SMART 3D MAPS

3D Printing, Low Cost Electronics and Smartphones to Create Interactive Maps for the Vision Impaired

3D Printing | Accessibility | Flinders Street | O&M | Vision Impaired

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BACKGROUND

Travelling via public transport is one of the biggest challenges that those living with vision impairment face, yet it is an essential part of living independently.

Key issues in using public transport with visual impairment:

- Gaining familiarity with the environment.
- Navigating to platforms.
- Difficulty with attaining timetabling information.

Currently Orientation and Mobility (O&M) programs allow people with visual impairment to familiarise themselves with an environment before traversing, through the use of 3D tactile paper maps.

However there are several issues with these maps:

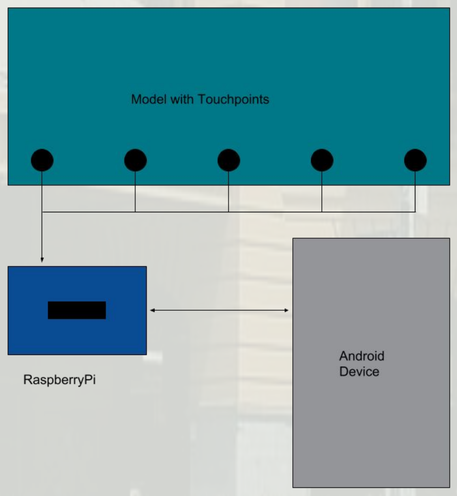
- The paper itself is expensive.
- Maps often don't last long due to how easily the paper wears out.
- Maps can only give a 2D representation.

This study relies heavily on previous work[4] into using 3D printing as an alternative to tactile paper maps. 3D printers have become far more accessible in recent years and thus provide an interesting alternative to tactile paper printing.

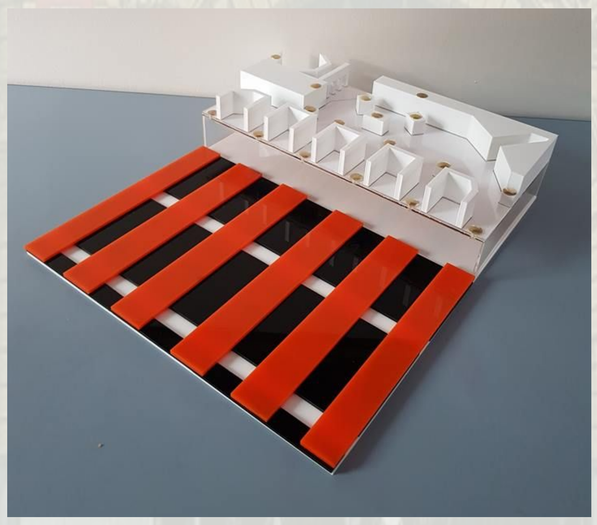
OUR OBJECTIVE

Our study focused on creating an O&M aid for Flinders Street railway station. We set out to create a 3D interactive model, one such that someone with vision impairment may explore the model by feel like a tactile map however our solution also provides extra information such as timetabling through interaction with the model.

SOLUTION



Solution Overview



Finished Product

METHODOLOGY

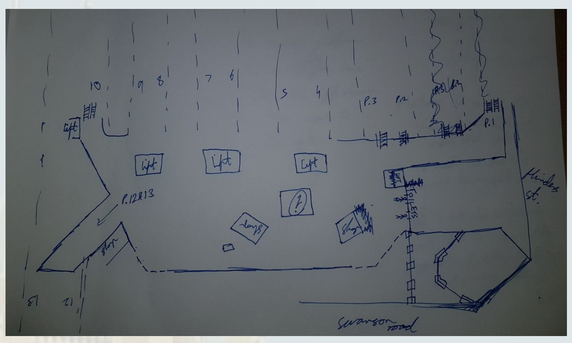
We used the Design Science methodology to develop our solution.

The relevant current technologies utilized are:

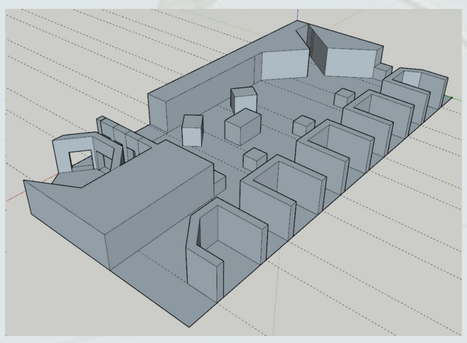
- 3D Modelling and Printing
- Laser Cutting
- Raspberry PI Microprocessor
- Bluetooth Low Energy
- Android Software Development Kit

MAKING THE MODEL

The first step of creating the solution was to create a model of the station. After surveying Flinders Street station, we produced a design that struck a balance between providing enough information to familiarise yourself with the environment and not having too much information in order to reduce needless difficulty in doing so.



Initial Floor Plan Sketch



3D Model Design

The rest of the model is a simple representation of platforms and the two tunnels using laser cut acrylic sheets.

ELECTRONICS AND THE APP

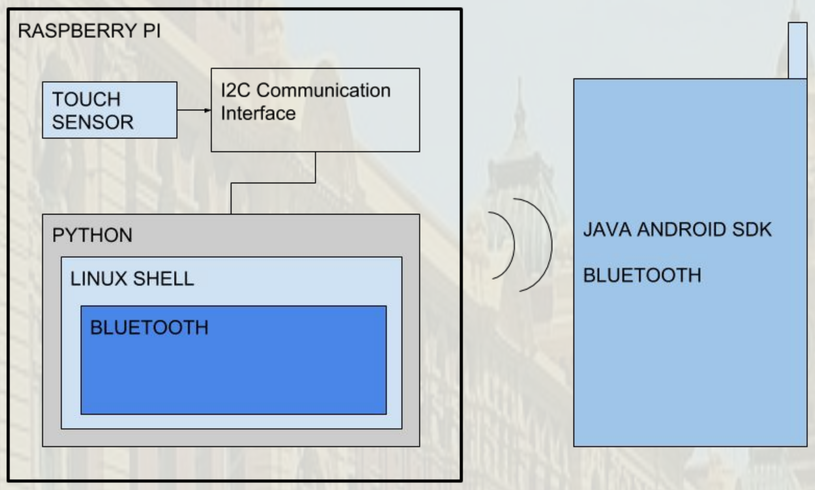


Diagram of the Electronics System

FUTURE WORK

Possible improvements for the model:

- Scale the model up 1.5x for easier navigation.
- Create separate inputs for each platform (so 2 and 3 would be separate).
- Create a 3D representation of the platform and tunnel area rather than the layered sheets.
- Allow more than 12 touch points so that other points of interest such as the Info booth can be interacted with.

REFERENCES

[1] Vision Australia
[2] Department of Transport (2012). People with disability: the forgotten road user group. Perth: Department of Transport.
[3] Polly K. Edman. 1992. Tactile graphics. American Foundation for the Blind Press, New York, NY, USA.
[4] Holloway L, Marriott K, Butler M. 2017. Accessible Maps for the Blind: Comparing 3D Printed Models with Tactile Graphics, Melbourne, AUS.

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