The Prototype of A Driver Attention Level Monitoring System: The Sanbao Radar

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***Abstract*--Our team is committed to improving driving safety by enhancing the attention level while driving. Sambao radar is a car networking application based on driving concentration tests with GPS positioning. Sapphire radar to MediaTek development version Linkit 7688 duo with lens and alert functionality, the detected expression sent to the backend calculation focus, and the picture shows driving the current concentration and the proximity of the vehicle concentration, we will provide driving and Passengers separate the use of the interface, I hope drivers and passengers to grasp the situation in a timely manner, so that damage can be minimized.**

I. INTRODUCTION

Recently, news of endless catastrophe caused by driving without focus and fatigue has caused the most serious casualties among them. For example, on September 11 2017, a well-known private passenger was distracted by a pick-up truck on a national highway and approached Car out of control, resulting in 6 dead 11 injured.

As a result, our team is committed to improving driving safety by enhancing the attention level while driving. Sambao radar is a car networking application that is based on driving concentration tests with GPS positioning. Sapphire radar to MediaTek development version Linkit 7688 duo with lens and alert function, the detected expression sent to the backend calculation focus, and the picture shows driving the current concentration and the proximity of the vehicle concentration, we will provide driving and Passengers separate the use of the interface, I hope drivers and passengers to grasp the situation in a timely manner, so that damage can be minimized.

II. RELATED WORKS

Driver distraction has been a research topic for several years. Distinct from other forms of driver inattention, distraction occurs when a driver's attention is diverted away from driving by a secondary task that requires focusing on an object, event, or person not related to the driving task [1]. There may also be individual effects, i.e., different effects of secondary tasks on individual drivers, which may be obscured within the average behavior of the population, and proposes a model-based approach to analyze them [2]. With the development of new in-vehicle technology, drivers are exposed to more sources of distraction, which can lead to an unintentional accident [3].

On the other hand, assessing human attention level via facial expressions is possible. The research of Ekman revealed the links between facial muscles and emotions [4]. He developed Facial Action Coding System (FACS) which identified each and every facial muscular movement to assess human emotion.

III. SYSTEM ANALYSIS AND DESIGN

This system has two kinds of users, namely driver and passenger respectively. The driver has the function of monitoring nearby vehicles when the driver appears Sambo, it will issue a warning sound to tell the driver to pay more attention. Passengers have to monitor the concentration of drivers, monitoring nearby Sambo vehicles, as well as weather, temperature ... and other weather information display.

When the car is driving, the driver's concentration score is displayed. When the driver's concentration is too low, an audible alert is issued to the driver. The driver's mental status is not good and the driver can be alerted immediately. And provide the Sambo location map that appears near the car to help passengers to be more alert and reduce traffic accidents. The current weather information (weather, temperature, rainfall, location) is also provided. The deployment is shown in the figure below:

Figure 1. The deployment of the prototype.

The table below explains the use cases:

Table 1. The Use Cases.

Use Case	Description
Monitor driver attention	During driver's driving, the driver's face expression is monitored and the concentration variation is used to calculate the concentration value. So that the copilot can keep abreast of the driver's mental state. When the driver's concentration is below the standard, an audible alert driver is issued.
Monitor nearby vehicles	The distance between the current driver and driver with low attention level is calculated, and the calculated result is scaled down to be displayed on the screen.
Display the GEO information of the nearby area	Display information such as weather of the nearby area.

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