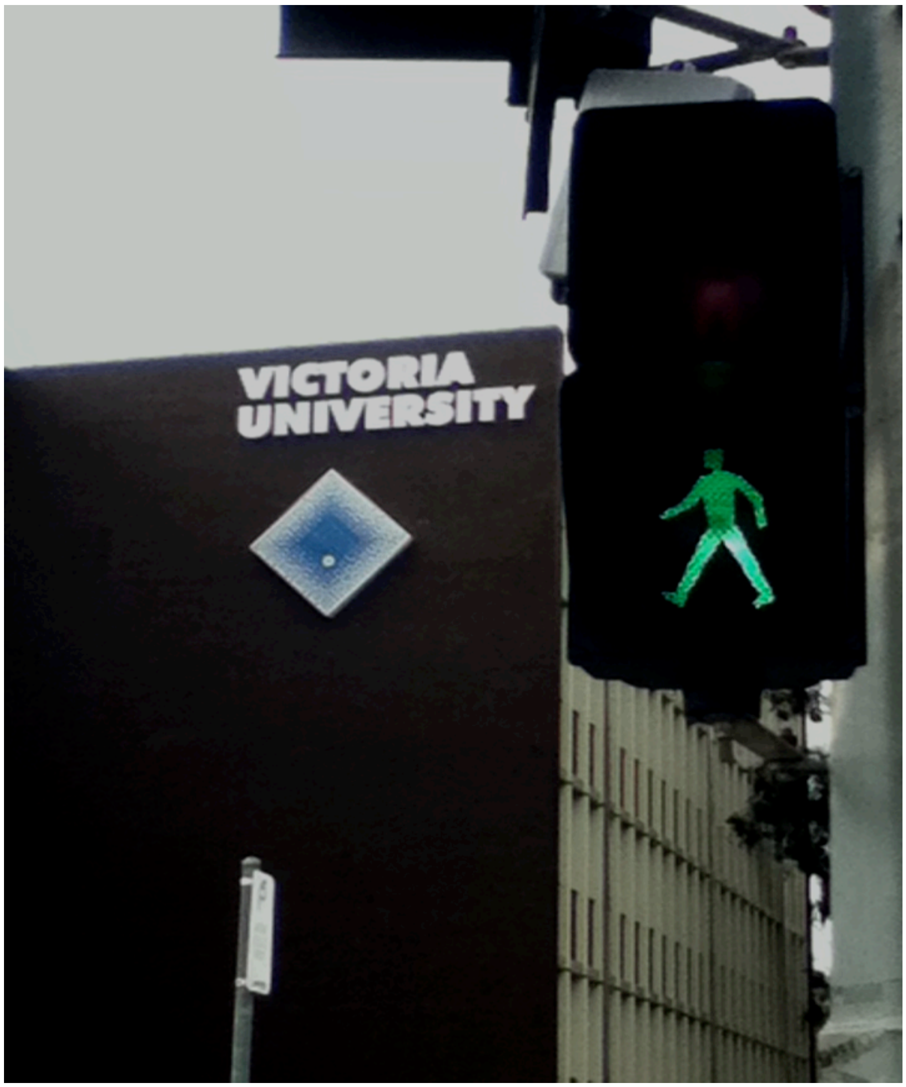
Push2Walk Pedestrian Crossing



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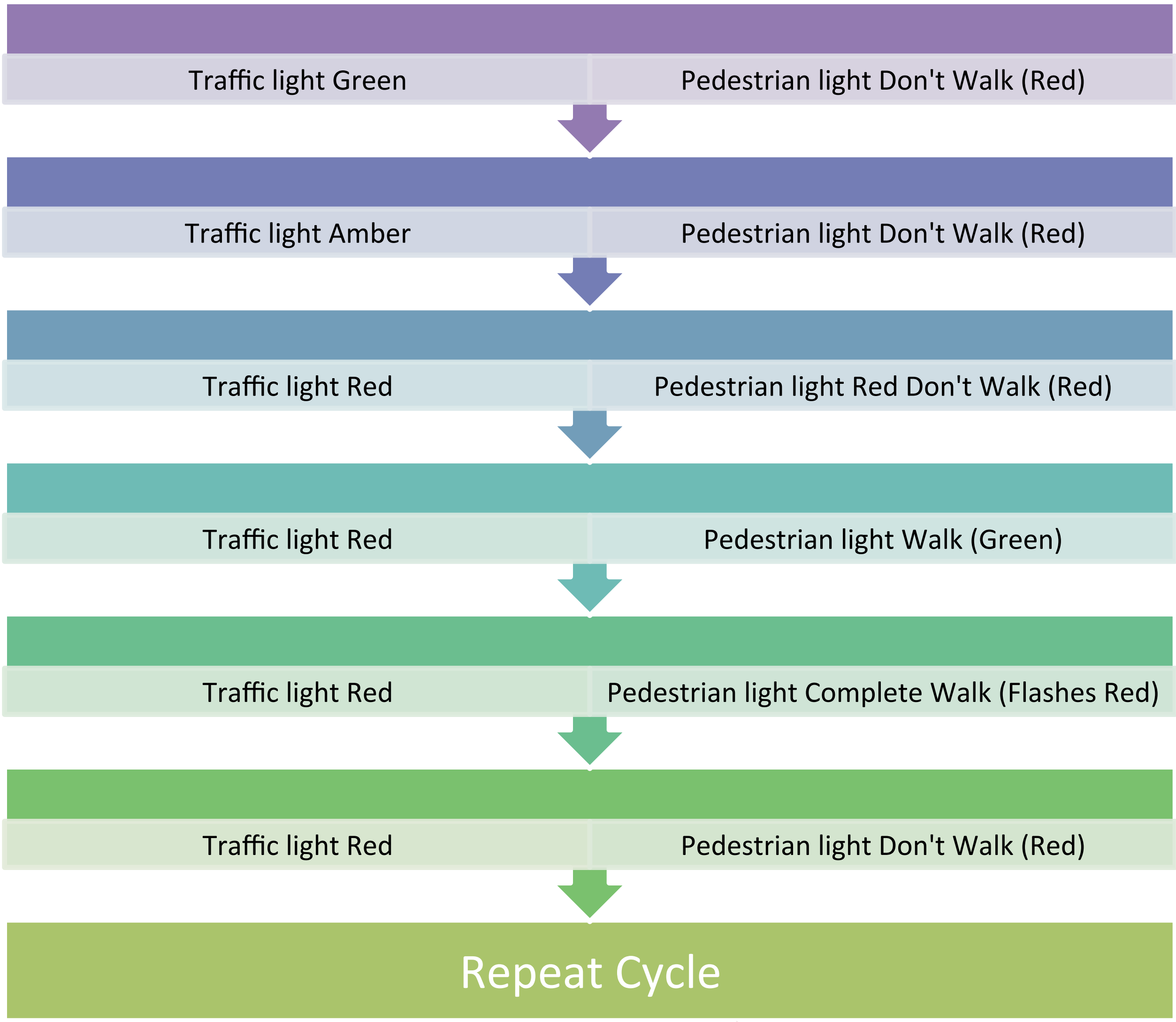
1. Analysis

The task was to create a replica of a pedestrian crossing, it was compulsory to be almost identical and to a life size scale. The resources donated by Vic Roads assisted the projects development, the equipment provided included most necessary materials for the project to be commenced. The materials included the pedestrian lantern and push button, which were later modified. Also available were the resources of Victoria University, this included the PICAXE development software and hardware (used to create flowcharts and programming), ISIS software (used to simulate and test the programming solution) as well as materials. The project consisted of analysing, designing and developing the programming and construction of the pedestrian crossing.

The created program was required to lead on the don't walk signal (red), check every .1 of a second if the button has been pressed, Turn on the pedestrian light button if the button has been pressed, Convert the pedestrian light to walk (Green) within 10 seconds of the button being pressed, Convert the light to the red flashing man after the green light period has ended, continue on the don't walk signal (red) and repeat the cycle, creating a continuous loop.

To ensure the project was successfully completed and identical to the process of an original pedestrian crossing, evidence and data was collected from various pedestrian crossings. These crossings included the pedestrian lights crossing Ballarat Rd, and pedestrian lights crossing Hoadley Ct. We witnessed the sequence pattern of the events, from the crossing which occurred as shown in Figure 1.



