

Portable On-Board Computer

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Annotation -This pre-bachelor's thesis is dedicated to the theoretical design of a portable on-board computer for a vehicle, based on the ESP32 microcontroller, ELM327 OBD-II interface, and TFT screen. The thesis discusses the principles of data acquisition from the vehicle's Electronic Control Unit (ECU), OBD-II diagnostic standards, and basic methods of digital communication.

Since 1996, vehicle manufacturers in many countries worldwide (including the USA and the European Union) have been required to equip all new cars with an OBD-II standard-compliant system, which works with universal protocols and a single connector. OBD, or On-Board Diagnostics, is the vehicle's internal self-diagnostic system. It is a computerized system that monitors various mechanical and electronic components of the vehicle (for example, the engine, exhaust system, sensors, etc.). If a malfunction or failure occurs in any of the systems, the OBD system identifies it and records an error code (DTC - Diagnostic Trouble Code). Reading these codes allows a mechanic or diagnostic device (such as a scanner) to precisely determine the source of the problem.

Commercial OBD-II scanners are often expensive and have limited capabilities. Therefore, our motivation was to create a device that would be more affordable, multifunctional, and modern compared to existing alternatives on the market.

Keywords - OBD-II, on-board computer, digital communication protocols, embedded systems, microcontroller