

A Review on Gestures to Control Car Functions

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Abstract: The main thing needed by any user from its personal car is controls. Either it is music control, call, or any other related queries; the user wants it to be simple. G.A.C named as gesture air control is the name given to the technique of controlling the various parts of the automobile with a simple hand gesture. It varies from volume to attending a call to opening windows. The utmost motive here remains that the eyes are on road which means the driver may never be distracted by the stuff while he is driving the car. The Gesture Air Control (GAC) technique allows the gestures to control those aspects just with the help of simple sensors embedded within the vehicle. The sensors wait for gestures input and on performing certain gesture the particular action is activated.

Keywords: Gesture Air Control (GAC); Hand Gesture; Car Functions, Swipe, Embedded Camera

I. INTRODUCTION

Any car today comes up with numerous capabilities and functions that even certain owner may think for a time that these are functionalities provided by it. According to a survey, the most distractive part in a car is the music system. Sometimes it is a cause of excitation and sometimes itself a distraction. Mostly the accidents occur with users adjusting the volume controls or skipping up the music tracks. This problem was answered with the invention of remote buttons embedded within the steering wheel itself, but rather the case is not that simple. That buttons are to be looked up on and remembered.

A. What is a gesture?

Gesture is a way of communicating with individuals without speaking up i.e. in a manner of actions by one's hands or simply using their body parts to communicate. This type of communication comes very handy in case of people with disabilities who express their thoughts through actions to discuss things like either they need something, want to express something etc. The gestures used by the disabled individuals are specified as certain language known to be the sign language. This sign language comprises of certain hand gesture symbols that points to certain action in accordance to the particular sign made through the help of hand gestures [7].

B. Why gestures rather than voice?

The voice as a way of communication is there till the existence of human beings rather that was not the time of knowing any particular language. The voice from that time has been implemented till today as a remarkable approach to many things.

With advancements in civilization, with the motive help the disabilities if individuals, gestures came into existence. Their functionality has been included to help revolutionize the world today as most of the gesture technology has been used to fulfill more purposes rather than to help the disabled. These include functionalities in cars, machines, devices, research etc. [8].

Gesture Air Control (GAC) is implemented in automobiles rather than basic functionality at every place. This system is used in high end automobiles that comprise the system embedded within the car itself during the manufacturer work.

C. What is GAC?

In this paper, a new research named G.A.C is proposed that states the use of gestures to control most of the mechanisms within the car itself. Now, using this music control has recently become a playful thing with volume up/down just a simple gesture of hand. The gestures correspond to maintaining a database of the type with animated gesture working stored with a visualization of the action. The gestures work by a camera placed on the display panel provided with the vehicle itself i.e. embedded in the display panel. Through this camera the gesture performed are recorded and then compared to the stored ones. This manipulation is shown by displaying the particular gesture on the screen in an art form that what the GAC system has derived from the gesture and what command is activated [9,10].

For this purpose a combination of IOS and Android is considered so that the animation can be smoothly stored within the memory provided to the automobile operations. The memory of the automobile corresponds to the same memory as a hard drive of a computer. The G.A.C display panel is included to depict that certain action is being performed in regard to the particular gesture. As with the help of an embedded front camera in the panel, it captures the animation of human hand that which gesture it is performing and the particular gestures are then compared to find the suitable one and perform the action correspondingly. G.A.C, a simpler way to have driver concentrate on road and other parts of the car itself [11].

The music display panel is the main aspect here, whose track and volume controls are there which are to be looked up by the drivers [12]. Making it air gesture, the need to work on music display panel is eliminated.

II. RELATED WORK

Tesla [6], the Italian manufacturer with the most successful innovation of Auto-pilot has been discussing on moving further with the gesture recognition technology that is being implemented upon the camera included display.

BMW [1] in 2016 unveiled its first major concept in the 7-series so as to make driver more comfortable while driving providing the functionality of gestures that can be used to control the functions of the car.

