

DECO3200

The Climber & Documentation

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Design Brief

Issue: The experience of the pedestrian button is frustrating

Target audience: All pedestrian in Sydney

Secondary research:

- Placebo buttons: Australia's state transport authorities reveal that the traffic light works on predetermined cycles with set times at busy crossings in capital cities. During that time, **pressing the button has zero effects.** (Naaman. Z., 2018)
- The pedestrian **traffic signal** require the pedestrian to **push the button to activate** the pedestrian crossing, while there is no obvious response telling if the button has been pressed. (Graham. B., Craw. V. 2018)
- The **waiting time will not be reduced** after pressing the button.

Personal research:

- Through questionnaires, most of our users **feel bored** when they are waiting for the traffic light.
- 66.7% of our responders **have misled** by the traffic **sound**.
- Through interview, 6 out of 8 interviewees **unsure whether the button has been pressed**.



Introduction

- Waiting for a traffic light is an essential part of the pedestrian's daily life, pedestrians now **spend** roughly **20%** of their time **waiting at intersections**. (David. L., 2018) Waiting for the traffic light may be **bored**. In Psychology, boredom makes time goes slowly. (Valteri. A., 2012) It may cause in **more illegal crossing** because pedestrians are forced to wait more than a minute to cross the road, (Ben G & Victoria C, 2018) it is dangerous.
- Because of the boring waiting time, most of pedestrian prefer to **play on their mobile phone** while waiting for the traffic light. Focusing on mobile phone may cause pedestrian to mislead by traffic light, or crossing the road during a wrong time, it is **dangerous**. Therefore, we decided to **come up with some concepts** for **improving the experience** of the traffic light to **attract attention** from the pedestrian, and make them focus more on the traffic light rather than mobile phone or others will distract pedestrian.
- At first, we came up with **three ways** to attract user's attention: **changing the shape of the button**, **showing the countdown through progress bar**, **playing animation by using ground projection**. After two round user testings, we found that 23 out of our 40 users prefer to have a **figure countdown**, 11 out of 40 users would like to have a **game section** and 16 out of 40 users prefer to have some **news** on the screen. Thus, our **final idea** is a **combination of lighting arrow, news display and figure countdown**.
- After we finished some part of our **final prototype**, we did a user testing and most of our users found that our concept is **less interactive**. In this case, we decided to make some **improvements** for our final concept. Since 11 out of 40 users has been talked about game, we wanted to **add some games** in our final concept. One of our users suggest that the **koala can pop up** when someone presses the button. Moreover, a new **toy claw machine** store has been opened in Central recently. So that we decided to improve our final concept based on these ideas.

Design process - Research and Testing

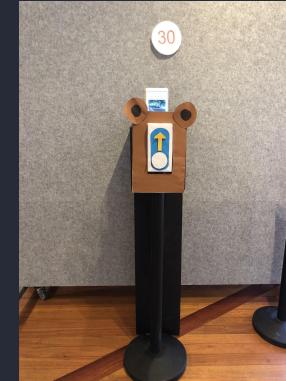
Step 1. Research and set up the problem we want to solve

At first, we did some research based on pedestrian and we found that most of the pedestrian are unsatisfied with the current Sydney traffic light button, consequently, we decided to focus on the topic of the traffic light button. We made three high-fidelity prototypes respectively and did user testing.



Step 2. Final concept based on user testing

After three round of user testing, we came out with our final concept, CNL button, there are three functions of that concept: the arrow will light up after someone pressed the button, the real-time news will be played on the screen and a figure countdown section.



Step 3. Three concepts and three round of user testing

In order to improve the experience of the traffic light button, we came out with three concepts, they are Shiny Shiny (a countdown in progress bar), Fist Bump (notes come out from a cashomat) and Ground Projection (attractive animation will be projected on the ground). We made three high-fidelity prototypes respectively and did user testing.

Design process - Time for building the final prototype

Step 4. Purchasing

The first step in building our final prototype is purchasing. In order to make our concept look more real, we bought a real traffic light and a countdown screen online.



Step 5. Building pillar in Dmaf

After getting our traffic light and countdown screen, we started to build our traffic light pillar based on the weight and size of them. At first, we made a base first. Secondly, we screwed the 2.2m pillar on the base. After that, we put four trapezoids beside the pillar for making the pillar more stable.

Step 7. Remedy

Our main inspiration is based on a sentence from one of our users: "will the koala pop up when I press the button?". Based on our user testing, the game is also a suggestion from some of our users. This sentence is a breakthrough for our improvement.