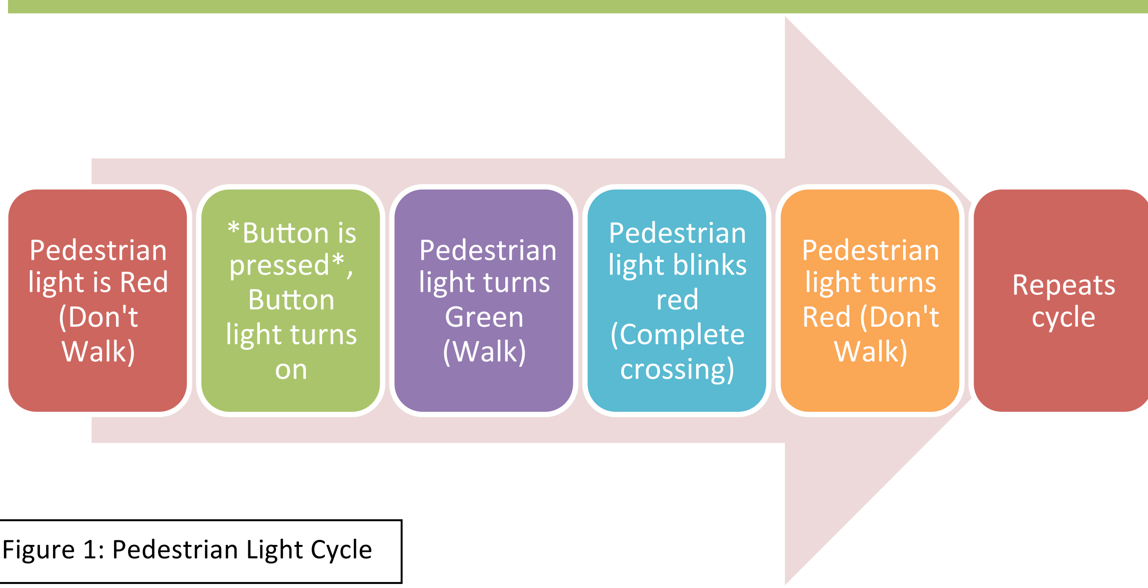


Figure 1: Pedestrian Light Cycle

Collected was data regarding times and sounds of lights and tickers, including the period the green walk lantern lit, the phase the man flashed and the amount of times he flashed per second. Also recorded were the ticking speeds of the stages and times they changed. The data is as shown in Figure 2.

Test	Data crossing Ballarat Rd	Data crossing Hoadley Ct
Green walk light	12 seconds	30 seconds
Blinking Man	6 seconds	9 seconds
Red don't walk tick rate	1.5 – 2 seconds per tick	1.5 – 2 seconds per tick
Green walk tick rate	.25 seconds per tick (4 per second)	.25 seconds per tick (4 per second)
Red man flashing tick rate	1.5 – 2 seconds per tick	1.5 – 2 seconds per tick

Figure 2: Pedestrian Light Timings

From this collection of data, the times were decided and added to the program. As part of the analysis stage, the team collaborated to make a list of constraints that the project might be affected by. This included time (the project was to be completed in one week and presented on the last day), data (the crossing times, lights and flashes varied from each crossing due to the length and area), the client (taking into account the main user the project must be safe for use).

To validate the solution we plan to use the PICAXE simulator, which runs the program in order of events and presents a vague picture of how the program will run. As always, it is also planned to manually check each post to ensure the program will run as expected.

2. Design

For the pedestrian lights to work the team was required to create a program that would make the chip run correctly, we used the PICAXE programming editor to create this program. We created two flowcharts, one for the controller and one for the ticker. The controller flowchart was divided up into three different sub-routines, the first for the button press, second for the green (walk) light and finally for the flashing red (don't walk) light.

Figure 3:
Controller Flowchart

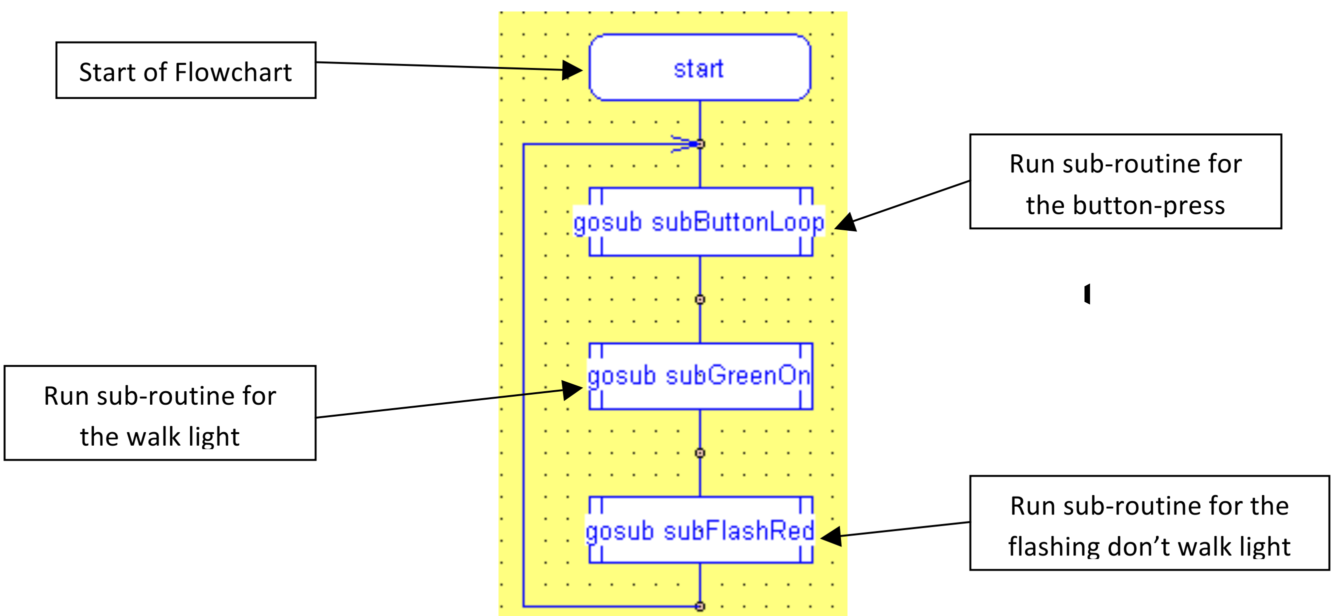


Figure 4:
Controller Flowchart
(subGreenOn)

