ELETRONIC MANAGEMENT OF OTTO CYCLE ENGINES

Filipe G. Santos, J. F. Justo, A. A. M. Laganá

Escola Politécnica, University of São Paulo

filipegbriel@gmail.com

Objectives

To model, build and test two control units for automotive Otto Cycle ICE's and, subsequently, develop algorithms for closed-loop control using sensors to measure exhaust-gas oxygen concentration (*Lambda*) and fuel composition (*Flex-fuel*).

Materials and Methods

This project relies on the cooperative efforts of RIBEIRO, G. G.; MIYASHIRO, L. S. The study has been divided into steps to meet the goals initially proposed:

- Study and revision of previous projects;
- Hardware construction;
- Bench-testing: Hardware in the Loop and V-Modeling;
- Software development and improvement;
- Engine testing on *Volkswagen Gol, 2009, G5 1.6L, Total Flex*;
- Data acquisition and data analysis.

Results

Due to task division, this project was responsible for the implementation of the system built by MIYASHIRO L.S., and tested by RIBEIRO, G.G., bringing the *ECUs* to the vehicle and debugging the identified problems by the HiL – that is, using V-Modeling methodology.

Having a VW GOL G5, the PCB was taken to the engine. With specific automotive prototyping tools, it was able to start the engine and to keep the rotation constant with a reference, being able to accelerate to 4000 rpm.

The results and methods were published on open source networks *(GitHub)* to help future students.

Picture: ECU acting on the engine.

Conclusion

The control unit was successful controlling the low gear regime and the requested accelerations.

Project fostered by *Associação dos Engenheiros Politécnicos*.

References

- ALVES JUNIOR, E. I.; JATO, F.; HIROKI. G. B. "Desenvolvimento de uma unidade de gerenciamento eletrônico para motor Volkswagen 1.6 L" FATEC Sto. André, 2016.
- SANTOS, J. P. F. e ROSSETTI, P. C., "Otto III by FlexECU - Gerenciamento Eletrônico de um Motor VW 1.6L", EP, 2015.
- JURGEN, R. K., Automotive Electronics Handbook. 2nd ed. McGraw-Hill Professional, 1999. 1000 p.
- BOSCH, Manual de tecnologia automotiva. 25 ed. São Paulo. Edgar Blücher, 2005. 1231 p