Another inspiration is a new doll catching machine in Central station, we found that maybe we can combine the idea of pop up with doll catching machine.

After research and testing, we found that making a doll catching machine is too difficult and unrealistic for us.

After a lot of testing and research, finally, we came up with our final version after making an improvement, making the koala climb the pillar by pressing the button.

Step 6. Made some changing

While building the final concept, we did some user testing and some of our users claim that our concept has less interactive. By receiving this feedback, we started thinking of this problem and finally, we agree with this feedback. In this case, we discussed for improving our concept. We re-examined the results of our user testing and we came out with a remedy.

Design process - Coding

Step 8. Making a connection between the stepper motor and Arduino

We connected the wire of the stepper motor to Arduino by watching the video. After that, we opened the stepper motor example in Arduino and make sure it was worked.

Step 9. Connecting the stepper motor with our push-button by coding

After testing and determining that the stepper motor is working, we started to connect the stepper motor with our button by following some coding tutorial class and some Q&A sources online. Moreover, we also consulted with our tutors about the way for making this connection.

Step 10. Achieving our concept by coding

After connecting the stepper motor with our push-button successfully, we started to achieve our ideas, one is that making the turning number of the stepper motor determined by the number of the button pressed, and the stepper motor will be turned back to the start after achieving the goal we set. We found some research and tutorial online, and consult with our tutors again and again until we achieved our goal.

Step 11. Further improving our pillar

We created a rotating head on the top of the pillar. We also created three boxes for putting iPad, stepper motor, Arduino and laptop respectively. We screwed them in the appropriate position on the pillar.

Step 12. Color our pillar and component to make our concept looks real

After that, we used brown color for the body of the pillar, the box for putting Arduino and laptop. The iPad cover, the button box, and the rotating head were painted in white-grey color. Last but not least, the bottom part of the pillar was painted in green color.

Step 13. Designing interface

We used processing to design the interface of our concept, we also connected our button to the interface. In this way, each time the button press, the percentage on the interface will be changed.

Step 14. Setup and testing

We set all our material up on the pillar we build, and we played it to find the problem it may have through testing.

Final prototype - Core functionality

The Climber is a physical game controlled by a button.

The koala is hanging on the pillar by using a string. When someone **presses the button five times** when the traffic light is red, the **stepper motor will turn one round** and the **koala will go up one step**. Every five times the button press, the stepper motor will turn one round and the koala will be lifted.

The **interface** in the iPad shows the **percentage pedestrian has reached**, and also a **figure countdown**. Each time the button press, the percentage will increase.

If the pedestrian is able to reach 100% within the specified time, the user **wins** the game. The **interface** will show that you have **won** and **played celebratory music**. Meanwhile, the koala will **go back** to the starting point. If the 60-second countdown ends and the progress bar **does not reach 100%**, the screen will display a **failure interface**. At the same time, the koala will **go back** to the starting point as well. When the pedestrian traffic light turns to **green**, the screen will turn to **a picture shows that "Please Cross the Street"**. As people will focus on the game and the screen while playing, it will remind people to cross the street at the right time and it may reduce the number of jaywalking.

Moreover, the length of time the game can be played depends on the duration of the traffic lights. When the pedestrian traffic light turns to **green**, the game **cannot be played**. When the user presses the button, the koala doesn't move either until the next red light. This is to prevent users from wasting time crossing the road because of the game.

Hardware/software requirements

Hardware

- Arduino uno
- L298N Dual Motor Driver
- stepper motor
- 12v battery
- Koala doll
- IPad
- Wire
- String
- Button
- Pillar

