Software Requirements Specification

Safe driving System

Team <급조>

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1. Introduction

1.1 Purpose /* Jiwon Park */

This document is written to explain a detailed description of 'Safe Driving System'. It explains the goal of this project and what is core functionality and describes how it operates. And it also shows the attribute and method for each class and connection between them. Our project has some constraints(e.g. cost for data transfer). This document will explain them.This document is intended for the both stakeholders and the developers of the system and will be proposed to angel investors.

1.2 Scope /* Jiwon Park */

This project will be a 'Safe Driving System' for drivers who can drive drowsy driving. This checks the driver's condition by analyzing the user's face in real time. It is also designed independently of the system itself. Our devices do not force drivers to wear earrings or offensive things. The user can operate this project simply by turning on the power.

1.3 Definitions, acronyms, and abbreviations /* Myunghoon Park */

Device : Equipment that actually monitors users include Raspberry Pi, Pi Camera

Server : A computer running a real logic that sends a picture file and requests data from the cognitive service

Cognitive Service : Services provided by Microsoft, It is a service to take pictures and to analyze and return emotional state

1.4 Overview /* Myunghoon Park */

Overall Description explain an overall summary of the project. It covers the overall function and outline of the project. In particular, constraints on the cost of sending and receiving data to and from the server are covered in the 2.4 Constraints section.In the specific requirement section, the object used in each device, including the interface and server interface in the device, is explained based on the Object Oriented Paradigm.

2.   Overall Description

This section will give an overview of the whole system. The system will be explained in its context to show how the system interacts with other systems and introduce the basic functionality of it. It will also describe what type of stakeholders that will use system and what functionality is available for each type. At last, the constraints and assumptions for the system will be presented.

2.1 Product perspective   /*Seungho Park*/

This system will consist of two parts: one Raspberry pi and one Server. The Raspberry pi will be used to monitor driver and transfer the data to server.

The server will be used to analysis transferred data , detect driver`s drowsiness. And send the result.

The Raspberry Pi will need buzzer and Pi camera that monitor driver and can alarm. So buzzer and camera will be embedded Raspberry Pi. The Raspberry Pi will need to communicate to a Server Raspberry Pi can send image frame and receive server response.

Server which detects driver`s drowsiness use cognitive service. The service judge driver`s drowsiness based on facial expression of frame transferred by Raspberry Pi.

This system has some restriction about the driver`s changeable facial expression. To avoid problem with inaccurate detections judging drowsiness is done with   frames for a certain time.
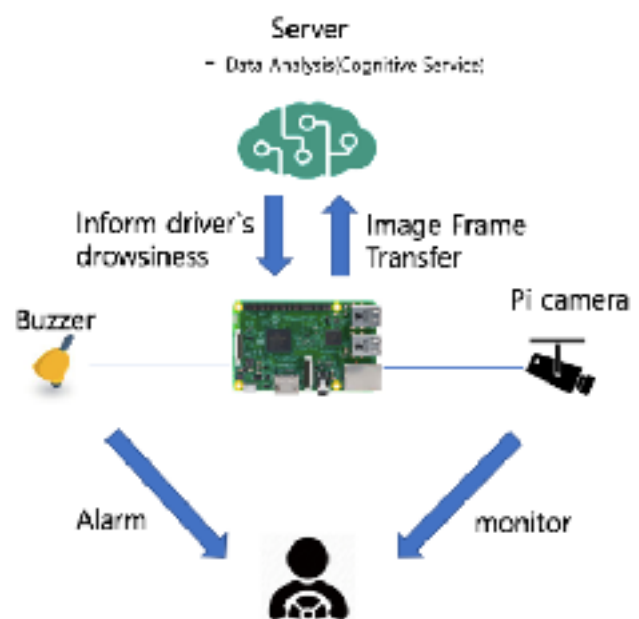
Figure 1 - Block diagram

2.2 Product functions /* Bomin Kim */

a)   Take pictures of driver with camera connected with Raspberry Pi in a car.
b)   Raspberry Pi sends pictures to a server.
c)   A server sends pictures to Cognitive Service.
d)   A server Receives emotions from Cognitive Service.
e)   A server analyze emotions and judge whether driver is sleeping or not.
f)   If a driver is sleeping, send a signal to Raspberry Pi.
g)   When a signal arrived, make a noise with a buzzer connected with Raspberry Pi in a car
      * See a figure in section2.1 (Product perspective).

2.3 User characteristics /* Bomin Kim */

a) This product is for drivers who have a posibility to sleep.
b) User's ags is over 20.
c) Users have various jobs.
d) Each user has different educational level, experience and technical expertise.

2.4 Constraints /* Jontae Baek*/

The following are some constraints of this project. There is no Interface to other applications, Audit function and Control functions. Because this project only provides the functionality to detect and alert drowsiness. Also do not use high-order languages.

a) There are some vehicle-related regulation laws related to this project.
   - This project should not cause defects int the safety of the vehicle.
   - This project should not interfere with other drivers driving.

b) This project need the following items and they have some limitations.
   - Raspberry Pi and WiFi router must be powered separately because there is no built-in battery.
   - Raspberry Pi's WiFi range is short so WiFi router should be nearby.

c) The functionality of sending of the user's photo and the determination of the photo in the server must be done in parallel.

d) This project use http protocol (TCP protocol). So signal handshake protocol is Three-way handshaking.

e) Program should ensure that the user should be alerted as soon as he or she is asleep while the progarm is running. And program have to judge the drowsiness accurately.

f) Warning alarm should not be overrun. Because it directly affects the user's driving. Likewise warning alarm is important, it should not be falsely sent. So project need to increase security.

2.5 Assumptions and dependencies /* Giung Lee */

a) User can drive.
b) User wakes up with a loud sound.
c) Device can check user's feelings.
d) Device can be connected to the server while the car is running.

2.6 Apportioning of requirements /* Giung Lee */

a) Check other emotions besides drowsiness.
b) To set the output to the desired user.
c) When the driver doze off, announce other cars.
d) Device works until car stops.