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A Survey on Design of Vehicle Diagnostics System Based on Cross Platform Application

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ABSTRACT: To solve problem of the vehicle ,a vehicle fault diagnostics system is designed. This system is designed. This system detects and isolate the fault in the vehicle. The system consists of three layers Business logic layer, application layer and service layer. Application layer consists of the mobile device, a desktop device for various operating system. Business logic layer consists of VCI as interface device to communicate between vehicle and application. Service layer consist of two server analytical server and D-server. Application is cross platform application which supports for android, windows and ios system. Xamarin is open source tool which is to develop the application.

KEYWORDS: Automation, Cross platform, Fault diagnostics, Xamarin.

I. INTRODUCTION

Automotive vehicles are nowadays equipped with a significant number of networked electronic systems by which advanced vehicle control, elimination of bulky wiring, and sophisticated features can be achieved. Most of the features are enabled by the use of distributed electronic systems including sensors, switches, actuators and electronic control units (ECUs).

Over the last several years, we witnessed a number of advances in a variety of forms such as glasses, watches, smart phones, tablet personnel robots and the even car having powerful processor ample storage and device array of sensors.

Programmer can now avail rich programming API to build software that levarege these advances in hardware. The number of diversity of application available to end user has contributed to the popularity of the mobile device. These advance in hardware and software have made mobile device available replacement for a desktop computer.

II. OVERVIEW OF SYSTEM ARCHITECTURE

Figure 1. illustrate the architecture diagram of the vehicle diagnostic system.Which specifically consists of three layers On-board network layer, business logic layer and service layer.On-board network layer consist of a number of ECU which can communicate with each other through the CAN protocol. Business logic layer consists of the mobile devices such as smart phone, desktop and tablets. VCI, It is a interface device between mobile terminal and ECU. Service layer consists of two server D-server and Analytical server. Which is responsible for data storage and management system.

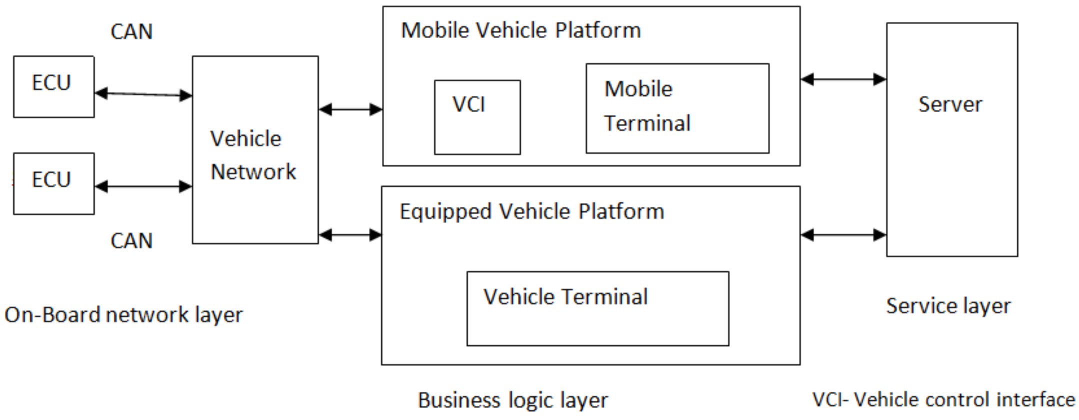

Fig. 1. System architecture of vehicle diagnostic system

III. SIGNIFICANCE OF SURVEY

Jaco A. Crossman *et al.* [5] proposed a modern vehicle has embedded sensors, controllers and computer modules that collect, altogether, a large number of different signals. These signals ranging from simple binary modes to extremely complex spark timing signals interact with each other either directly or indirectly. Modern vehicle fault diagnostics very much depends upon the input from vehicle signal diagnostics. Modelling vehicle engine diagnostics as a signal fault diagnostic problem requires a good understanding of signal behaviours relating to various vehicle faults. Two important tasks in vehicle signal diagnostics are to find what signal features are related to various vehicle faults, and how can these features be effectively extracted from signals. In this paper, they present our research results in signal faulty behaviour analysis, automatic signal segmentation, feature extraction and selection of important features. These research results have been incorporated in a novel vehicle fault diagnostic system, which will be described in another paper sequel to this one.

Yilu Murhley *et al.* [6] proposed Distributed diagnostics agent system (DDAS), developed for automotive fault diagnosis. The DDAS consists of a vehicle diagnostic agent and a number of signal diagnostic agents, each of which is responsible for the fault diagnosis of one particular signal using either a single or multiple signals, depending on the complexity of signal faults. Each signal diagnostic agent is developed using a common framework that involves signal segmentation, automatic signal feature extraction and selection, and machine learning. The signal diagnostic agents can concurrently execute their tasks; some agents possess information concerning the cause of faults for other agents, while other agents merely report symptoms. Together, these signal agents present a full picture of the behaviour of the vehicle under diagnosis to the vehicle diagnostic agent. DDAS provides three levels of diagnostics decisions: signal–segment fault, signal fault, and vehicle fault. DDAS is scalable and versatile and has been implemented for fault detection of electronic control unit (ECU) signals; experiment results are presented and discussed in this paper.