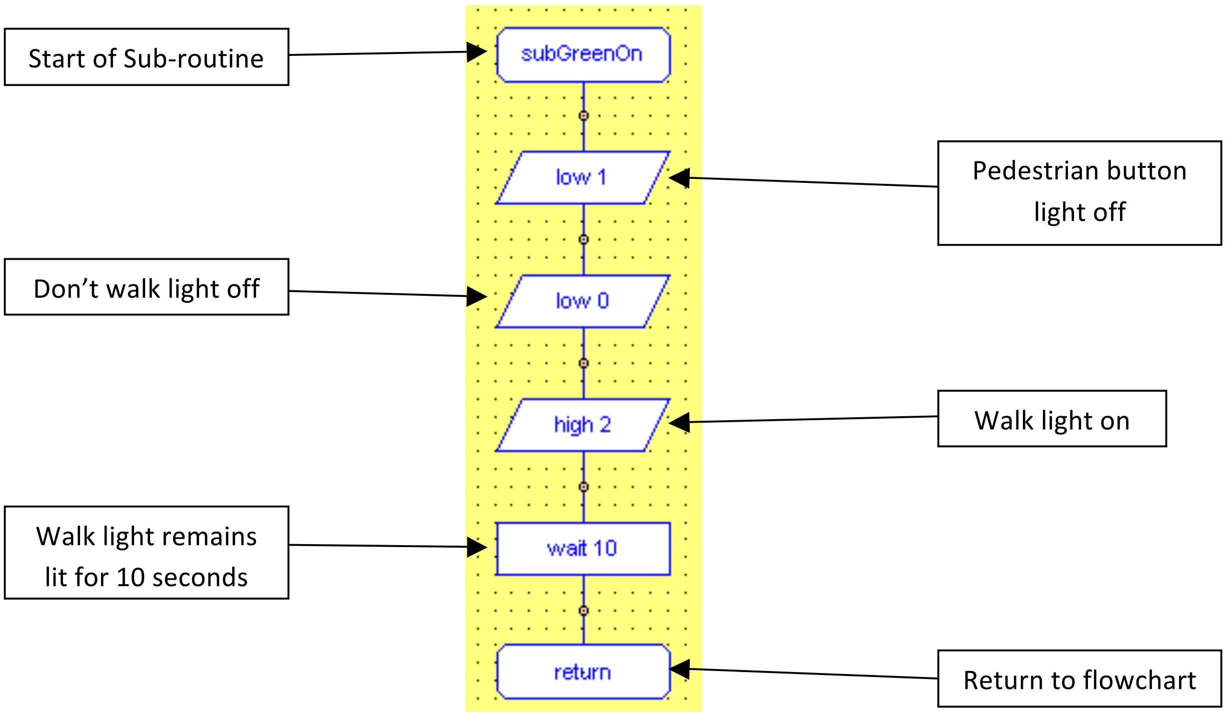


Figure 5:
Controller Flowchart
(subFlashRed)