Software

- Processing
- Arduino
- Adobe Illustrator

Illustrated setup instructions

Pulley



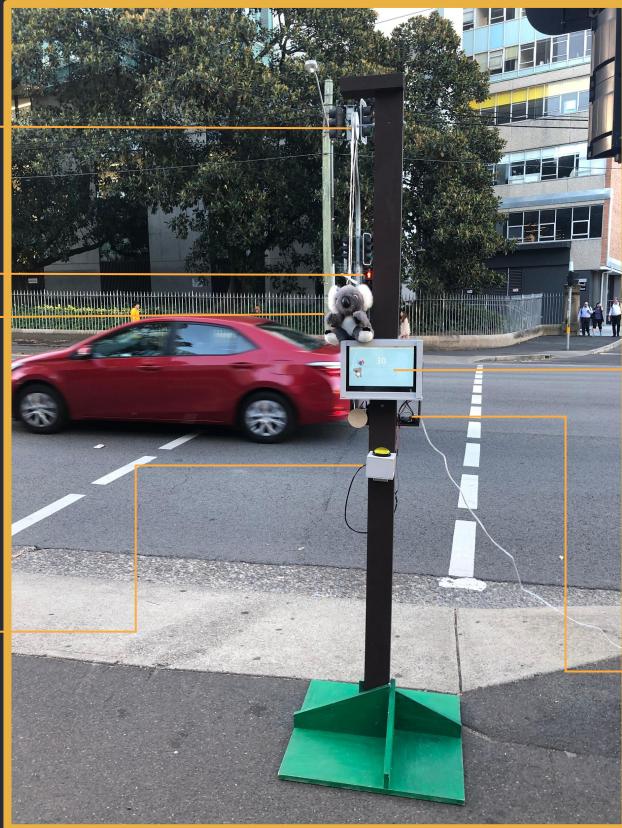
Countdown

Koala doll



Button

The motor is connected to the Arduino Uno. The code is that when the button is pressed 5 times, the motor will turn one round.

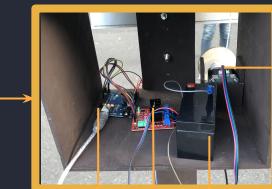


Display



Countdown

Progress bar



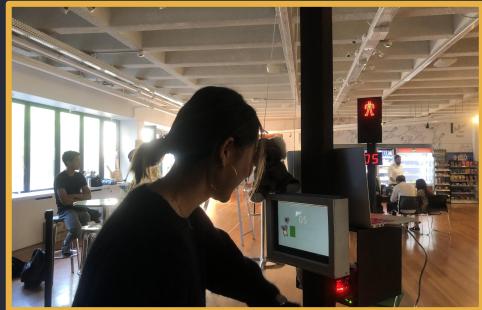
Motor

Arduino board

Battery

L298N dual motor driver

User Testing



Known Issues

According to the result of user testing, we found some problems existing in our concept. It is divided into the physical game part and the button part.

There are some problems with the **physics** part of the game. Firstly, the choice of **cartoon characters** in our game is **cartoonish**. Most of our participants were adults who thought the game more suitable for kids rather than adults. Secondly, in our game Settings, there can **only be one participant at a time**. In the pedestrian traffic light waiting area, there is usually more than one participant. In our game Settings, multiple participants are not allowed. More, the game **did not have instruction**, which led to many participants in the first time do not know what is going on, or do not know how to play the game. Due to a delay in our code, many participants **did not get timely feedback** after pressing the button, which made them lose interest in the game. In addition, the **lack of a 'goal'** in our koala climbing game caused many participants to enter the game without a sense of purpose. The last and most obvious problem is that the **plush toys** we use throughout the game design **can easily be damaged or lost** due to weather or human factors.

There are also problems with the **button section**. First of all, our **button did not have feedback**. Participants did not get feedback after pressing the button, which made many participants not know whether the button was successfully pressed or not. Secondly, **our buttons are not strong enough**. As fragile hardware, our design is not strong enough, which greatly reduces the service life.

Future work

For future work, we will improve and optimize our existing problems.

Firstly, setting a light above the button.

When the user presses the button, the light above the button will light up. This design gives the pedestrian feedback of the button.

Secondly, adding an instruction in our interface.

Instruction of the game makes pedestrians know the way to play the game.

Thirdly, putting a broad with a word "target" at the destination.

