ENTERING THE AGE OF THE CONNECTED VEHICLE: A NEW DAWN IN AUTOMOTIVE DIAGNOSTIC AND TELEMATIC SOLUTIONS

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Abstract

This paper is written based on the Author's experiences from his affiliations with Launch Tech Co. Ltd., China. It aims to announce a revolutionary new concept in motoring – the connection of cars and people though Social Media and technology.

The GOLO represents the very latest in automotive telematic technology from Launch Tech Co. Ltd. This revolutionary mobile diagnostic station is the culmination of the organisation's 20 year history in developing and producing automotive diagnostic equipment.

GOLO is comparable in function to Launch Tech's predecessor models, with its familiar and clearly arranged operation. However, that's where the similarities end. Their new concept makes a paradigm shift in automotive diagnostic capability for it has been developed for telematic operation.

This paper seeks to describe the GOLO's diverse capabilities, and reveals the type of information that can be obtained through its remote capabilities.

Key Words

Event Data Recorder, Remote Diagnostics, Telematics, and User-Based Insurance

Abbreviations

CAN – Controller Area Network

DLC – Diagnostic Link Connector

GPS – Global Positioning Satellite

GOLO – Go Online, Live Online

SIM – Subscriber Identification Module

UBI – User-Based Insurance

Introduction

Since the advent of the new millennium, there has been an exponential rise in the number of computer-based functions embedded in the modern automobile [1]. State-of-the-art electronics, and the networking of onboard vehicular systems, has spawned a real need for the development of fault finding solutions to reduce vehicle downtime and repair costs.

Automobile manufacturers and auto-tech organisations, as a direct result of this upsurge in vehicle technology, have had to develop a raft of strategies in order to address the diverse diagnostic tasks that have resulted in the vehicle after sales sector [2].

In our current regulatory and compensation environment, automotive interest groups (i.e. retailers, fleet hire, insurance, etc.) are constantly seeking new and innovative ways to capture value for their stakeholders. This paper puts forward the case for employing telematic diagnostic technologies, as a strategy, for addressing the concerns in these sectors.

Overview

The concept behind the GOLO project began life in the Autumn of 2006. The model was developed by a team of experts, who used forensic (research-based evidence) methods to corroborate two types of data – historical and CAN bus. Since then, this model has been fully validated, and has proven to be very successful in its application.

In recent times, GOLO Europe, a subsidiary of Launch Tech Co. Ltd., has moved towards realising the concept of 'The Connected Car' as part of a commercial project. Due to their formidable expertise in the field of vehicle forensics, they are naturally seen as the global leaders in CAN bus data, Telecoms, and the transfer of vehicle data through Telematics.

GOLO uses a 'total cloud computing solutions' platform, whereby electronic data from an *equipped vehicle* is delivered, over the internet, and stored on a secure server. GOLO's *plug-and-play* capability makes its fitment to a vehicle a very simple process. No tools or specialist knowledge are required for its installation. Indeed, a relative novice can easily fit a GOLO in only a few short minutes.

Set Up

Installation begins, by plugging a wireless device, called a dongle, into the vehicle's EOBD diagnostic connector. The GOLO dongle comes equipped with a mobile telephony device called a Subscriber Identity Module (SIM). The *end-user's* smartphone is then used to download and install the free GOLO software from their mobile device's App Store. The vehicle, smartphone, and dongle are then synchronised and *paired* with each other over a secure Cloud server. Congratulations, you are now ready to "Go Online" and "Live Online"!

The Diagnostic System

The GOLO is a compact mobile automotive diagnostic device. The concept's operation and function are similar to that of a conventional scan tool – the only difference being that the primary interface is the end-user's smartphone screen. The GOLO uses a wireless dongle, which is plugged into the *subject vehicle's* Diagnostic Link Connector (DLC). See Figure 1.

The dongle is used to acquire all of the data from the vehicle's network of *connected* micro-controllers. It then transmits this data, over a 2/3/4G mobile communication network, to a secure Cloud server. See Figure 2.

Figure 1 The GOLO Dongle

Figure 2 GOLO's Telematic Concept

Real-Time Remote Diagnosis

The *knowledge base* of the GOLO diagnostic system is updated in *real-time*. This allows all of the information generated in the various vehicle sub-systems to be displayed, on the screen of a *paired* smartphone, at the precise moment it was created (live data). Furthermore, because vehicular data is streamed to the Cloud in *real-time*, real-time *remote diagnosis* is possible – i.e. it has the capability to diagnose faults in a distant vehicle once a Network signal can be acquired.

Smartphone Interface

The GOLO^{x} Apps are currently available from the App/Play Stores for Apple iOS and Android enabled smartphones. Once the App is installed, the smartphone is equipped to access the Cloud and operate the interfaces to the *equipped vehicle's* electronic sub-systems. A *paired* smartphone can then render these sub-systems functional for diagnosis and reporting through clearly arranged icons on the *start screen*. See Figures 3 and 4.