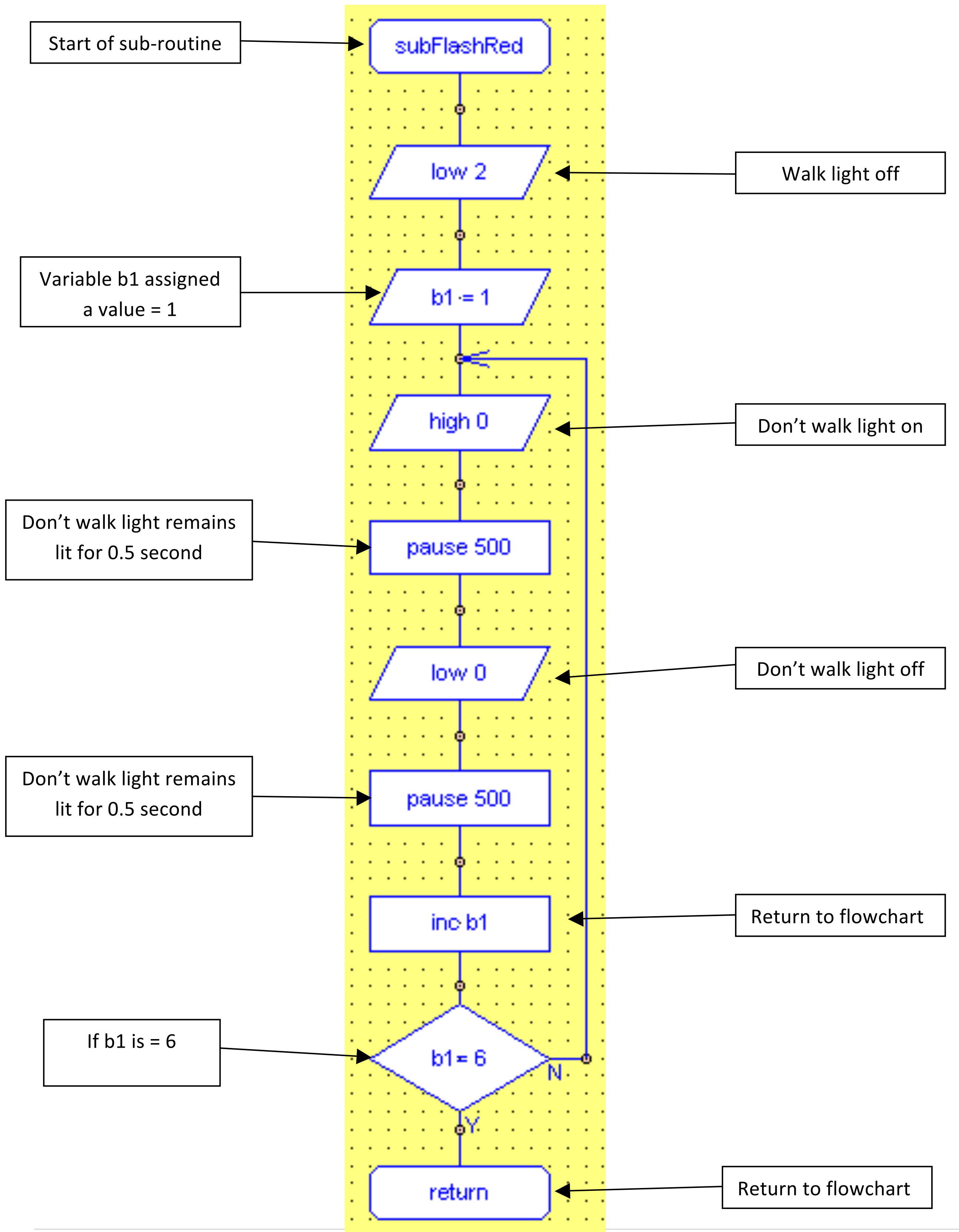


Figure 6: Ticker Flowchart (Main)