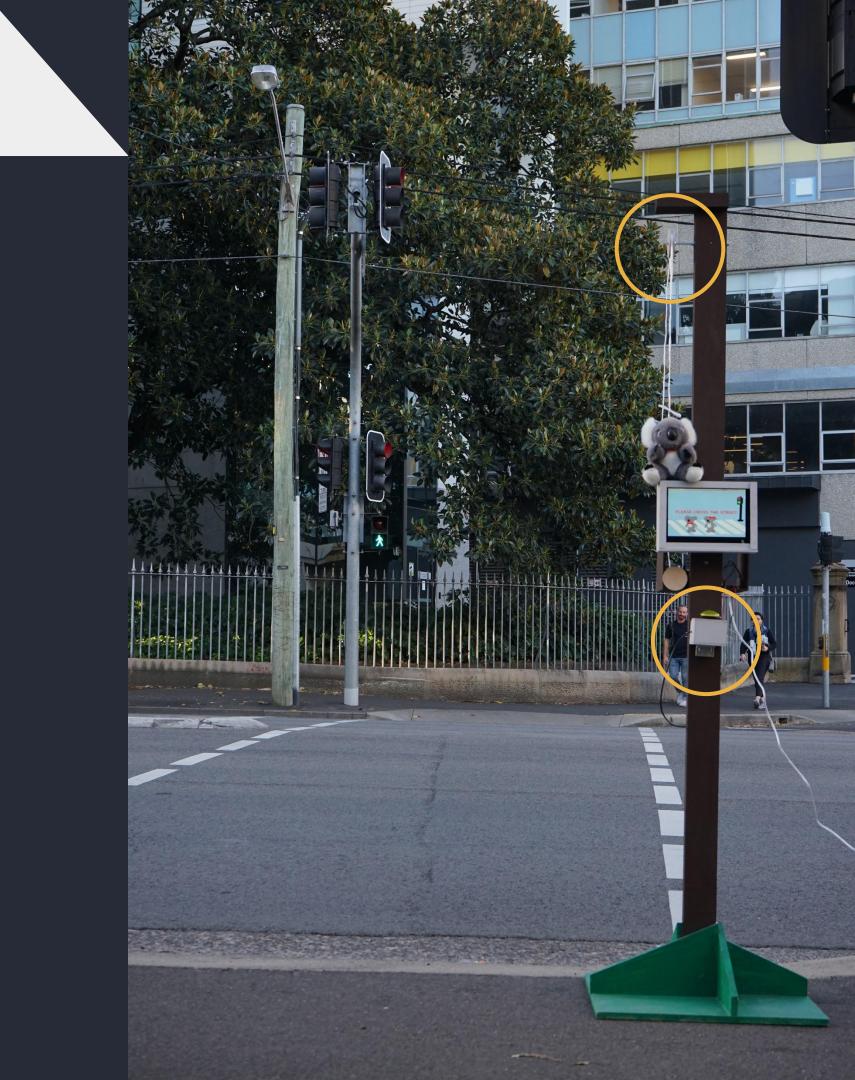
It helps pedestrians have a sense of the goal when playing the game.

Fourthly, improving the code by removing the delay setting.

So that participants can get feedback immediately after pressing the button.

Lastly, putting a transparent protective shell on the top of the pillar.

It helps to protect our concept as it includes a lot of physical things.



Future versions

For future version we will keep the original koala climbing game while iterating. Keep the koala, pulley, screen, and button while adding an LED light.

In the case of red light, the display screen will show an instruction of the game, and show the game percentage processing bar and a figure countdown. When the pedestrian starts to press the button, the screen will display the game interface 'start' and the progress bar is increased. At the same time, the light above the button will light up. Participants have to press the button five times to make the motor turn once and the koala rise through the pulley. In the koala in the top set a eucalyptus leaves, the game will only win when the koala reached the eucalyptus leaves in a specific time. Users need to press different buttons to make the koala climb higher and higher until it reaches the eucalyptus leaves. If the participant can get the percentage of the bar up to 100%, the user will win, the display will show that you have won and play a celebratory music. If the koala does not reach the top in 60 seconds, the display will show a failure page and the koala will go back to the starting point. In addition, the length of the time of the game is depended on the length of the red light. The screen displays a countdown of the remaining time for the red light. During the green light, the page on the screen will display "Time TO Cross". When the user presses the button, the koala will not go up either until the next red light. Meanwhile, this is to prevent users from wasting time crossing the road because of the game.

Product video



YouTube link: <https://youtu.be/M-jyk2Y-Oos>

Bibliography

Arstila, V. (2012). Time Slows Down during Accidents. *Frontiers In Psychology*, 3. doi: 10.3389/fpsyg.2012.00196

Does the pedestrian button do anything?. (2019). Retrieved 8 November 2019, from
<https://www.news.com.au/lifestyle/real-life/have-you-been-wasting-your-time-by-pushing-the-pedestrian-button/news-story/b87735fb87ad862c7e6fee6206510edc>

How Australia's traffic signals favour drivers and discourage walking | David Levinson for the Conversation. (2019). Retrieved 8 November 2019, from
<https://www.theguardian.com/cities/commentisfree/2018/jun/11/how-australias-traffic-signals-favour-drivers-and-discourage-walking>

Norman, D. (1999). Affordance, conventions, and design. *Interactions*, 6(3), 38-43. doi: 10.1145/301153.301168

Zhou, N. (2019). Placebo buttons: Australian pedestrians press for no reason at traffic lights. Retrieved 8 November 2019, from:<https://www.theguardian.com/australia-news/2018/sep/09/placebo-buttons-australian-pedestrians-press-for-no-reason-at-traffic-lights>