Ford [5] another brand name proposed a UI in collaboration with Intel that corresponds to facial recognition and gestures for the next generation of the ford automobiles.

Genesis [2] concept by Hyundai, HCD-14 that comprises voice recognition, gesture control etc. that represents the future upcoming presentation of the cars by Hyundai.

The German automaker [4], Lexus previewed a concept named LF-FC that presents the gesture control + voice recognition to the next level. The LFA model has been modified to adapt to gestures control.

Volkswagen [3] has been updating its existing models with we-swipe technology that comprises e-golf touch that is assisted with a 9-inch screen with high resolution that allows multiple gestures to be processed.

Bastian Pleging et al. [13] provided the combination of speech and gestures on the steering wheel. The approach was to identify functions by the speech and gestures for the manipulation (eg., left/right) and users can undo their action too with the help of gestures.

Andreas Riener et al. [14] introduced the approach of intuitive driver-vehicle interface based on hand gestures to interact with people easily. The main goal was to control e-mails and to respond them via gestures whether to activate/deactivate the e-mail system, delete or read the mail, pause or resume the same with the help of some predefined gestures.

JuhaKela et al. [15] developed a technique named smart design studio. Accelerometer-based gesture recognition was observed which provided new possibilities for the users to interact with mobile devices and electronic gadgets. The motion was recognized and simply the specific command was active in the device but when such technique is used in vehicles it requires eye-focus. This approach was a part of human-technology interaction.

SuatAkyol et al [16] designed a real-time gesture recognition system for automobiles. It was used for receiving traffic news and e-mails from a message storage.

Sebastian Loehmann et al. [17] developed a small set of gestures that can work independently with some gestures that were easy to learn for the users. Even, the some functionality was developed to recognize the stop gesture in several devices.

Jean-Luc Dupraz et al. [18] developed a digital pen to control car functions that can interact with a user-interface. The pen comprised of the features like user notification, digital camera feature, voice recording as well as recognizing, calendar, calculator and biometric sensor features.

A. Riener et al. [19] proposed an approach with the static and dynamic set of hand gestures to interact with user-interface. Gestures were captured with a (RGBD) camera. Recognized gestures were used to manage applications in vehicle while driving other than button or knob control.

Martin Zobl et al. [20] presented video-based real-time hand gesture recognition system for in-car use to simplify the interaction. It allowed the user to control the multimedia controls and the infotainment system by just making hand poses as well as dynamic hand gestures.

George V. Paul et al. [21] developed a system to trace the movements of driver in the vehicle and control the devices according to the movements or hand gestures. According to the different nature of the users, the different ideas were implemented to control different parts of the vehicle with the hand gestures and this produce command for a desired response by capturing the body movements.

NielsHenze et al. [22] proposed a technique to acquire gestures from a constant user feedback. The set of free-hand gestures for controlling the music system playback was developed using the static and dynamic gestures which were derived and then analyzed in a comparative evaluation and free-hand gestures were discovered to be suitable for controlling music playback in vehicle.

III. PROPOSED SYSTEM

The gesture technology goes way back in the time of Roman Empire. From there on gestures became a piece of communication relevant to any description. The main reason remains in the modern day cars are that the steering wheel itself has become too much congested with the buttons spread all over it. This technology have consumed the simple steering wheel make it much uncomfortable to the driver. The gestures work by a camera placed on the display panel provided with the vehicle itself i.e. embedded in the display panel. Through this camera the gesture performed are recorded and them compared to the stored ones. This manipulation is shown by displaying the particular gesture on the screen in an art form that what the Gesture Air Control (GAC) system has derived from the gesture and what command is activated. The Gesture Air Control (GAC) system removes all this un-comfort ability by concentrating in the center dashboard display panel with the incident screen, the gestures interpret the incident information on the display panel. These gestures correspond to various commands. Some of these can be implemented as follows:

- *Music*: swipe is considered the simplest of the gestures. Using swipe in the GAC technology, the user can switch between screens and the music tracks itself, while with finger swipe as the volume control options i.e. swipe finger up for the volume increase and vice versa.