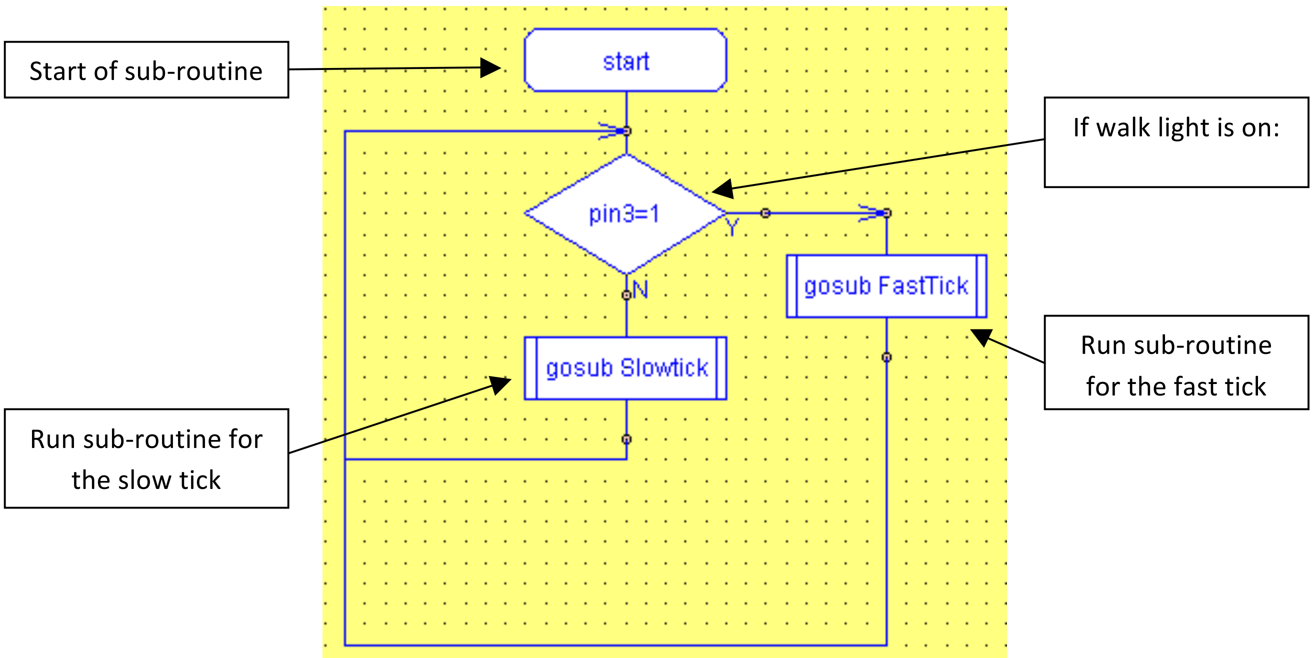


Figure 7: Ticker Flowchart (FastTick)

