modifiable platform offering the chance for amateurs and researchers to implement their ideas and search for phenomena of their concern (after introducing their desired modifications) easily Without the restrictions that they would otherwise face if they were to use a normal operational automobile ECU. The normal vehicle ECU follows strict standards (AUTOSAR standard) which highly restrict the control parameters of the ECU's software so that it can ensure safety, durability, fuel efficiency and high performance.

This project also paves the path for the educational scope to dive into and include automobile control not only from the theoretical aspect but from the practical aspect as well.