

Title

Smart Driver Assistant

Target

Restricted only to our group.

Proposer Information

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Shared among the group members equally

Project Description and Background Information

Description

This project is based on voice command feature and image recognition feature of Android operating system. That means it will be an Android application. The aim of this project is to decrease the smart phone usage while driving a car. Therefore the car accidents number is supposed to be reduced. The drivers mostly use their hands to call somebody or text them. Our application will set the drivers hands free. They will use only their voice to perform these operations i.e. call or text.

Another very important feature will be that the phone itself might be placed near the corner of the window or in front of the driver in order to check whether if he/she might be sleeping. If it will be the case so, then the phone will interact with driver, to wake him/her up. *The type of interaction might be an alarm with vibration or a customized message set by the driver itself with maximum volume enabled.*

This application will execute the commands according to the user request. The commands can be as below:

- Call
- Send a message
- Read out a message
- Read out incoming notifications
- Activate safeguard mode

The application itself will interact with the driver for checking his/her conditions of sleeping.

It will use the latest and most used messaging applications which are currently on the market, such as Messenger¹, WhatsApp² etc. But it will use also the GSM feature of mobile phones to perform the requests defined above. *By GSM features we mean that the above commands will make use of native call application and messenger application installed on the phone which uses SIM card features.*

Similar Products/Projects

Currently there is no such application as ours. There is one application similar to the part of performing voice requests, but not quite. That one is found on Android market with the name *utter! Voice Commands BETA!*³. It is a general voice controller. It includes too many features, but it can not read or write messages and it does not even use the camera to check the state whether the user is sleeping or not. That means it is just a simple application which uses the voice to perform some requests. Many of the requests require user intervention.

Another application which is not similar to ours but to *utter!Voice Commands Beta* is *Google Now*.

Google Now and *utter!Voice Commands Beta* both of them are supposed to perform the call command. When the command is executed only the contact information is displayed. That means the user intervention is required to fully finish the execution of that commands.

Google Now and *utter!Voice Commands Beta* both of them are supposed to perform the text command. Again the user intervention is required to finish the command.

Both *Google Now* and *utter!Voice Commands Beta* can incompletely perform these commands only for people who are in the phone contacts. That means none of them is capable of sending or reading messages from Facebook Messenger application or WhatsApp application.

Our application will be customized and will serve only a single purpose – the one which will take the voice as an input and perform calls or texts accordingly AND interact with the user in case of sleeping. A major difference compared to *Google Now* and *utter!Voice Commands Beta* is that the user using our application will be able to call or text their friends on social media.

Justification of the proposal

As mentioned above the purpose of this project is to reduce the number of car accidents caused by drivers only because of their phone usage and the cases when they are sleeping. When the phone is used while driving, the driver's concentration is highly diminished, thus it creates a gap for making an error. In other cases when the driver has been driving for hours or is waked up early for job, it creates again a gap for making an error. This error could cause his/her death as well as other people who are driving or passing by. So we aim to take that phone and make it look like a special device which will serve as a guard of the driver and give the driver the opportunity to be fully focused and have a high probability of avoiding any accidents. The only way of 'communication' between the driver and his/her phone will be his/her voice and the application's voice. It might give the idea that the driver will have a tendency of using the phone as it will stand in front of him/her, but it will not be the case so. Specific details regarding this part will be given in *Technical Aspects of the Project* section.

Contributions, Innovation and Originality Aspects of the Project

As the phone is used almost by everyone, but no one has a tendency to use it as a tool to save their own lives or the other's lives. So why not take more benefits from scope of features of the phones and extend it for our own welfare.

Volvo uses face recognition to help tired drivers⁴ when they don't show full attention or the drivers are sleepy, the car can take appropriate action using driver assist functions. One point which is worth mentioning is here is that the driver in case of sleeping will continue sleeping as the Volvo's approach will not interact with the driver in order to wake him/her up. Another point which is worth mentioning again is that most of the cars do not currently support this system.