Rajesh rajamani *et al.* [7] proposed complete fault diagnostic system is developed for automated vehicles operating as a platoon on an automated highway system. The diagnostic system is designed to monitor the complete set of sensors and actuators used by the lateral and longitudinal controllers of the vehicle, including radar sensors, magnetometers and inter-vehicle communication systems. A fault in any of the twelve sensors and three actuators is identified without requiring any additional hardware redundancy. The diagnostic system uses parity equations and several reduced-order nonlinear observers constructed from a simplified dynamic model of the vehicle. Nonlinear observer design techniques are used to guarantee asymptotically stable convergence of estimates for the nonlinear dynamic system. Different combinations of the observer estimates and the available sensor measurements are then processed to construct a bank of residues. The paper analytically shows that a fault in any one of the sensors or actuators creates a unique subset of these residues to grow so as to enable exact identification of the faulty component. Both simulation and experimental results are presented to demonstrate the effectiveness of the fault diagnostic system in the presence of various faults.

Yilu zhang ***et al*** [8]. proposes a new concept of Connected Vehicle Diagnostics and Prognostics (CVDP) to address some of the challenges in vehicle system fault diagnostics and prognosis, such as the diagnostics of unexpected new faults, and infrequent or intermittent faults. As an initial practice, this concept has been implemented in the vehicle design validation process at GM.

Christofer sandstorm ***et al.*** [9] proposed methodology that reduces engineering time for the design diagnostics system while still achieving desired fault detection and isolation properties.
The Main idea of the paper is to combine lookup model with analytical model and explicitly affect monitor system. The clear improvement in overall performance demonstrates that the method achieves both good fault detectability and isolability performance, without the need for measurements of a faulty system or detailed physical modelling.

Reza Malekin ***et al.*** **[10]** proposed system aims to measure speed distance, fuel consumption and it also implement global positioning system tracking to determine the location of the vehicle. The system is integrated different technology which can reduce the cost of buying multiple devices with different capability.
In the proposed system it is notated that when engine turns off automatically the system power off. The problem is detected when a distance is increased between OBD-II and the emulator wifi range is decreases. When experiments with a real vehicle it gives true results.

Rory Telford ***et al.*** **[11]** proposed a system to detect UAC failures and enhances overall system reliability, few focused on increasing complexity and dynamic EPS.This study outline the development of novel UAC EPS fault classification and diagnostics system which is based on Marcov model.
T.F. Bernardes done systematic review where it explain different approaches used in cross platform
development in order to achieve comparisons between different approaches. It can also explain pros and cons of each approach

Nadar Boushehrine jadmosadi ***et al***. [12] studied that Mobile app developers often wish to make their apps available on a wide variety of platforms, *e.g.*, Android, iOS, and Windows devices. Each of these platforms uses a different programming environment, each with its own language and APIs for app development. Small app development teams lack the resources and the expertise to build and maintain separate code bases of the app customized for each platform. As a result, we are beginning to see a number of cross-platform mobile app development frameworks. These frameworks allow the app developers to specify the business logic of the app once, using the language and APIs of a home platform (*e.g.*, Windows Phone), and automatically produce versions of the app for multiple target platforms (*e.g.*, iOS and Android). In this paper, we focus on the problem of testing crossplatform app development frameworks. Such frameworks are challenging to develop because they must correctly translate the home platform API to the (possibly disparate) target platform API while providing the same behaviour. We develop a differential testing methodology to identify inconsistencies in the way that these frameworks handle the APIs of the home and target platforms. We have built a prototype testing tool, called X-Checker, and have applied it to test Xamarin, a popular framework that allows Windows Phone apps to be cross-compiled into native Android (and iOS) apps. To date, X-Checker has found 47 bugs in Xamarin, corresponding to inconsistencies in the way that Xamarin translates between the semantics of the Windows Phone and the Android APIs. We have reported these bugs to theXamarin developers, who have already committed patches for twelve of them.

Wafaa ***et al.*** **[13]** proposed new code conversion approach based on XSLT and regular expression to ease code conversion process. Additionally, it provides assessment method to compare ICMD with different approaches. This paper is extension of ICPMD which is code conversion approach from wp8 to android and vice versa.

IV. REMARK

Vehicle diagnostics system is fault diagnostics system which detects fault from vehicle and provides guidance to remove it. It uses Diagnostics trouble code (DTC) to detect fault. Multiple ECU is present in the vehicle for the specific diagnosis. VCI devices connected to vehicle and diagnostics application. VCI device detects DTC from each ECU and record a trouble code.

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It is a diagnostic application which is cross platform application. Xamarin is a tool to develop cross platform application. C#-shared codebase, developers can use Xamarin tools to write native Android, iOS, and Windows apps with native user interfaces and share code across multiple platforms.

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