- *Calls:* The most disturbing event ongoing inside of a car is a phone call. Whenever there is a call the driver is keen to attend it as it can be a very important business deal or something. These calls lead to distraction from the road of the driver. This is controlled by using finger actions like a ‘V’ sign for picking up the call and a simple finger for dismissing calls.
- *Navigation:* In modern era the confusing thing becomes when you have to drive a car meanwhile searching a location on the GPS computer. Using gestures it can simply navigate to the stored locations by the owner. This can be done with a ‘O’ sign by the Thumb and the forefinger.

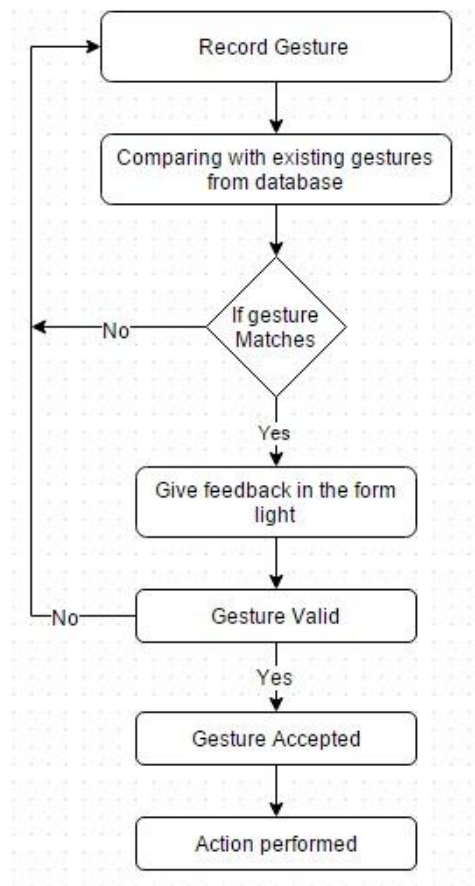


Figure 1. Flowchart

The GAC technology is limited to these three functionalities at the time, these can be enhanced more to add new functionalities. One of the major concerns of this paper is to tackle the uncomfortability of the driver to make him more serious to driving rather than roaming with the car functionalities leaving behind the main motive the car is made up for.

IV. EXISTING SYSTEM

The existing technology in the field includes various ups and downs. The currently being used systems emphasize on the push buttons embedded through the steering wheel connected with the help of wires internally that connects the system itself. The existing system is efficient in itself, the GAC just shows up a 10-15% increase in efficient with decrease in driver distraction up to 5-10%. This system rather enables not only the driver with the authority of controlling functions rather anyone can comprise an action through gestures. For e.g.:- a non-driver family member can use GAC technology pre-embedded in the automobile.



Figure 2. An interior view of the ‘Maserati Ghibli’ showing bulk of buttons.

These things are much common in the modern day automobiles where there numerous buttons can be found on the steering wheel make the driving more uncomfortable. A view of this is shown in the Ghibli S from Maserati (An Italian manufacturer) where the panel itself is filled up with the buttons. There are buttons for window control, cruise control, music, calls, airbags, SOS etc. which leaves a user in even more complication than he is in already.

V. OBJECTIVES OF GAC

1. To keep driver eyes on road rather than distraction.
2. Driver safety maintenance through touch free gestures.
3. More natural means rather than sticking hands eyes on panel.
4. Bringing back the old days comfort ability.

VI. CONCLUSION

Gesture Air controls exhibits never used before technological aspects allowing one to control every car functionality aspect just by a gesture through the thin air. Typically, it allows one's concentration not to be hindered during the drive expecting calls or text, Rather it takes up those functions and situates them to different gestures throughout the car functionalities. It is concluded that the future through technologies provide a future proof systems thereby allowing the set of instructions to be carried out automatically thereby promoting self-autonomous systems.

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