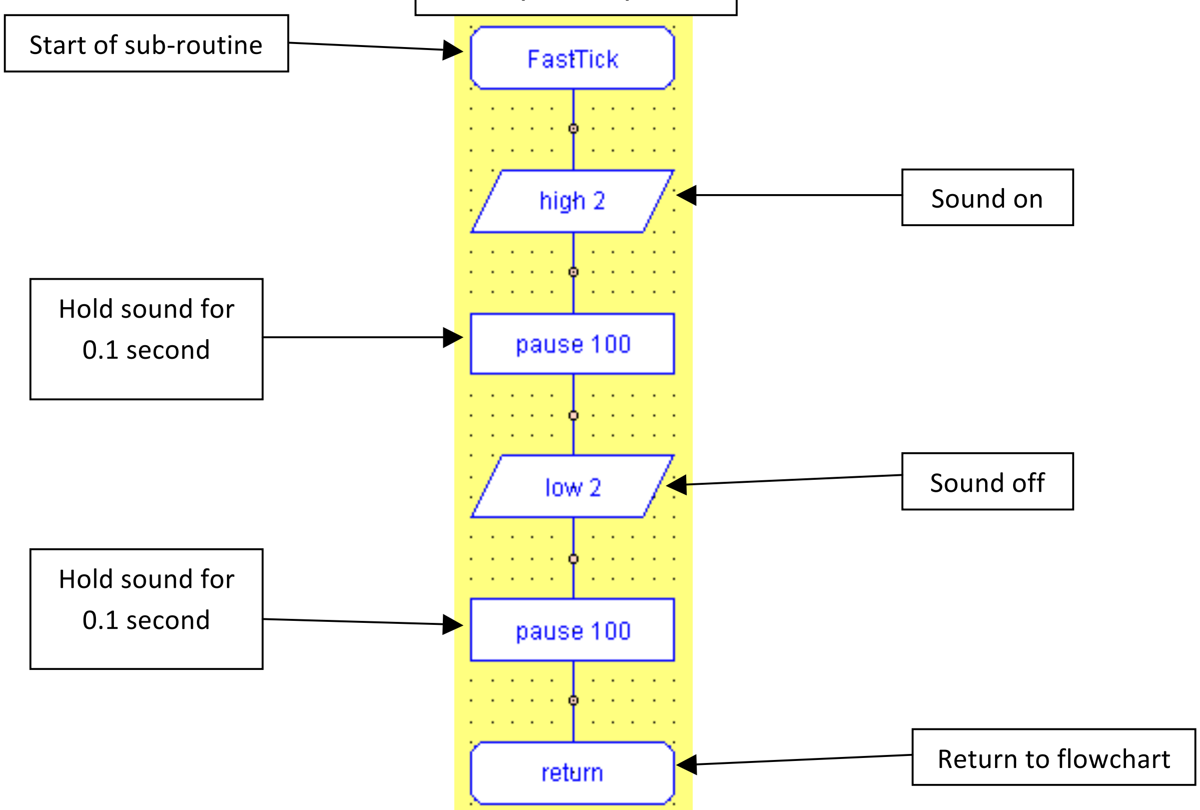
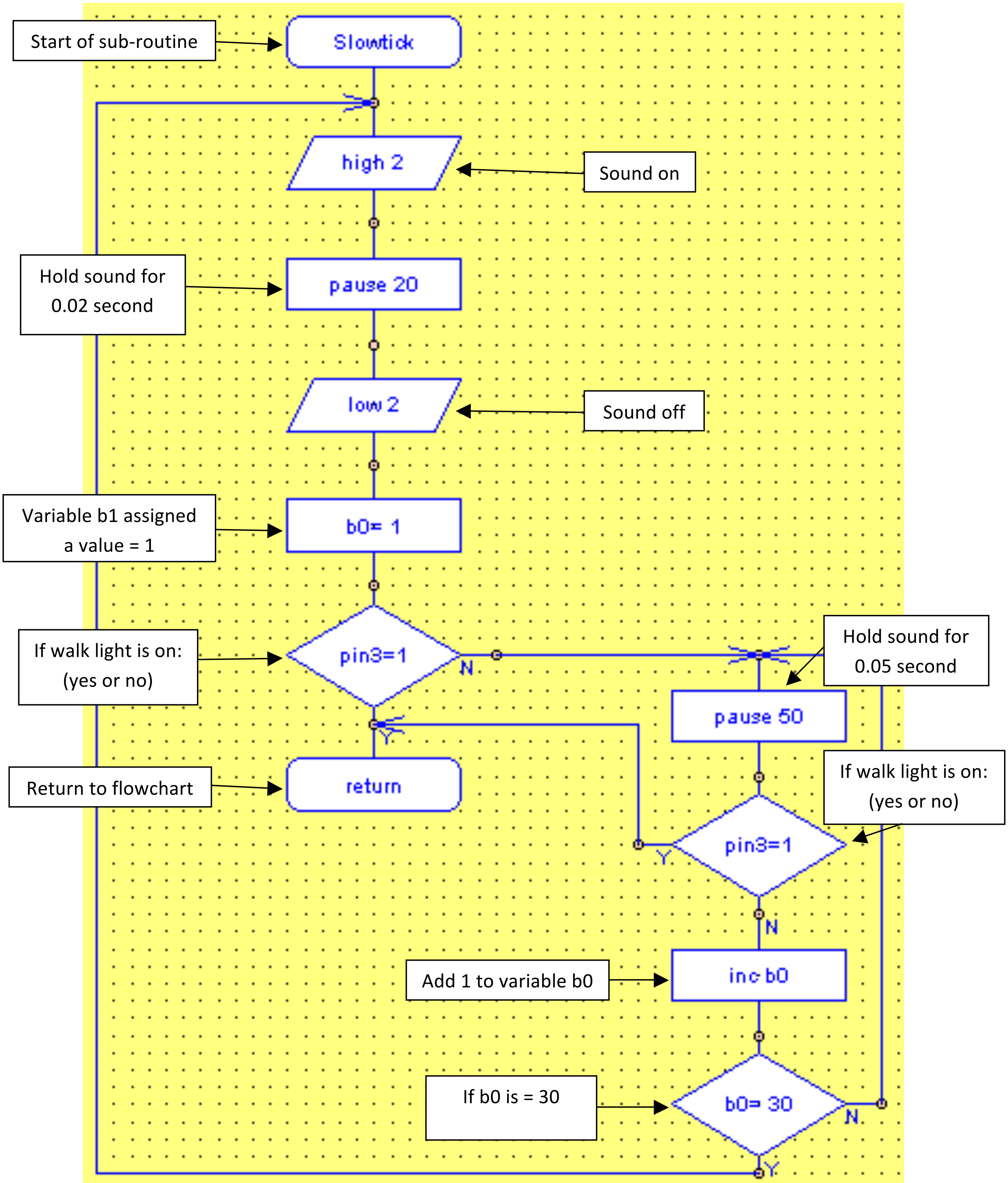


