**COMP7505 User interface design and development**

**Proposal**

**A More Natural HCI based on Ultrasonic Wave Gesture Recognition**

1. Group member:

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（选一个小组代表，标注）

2. Research objectives:  
（我们研究的是什么内容，主题是什么）

基于超声波手势识别的新型人机交互

A More Natural HCI based on Ultrasonic Wave Gesture Recognition  
3. Introduction:

传统的手势识别是基于计算机视觉，通过摄像头捕获动态图像帧处理来识别手势，典型的如微软的Kinect设备。但基于视觉的手势识别对设备要求高，设备体积大，成本高，收环境光影响，以及功耗大等缺点，基于超声波的手势识别却摆脱了那些限制。

超声波手势识别可以很容易应用到普通移动终端，例如智能手机，使用扩音器放出超声波，并使用麦克风进行回收。识别原理基于多普勒效应，人的手势移动会改变波的频率，通过傅里叶变换解析波形变化，以及利用机器学习对识别程序进行训练，可以实现对预设的几种交互手势进行高准确率的分类和识别。可应用于未来智能设备的一般交互中以及游戏交互中，实现更自然的人机对话。

Compared with traditional gesture recognition method which based on computer vision, like the Kinect of Microsoft, recognizing human gesture by processing the motion video, here the Ultrasonic Wave Gesture Recognition technology is more economic, convenient, energy saving and not that pre-condition demanding. Ultrasonic Wave Gesture Recognition can be directly applied to general smart phone or PC, emitting ultrasonic wave from the speaker and retrieve then with the micro-phone. Based on the Doppler Effect, the wave frequency can be changed according to the user’s motion. A proper Fourier transform algorithm will be selected for wave analysis, and a machine learning model will be built and trained to category and recognize gestures, transferring users’ motion to primitive orders.

Ultrasonic wave gesture recognition can be used for general human-machine interaction, it’s a more natural way for people to operate smart phones or PC.