Figure 3 Smartphone Screenshot

Figure 4 Golo^{2} Start Screen

Operating Modes

The *navigation indicator* takes the form of a virtual 'gear lever'. It is positioned in the bottom part of the start screen. The gear lever *tracks* finger movements on the smartphone's touch screen and is used to select the App's various operating modes. See Figure 4.

Mode 1 – Vehicle Position

Moving the *navigation indicator* to gate one selects the 'Car Position' icon. In this mode, GOLO functions primarily as a Global Positioning Satellite (GPS) tracking device. Because *live streaming* is employed, an *equipped vehicle's* precise location and principal operating parameters (e.g. road speed, engine speed, coolant temperature, etc.) are displayed, and updated in *real-time* over a moving map display. See Figure 5.

Because the GOLO dongle comes equipped with a mobile SIM card, it can permit a *paired* smartphone to function as a basic satellite navigation system (SatNav). The dongle's signal allows the *equipped* vehicle to be tracked on a *moving map* displayed on either a *paired* smartphone or a control centre's computer screen.

Mode 2 – Electronic Fence

Moving the *navigation indicator* to gate two selects the 'Electronic Fence' icon. In this mode, GOLO's GPS function further provides the *end-user* with a fully customisable virtual geo-fencing solution, Figure 6. This technical feature can be set with trigger notifications for specific people – e.g. family, friends, hire-customers, etc. Notifications, concerning alarm events, can be sent to the *end-user* via SMS text message or email.

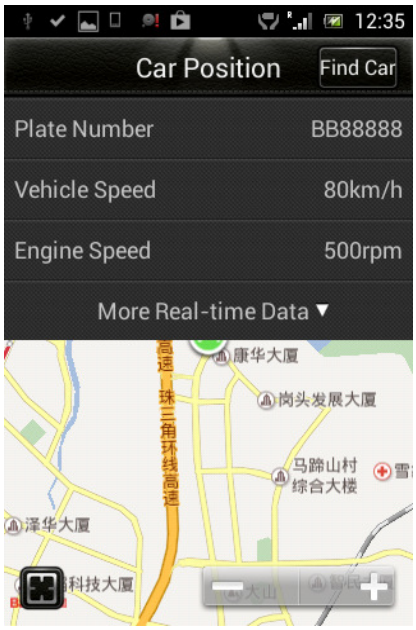

Figure 5 Moving Map Display

Figure 6 Electronic Geo-fencing

Mode 3 – Journey Log

Moving the navigation indicator to gate three selects the 'Driving Info' icon. This mode presents the end-user with a low-cost and convenient e-journal. This clever and well developed feature provides a method for keeping track of monthly motoring expenses and travel logs. This attribute is extremely useful for controlling costs on a vehicle with multiple drivers.

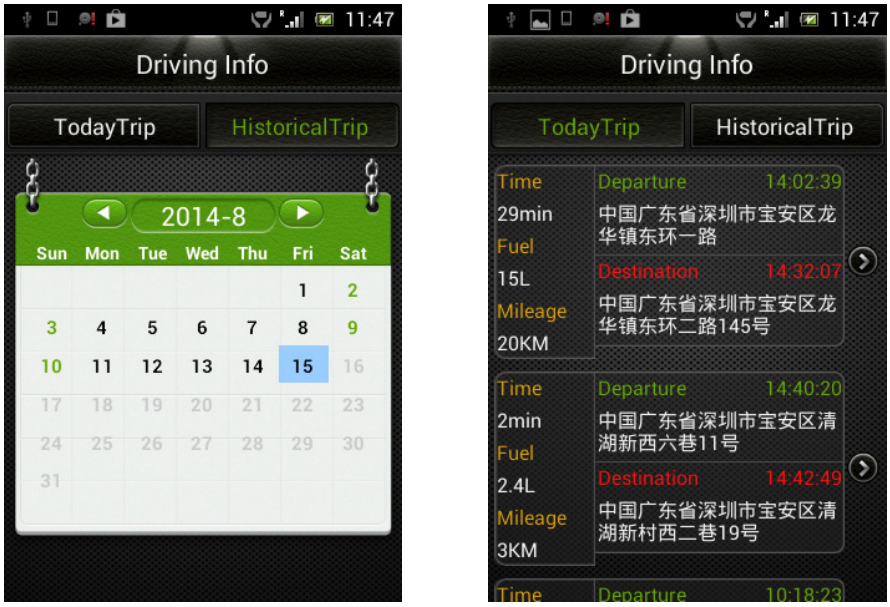

Figure 7 Electronic Journey Log

Mode 4 – Remote Diagnostics

Moving the navigation indicator to gate three selects the 'Vehicle Check' icon. This is perhaps more exciting for the motoring DIY enthusiast, such that GOLO functions as a compact mobile automotive diagnostic device similar in technical features to that of a professional garage scan tool. See Figure 8.

However, GOLO goes one step further, in that it has the capability to remotely diagnose a fault from a far-off vehicle – once a mobile telecoms network signal can be acquired. This innovative feature will no doubt bring the motorist much peace of mind for those far-off long-distance journeys. Not to mention the garage, who will be able to make instant arrangements for ensuring the customer's onward mobility in the event of a vehicle breakdown – e.g. a service vehicle can be despatched and routed, with the necessary spares, to fix a beleaguered vehicle correctly first time. This should help ease customer anxieties and reduce repair costs – roadside fixes eliminate the need for alternate vehicle hire or accommodation expenses, etc.