Figure 8:
Ticker Flowchart
(Slow Tick)



3. Construction

Our goal of creating a replica pedestrian traffic light required us to complete various tasks. Firstly the original equipment, the pedestrian lantern and pedestrian button needed to be converted from 240 volts AC to a lower voltage of 12 volts AC. For this we had to remove the transformers which allowed us to use a lower voltage, and then replace the bulbs from 50 watts to 20 watt halogen down lights. Next we were required to develop the Vero board which would hold both picaxe chips and relays. To do this we soldered both relays onto the Vero board then blue tacked the picaxe chips in place, we then had to complete the wiring for the picaxe and relays. Firstly both picaxe chips needed a ground (0 volts) and 5 volts, both battery packs were removed and then wires were run from the positive and negative of the chips onto the copper tracks that were designated to be the positive and negative. To complete the wiring for the relays the negative was connected to the ground (0 volts) and the positive to the corresponding picaxe chip. We then were required to wire the Vero board containing our picaxe chips and relays to the pedestrian lantern and button, for this we used a terminal block so that we could easily remove and change wires without having to cut and desolder them. The wires inside each of the pedestrian lantern lights were cut; in place of them we added a terminal block for each and our own wires. This was designed so we could easily manipulate the wires and then connected to a twelve volt power supply, which was then connected back to the first terminal block, completing the circuit and making the light work. The same was done with the pedestrian button LED and the pedestrian button. After this we tested each component individually using a portable power supply that was set to 12 volts. Using this method we discovered a problem with the controller picaxe chip but this was easily rectified by re solder the positive and negatives and after this all of our components worked.