Our project is aimed to be used by everyone who owns an Android phone. It will fulfill the gaps which Volvo's approach could not fit. Furthermore our application will perform users' command

requests, i.e texting or calling.

In terms of advantages we can say that the driver will not need to buy anything in order to use this application, *except a pair of headphones, even though it is not really needed*. It will be pretty simple to use.

As a disadvantage we can predict that the battery life might decrease faster according to background services. *And for that reason the driver is supposed to keep the phone plugged for charging*. And in this case we will also trade between different approaches for efficiency.

We believe that this area need more attention and it might influence other national or international companies for further research.

Technical Aspects of the Project

For the voice recognition part we are planning to use the Google API for both speech to text and text to speech. The user will send commands to the phone as mentioned above and phone will perform requests accordingly. If the command is not recognized it will prompt again for receiving the appropriate command. The list of commands will be clearly defined in the interface of application with their explanations as well. That means the application will have a simple GUI interface. In the application interface the user will have opportunity to choose the sources from which incoming notifications, calls or messages commands will be performed.

To be more precise if the user wants to associate his Facebook account with this application, his/her Facebook account will be integrated with this application. It means the user will have the options where to choose from. If the user wants to call or text somebody we will provide the options from where to choose, that means it can be a contact from his/her phone or a contact from social media. In the same way when a new notification arrives we will specify the source and the type of that notification. It will be read out only in the case when the user command to do so.

For the second part, namely checking the user condition of sleeping, we will use the camera to detect the eyes. For eye detection algorithm, we will probably use image processing . We also make some research on OpenCV⁵ library which could be integrated for our purpose.

Android OS includes its own face detection algorithm⁶ which even work very good in low light environment. It was tested by our group in a low light environment. So our biggest challenge is adapting this algorithm for eye detection in a low light environment.

If the eyes will be closed for three seconds or the user's eyes are not found, it means that user's attention is not aimed as needed or he/she might be sleeping. *As a pre-strategy for having lowest number of computations which will take place in user's phone and for being more efficient, we are planning to take pictures in each 500 – 1000 ms and process them accordingly. In case there is a perfect match i.e. in each picture during the three second interval the eyes are found to be closed then flow will go as below:*

The application will interact with the user by asking some questions and will wait for an answer between one and two seconds. If no answer is received in that case the application will alert the user by ringing special sound with vibration. As we said in the justification of the proposal, the fact that the use will have its phone in front of his/her view and it might give the idea that they will be tempted to use their hands. For that purpose we will block the screen so that when a new notification arrives the user will not have the opportunity to look its source. And this is because we will place a customized view from the class of *WindowManager*⁷ on the entire screen. Whatever notification arrives the screen will continue to be turned off.

We have some past experience in Android development and we believe that as engineers in a nine month work period it will be possible to complete the project on time.

Targeted Output, Targeted User/Domain Profile

Our initial purpose of usage of this application is to be used by the people those using cars. We intend to propose two way for the application use:

- 1-) The user will know that he/she has a need for checking themselves against the sleep and will place the phone in front of them.
- 2-) The user already trust himself/herself and does not need to use the camera for checking the condition of sleeping. In this case the phone might remain in the user's pocket and the commands might be given from the headset.

We strongly believe that our project will be used worldwide as in reality there is indeed a need for its usage.

Project Development Environment

Since our project is an Android application we will use Android Studio as a development environment. We will test our product in multiple Android devices. As a programming language we will use Java. XML will be used for GUI appearance. This project is planned to be used with agile methods.

External Support

As a hardware an Android phone or tablet and/or headphones might be needed. We plan to give detailed explanations in the GUI about the usage and functionality of the application.

References

1. <https://play.google.com/store/apps/details?id=com.facebook.orca&hl=en>
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3. <https://play.google.com/store/apps/details?id=com.brandall.nutter&hl=en>
4. <http://www.gizmag.com/volvo-automated-driver-monitoring/31257/>
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