AC40001 Individual Project Mid-term Report

Physical Computing

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Introduction

Over the past few years, during which I've lived primarily in the UK, I have had many encounters in workplaces or from personal connections to people who come abroad to the UK and struggle with the language barrier. I experienced this daily with both my parents not being experienced in using the English language so to help myself and primarily them with the issue I decided to design a device which will translate images containing text on labels, documents, and others to their targeted language.

This design is planned to be a small portable device with a touch screen for ease of use that will be able to take photos, take out the text components of the photos and then translate the text directly to the language of choice the user has put. This will help people struggling with translations in places like stores, where they might face difficulty with understanding what ingredients or products they are buying, translate paper mail and printed documents and other encounters where they might not understand text.

Background research

Starting up the main concern I had with a project of my type was the 'market' I was going into and the competition I would have on my design. I do fully understand that there exist good solutions to my problem in more efficient formats. However, as a person who has followed tech markets for ages and has spoken and helped people with a language barrier on issues such as those mentioned in the introduction, I am aware that most individuals would not go for the more efficient and logical option of using their phone to resolve the problem. Instead, the majority would just use devices primarily fit for the problem at hand. Doing additional research also just reinforced this point as people want the solutions to be as simple as possible, having a device that addresses your common issue directly. Taking a note from this for the user interface will attempt to simplify it as much as possible while adding options in an easy to navigate menu to make it as easy as possible for the user.

Main features

The project will be constructed using a camera and a touch screen display as the key components. The camera will be used for taking pictures which ideally will be stored on the device if the user is in later need of reviewing what the translations were. The touch screen display will be 3.5 inches for the prototype as it seems fitting size for the planned functions of the device.

Software will be implemented for the device which will include a customizable interface, including options for different colour settings. Using the interface will be made simple with a few buttons to improve simplicity and ease of use. These buttons will be for, taking a photo, translating, choosing language, settings and reviewing previous translations. Reviewing previous translations is an additive that I am planning to add on when the key features are implemented as it's not the most important feature.

Covering the main application features would require connection to the internet via Wi-Fi and it will be used to use a text detection service through an API, one being tested right now is Google Vision. This is used over a manually implemented OCR (Optical Character Recognition) as the precision of google vision's service is way greater than something I can do

myself and precision on text recognition is a big priority.

For the translation component of the device, I will use another service of the Google Cloud APIs which is the translation one as from the testing I've carried out seems to work perfectly well.

Work progress

From the beginning of the module, I started working on research in development possibilities and background research of the 'market'. I mostly focused on researching other devices and software that do similar things to what mine is planned to do. I took out key notes which I found from them such as different variations to the interface and additional features they had.

Following that I focused on researching physical components which would be fitting for my design in size and functionality. I have settled on using a 'Raspberry pi zero 2' as the main board with a camera module. With these components in mind, I worked on figuring out how big the device will be and what options I have for the casing of it and decided for the prototype I will use a 3D printer to get a decent rectangle like casing for it.

Physical plans aside I worked on researching the software needs and so far, I've managed to set up very basic testing using Google Cloud services through python. I focused on this approach as it should be the easiest to implement while on the raspberry pi board. The testing is also done in the most basic format I could figure out to test code segments on their own and to get the most accurate results of each. The tests I carried out seemed to be with perfect accuracy to what I needed. I tested them by taking photos of box labels from hardware stores and taking a photo of a post mail I received.

Personal Reflections

So far, I feel quite mixed with how the work is going. I find that the sessions during which I work are going quite well but are not too frequent. I find myself in a big setback for now as getting the physical components is not going as smoothly as possible which delays a lot of work, I can be getting on with, but I believe after they arrive, I will probably be ready to just get on and finish big parts of development in a short time. I find most challenges to be with experience of the development environment, while I've done some basic physical computing before I do have to research some more advanced ones and without the components from the stars its more difficult but should be overcome easily with time. With that mentioned I do have to say that I am very pleased with the discoveries I've found about the components and the services I've investigated not only for how good they seem for the project but also seem like a good find for the future.

Plans

I didn't really focus on making a big plan to direct the flow of the project, but I have key milestones which I am looking to follow in order. Focusing on making a prototype setup with the board once it arrives will be one and then uploading the code for managing text and translation are key priorities. Once those are done all the focus will be on designing the User Interface of the device and working on optimization past that. I do expect to face issues with the implementation of the core systems due to the lack of experience with boards but believe that will have planets of time left to optimize the device and make a good product.

Looking at the risks involved with the tasks I will have to use a soldering kit and possibly lithium batteries for power with which I do plan to follow full on safety precautions as mentioned in the risk assessment so everything should be well covered and go smoothly.