Team Name: Motion Inc

Family Name	First Name	Email	Student Number	Registration
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Problem

In modern vehicles touch screens are becoming more and more common. These screens have the disadvantage that the driver must be looking at them to be able to interact with them as opposed to tactile knobs and buttons that the driver can become accustomed to using without looking away from the road.

An example of a gesture which would have traditionally been done with hardware is switching to the next song. Instead of pressing a particular button, the driver could simply wave the hand from one side of the screen to the other without touching it.

Scope

This project will be mostly software-based. The actual code to integrate a webcam with software is already done through numerous open-source libraries such as OpenCV, and as such this will not be part of the scope of the project. Furthermore, if algorithms exist to perform certain image search functions, these functions should be used instead of implementing them from scratch as this will allow for my high-end intricacy of gestures and less time spent on low-level image processing.

The scope of the project will be to take an image and recognize any hand or foot-shaped objects within it; and once these objects are recognized to use them in conjunction with past found objects to recognize various gestures.

Solution

This team will be using a webcam to track the motion of a hand in the area in front of a screen to perform various gestures in conjunction with the screen. There will be a focus on features suitable for an infotainment system but this could be used for many other applications.

This group would make use of the openCV libraries and will be making a demonstration with an ARM embedded system (albeit a pretty powerful one) for which openCV has already been compiled, with the fall-back of simply using a laptop. We will also consider the possibility (time allowing) of continuing on to create an app for Android which would allow any front-facing camera to perform basic interactions by simply placing the device face-up on a table.

Tasks

Task Name	Description	Estimated Completion Date	Status (members)
GitHub repository	Create Github repo with collaborator access for team	May15th	Completed (Morgan)
GUI	Create basic GUI to see camera output, etc	May 23rd	Completed (Morgan)
Familiarize & Install	Learn OpenCV, install and setup OpenCV and Qt	May 31	Underway (all)
Basic Tracking	Software can recognize a hand and track basic gestures	June 7	Underway (all)
Background Comparison	Smart learn of background and compare changes	June 21	Not started (Justin)
Filtering	Filter methods (using OpenCV) on images to get hand shapes	June 21	Underway (Morgan)
Website	Website complete other than document uploads	June 21	Not started (Brandon)
Refined Tracking	Integrate work on background and filtering	July 5	Not started (all)
Advanced Tracking	Advanced methods, ideally including individual finger movement	July 18	Not started (all)

Progress

See task list above. Our investigation of image detection algorithms led us to the OpenCV library which provides support for many basic visual processing tasks and has many tutorials/examples. After investigating interfacing with the UVic EcoCAR Teams' infotainment system we found it compatible with the Qt framework which we will be using for our GUI. Furthermore, we have set up Github repositories to host our code, and created several simple programs with OpenCV using a laptop webcam.