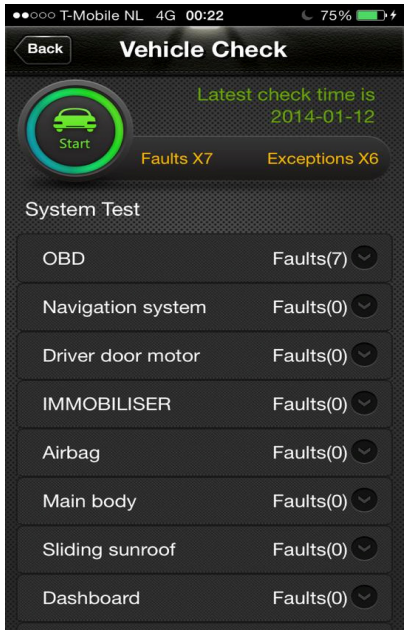

Figure 7 Remote Diagnosis

Modes 5 & 6 – Expanded Capabilities

GOLO's final two App functions give it a unique expanded capability. The 'Info Centre', permits the end-user to access a multitude of configurable message alerts – e.g. service reminders, sudden changes in the vehicle's velocity, door not closed reminders, engine overheating warnings, fatigued driver alarm, etc. GOLO is also equipped with limited crash recorder capability. This Event Data Recorder is capable of transmitting a data package to the emergency services – providing them with GPS coordinates for the vehicle and the main parameters associated with the collision (e.g. impact speed, rate of change in velocity, air bag deployment, etc.). This is potentially a life-saving feature, as it allows the vehicle's occupants to be triaged at the accident scene.

Another interesting technical feature of GOLO's dongle is its mobile telephony device. This has the ability to create a Wi-Fi hotspot within the vehicle, or its immediate environs, giving its occupants the capability to connect their mobile devices to the Internet for services, such as: Digital Audio Broadcasts, e-mail, Google maps, audio and video streaming, etc.

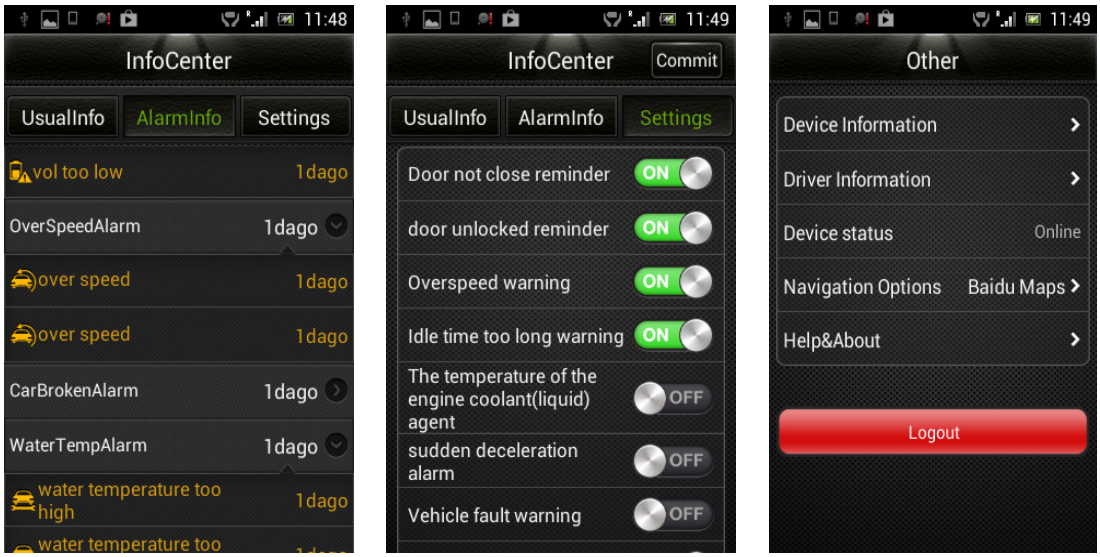

Figure 8 Expanded Capabilities

Conclusion

The GOLO marks a significant development in automotive telematic technology. The principal feature, that sets it apart from its rivals, is the unique way in which it allows motorists to connect with each other. Motorists can link-up, in *virtual communities*, to share and exchange vehicle data and ideas.

Launch Tech is confident that this use of Social Media will help future-proof the GOLO concept for generations to come. This attribute will also accommodate a whole raft of other telematic services that, as of yet, have not even been considered.

GOLO's GPS and live data streaming capabilities are extremely attractive features for fleet operators and insurance companies alike – permitting the former to reduce their rolling-costs, whilst allowing the latter to develop a radically new bespoke business model called User-Based Insurance (UBI).

Welcome to the age of the 'connected vehicle' – providing a safer, more cost-effective and enjoyable driving experience for all concerned.

References

[1] J. Daniels, Modern Car Technology, Haynes, 2001.

[2] R. Allen, Automotive Design Engineering, Century Press, 1992.