FTH

Conventional fixed telephone does not have any fancy functions like the modern “smart” fixed telephones, so we made this device to enable them for it.

The signal in phone cable is coded in Dual Tone Multi Frequency (DTMF). Our device intercept this signal and decode it to get the phone call information in the cable. Base on this, our device can get the phone number when both calling in and calling out. Thus it can realize the function of filtering the coming in phone call. Also it’s possible to set the device by using the fixed telephone itself.

To realize calling out and hanging up, a single relay is used to simulate the behave of the switch in the fixed telephone. The relay is controlled by the MyRIO hardware platform provided by National Instrument.

All the signal processing works and other hardware programming are in LabVIEW environment. The demo UI was also made in LabVIEW.

Xin and I made this project and we have equal contribution to it.

This project is for a contest hosted by National Instrument. We won a first prize.

Such as blocking the black phone call, setting tasks on specified time, pulling contacts information from the cloud.

AH

This device solves the pain points in the astronomy observation by using a virtual star map, which is projected on the semi-transparent board in the front, that can move and zoom automatically when the users moving their head. The start at the center of the virtual star map can overlap with the same actual star in the sky automatically.

By hacking the electronic star following system, the telescope can be controlled by programming.

This device is for solving the problems for the astronomy amateur when doing astronomy observation. When observing the stars, it is always painful to looking for a specific star with a star map. Sometimes with a little distraction the star will be lost and another round of searching would be needed. Also it’s hard to adjust the telescope to aim at the stars, especially for the rookie amateurs.

The mini projector on the helmet projects a virtual star map on the semi-transparent board at the front. The projector is connected to a laptop which receive the data from the IMU sensors on the helmet. Base on the IMU data, the posture of the user’s head can be figured out, so does the direction of the user’s eyesight. By adjusting the virtual star map, the star at the center of the star map can overlap on the actual star in the sky. Some related information about the star are also listed around it.

Xin and I made this project and we have equal contribution to it.

This project is for a contest hosted by Microsoft.

We won a first prize.

BF

This project is designed to enable the user’s posture recognition, on-body touch position detection, multi-user interaction and context detection by collecting the EM field data around the human body and classifying them.

This project was failed. None of the feature above were realized.

Recognition

Hypothetically Scenarios

Scenarios

Architecture

This project is designed to realize a lot of interactions including user’s posture recognition, on-body touch position detection, multi-user interaction (like detecting if two users are shaking hand) and context detection.

The method is using a set of two hardware devices which are one transmitter and one receiver. The transmitter generates swept frequency signal and the receiver receives this signal and convert it into digital data and then transfer it to the PC to process it. A DDS chip AD9954 was used to generate the swept frequency signal.

The idea came from Yuntao who was a PhD at Tsinghua University’s lab when I was an intern there.

Although we managed to collect the data, the project was still completely failed. The data was seriously contaminated by the environment noise and no pattern could be found when we were trying to classify it.

Now I know that it’s impossible to realize all the applications because it simply betrays the Shannon’s theorem. The channel capacity of this one-dimensional raw data is much less than the real life’s gestures or other interactions.

I learned a lot of things though. :-)

DSC

The smart car here is for a smart car contest. The car runs on a marked track specified by the contest and the quickest car wins. The hardware parts of this car was specified by the contest and basically we can only design the structure and the algorithm.

The smart car can run on a marked track automatically. It uses linear CCD sensor to recognize the track and PID algorithm to control the servo and motor speed.

GI

It uses only one small contact microphone mounted on the wrist; nothing needs to be attached on the hand or fingers. Therefore it does not interfere with daily life activities. A Hidden Markov Model (HMM) based classifier can recognize two rubbing gestures of UP and DOWN, as well as a tapping gesture of TAP with an accuracy of 97.3% under user dependent conditions. The "true one hand" operation is also realized when RubFinger is combined with wrist mounted wearables such as smartwatches.

RubFinger is a novel device that can realize full-time wearable input by detecting aerial rubbing and tapping gestures of the thumb and index fingers.

It uses only one small contact microphone mounted on the wrist and nothing else need to be attached on the hand or fingers. A Hidden Markov Model (HMM) based classifier can recognize two rubbing gestures of UP and DOWN, as well as a tapping gesture of TAP with an accuracy of 97.3% under user dependent conditions. The "true one hand" operation is also realized when RubFinger is combined with wrist mounted wearables such as smartwatches.

We meant to design a game base on a drone bought by the lab of my university, for a contest.

The smart car is for a contest that fastest car wins.