



Based Development of a PC and Smartphone Based Wireless Automobile Diagnostic System

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Abstract: The design, implementation and testing of an automobile Engine Control Unit (ECU) data acquisition system is presented. The ECU parameters are graphically analyzed on a PC (Windows/Linux) or a smart phone. The graphical analysis software for real-time data monitoring are developed on Qt framework for PC use and android platform for smart phone use. The use of open source software Qt framework and android SDK for GUI development is a highlight of this system. The wireless communication features of the system using Zigbee technology allows remote real-time monitoring of the vehicle on test track.

Keywords: Android, Engine Control Unit, OBD protocol, Qt Framework, Zigbee.

I. INTRODUCTION

The microprocessor based system responsible for the synchronization of various sub systems of an automobile. The ECU collects sensor values from different parts of the engine and performs the appropriate actions [1]. The ECU logs will allow easy identification of errors and subsequent repairs. The commercially available automobile diagnostic equipment suffer from numerous draw backs like non-support of hardware up gradation, most of them have sluggish operation which cannot match the needs of real-time diagnostics and inadequate network capability. Hu et.al [2] has designed a diagnostic system based on Freescale16-bit microcontroller with the graphical software developed on Microsoft Visual Basic 6.0. PC based diagnostic system with internet updates has been proposed by Jim et al. [3] which exemplify the prevailing trend in this domain.

In this paper, the development of low cost, fast, wireless and network capable automobile diagnostic system is proposed. The system is based on the industry standard Onboard Diagnostic -II (OBD-II) standard. The PC based analysis software is platform independent and can run on both Windows and Linux systems. The forth coming sections discuss the different aspects of the wireless automobile diagnostic system.

II. ONBOARD DIAGNOSTIC STANDARD

OBD system was originally conceived as mechanism to monitor efficiency of engine and thus control vehicle exhaust emission. Different car manufacturers came up with their own proprietary Data Link Connector (DLC), fault code and communication protocols for their cars. OBD-II provides a common platform for automobile fault detection. Different automobile manufacturers use signaling protocols to communicate with the ECU.

TABLE I. DEFINITION OF OBD – II STANDARD [1]

Physical Layer	ISO9141-2	SAE J1850	ISO14230-1	ISO 11898 ISO 15765-4
Data link Layer	ISO9141-2	SAE J1850	ISO14230-2	ISO 11898 ISO 15765-4
Network Layer				ISO 15765-2 ISO 15765-4
Transport Layer				
Session Layer				
Presentation Layer				ISO 15765-4
Application Layer	SAE J1979 ISO 15031-5	SAE J1979 ISO 15031-5	SAE J1979 ISO 15031-5	SAE J1979/ ISO 15031-5