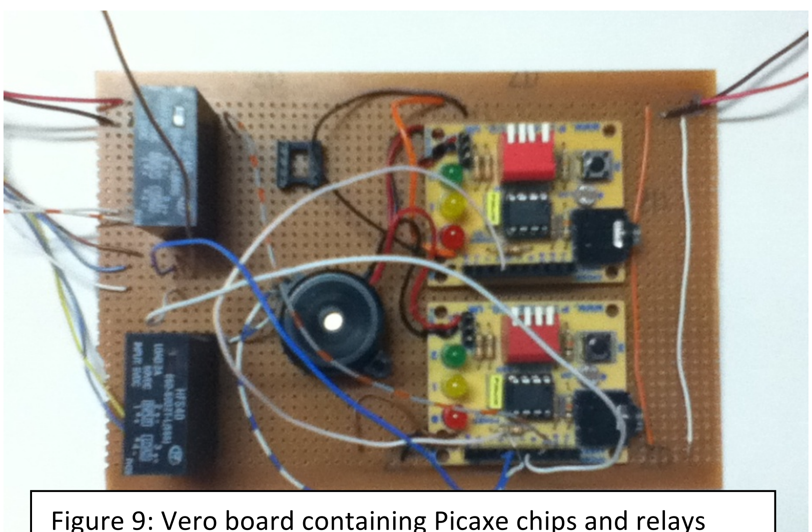


Figure 9: Vero board containing Picaxe chips and relays

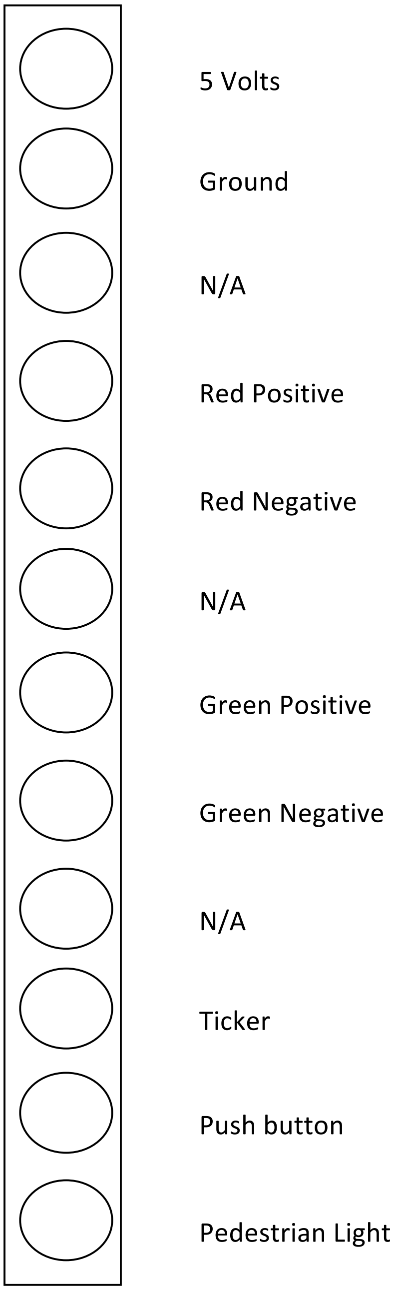


Figure 10: Diagram of the main terminal block which holds the main wires

4. Conclusion

The prototype of the pedestrian crossing works as planned. All components, the lights, ticker and controller are in sync. The requirements of the client and user are met, such requirements are portability, effectiveness and quality. The prototype works identical to the original pedestrian crossing, as the push button is activated on the controller, the red LED indicator on the controller lights up, in a 10 second rotation the walk sign lights up as a green colour meaning go. 10 seconds after the green light is activated it shuts down, the red don't walk sign lights immediately consisting of 6 flashes, each flash has a duration of .5 seconds on and .5 seconds off. Once that operation has been completed the red don't walk sign lights up and stays as it is until the push button is reactivated. The appearance of the prototype is very similar to the looks of an actual pedestrian crossing; the traffic lantern and the push button was donated by Vic roads, this traffic set was previously used meaning it is authentic. Regarding further work, the pole holding the lantern must be of quality, the pole must be able to support the lantern and must be able to withstand movement and weight. As for the wire, this is a hazard; a recommendation is to set up the device against a wall, running the lead along a wall preventing any trips or falls involving the users. The final delivered product will be a replica of a current pedestrian crossing, this will teach intellectually handicapped what a crossing looks like and what to do when the situation of crossing a road arises. This week has been a big learning curve for us individually and as a team, we have learnt to work together efficiently and to think outside the box. We have enjoyed the experience of living the university life for a week. It has been a great experience for us that we will always remember.

Acknowledgements

- We would like to thank the AKORN Company especially to Georgene, without Ms Bridgeman the project would not have taken place.
- Thank you to Vic Roads for kindly donating the Pedestrian lantern box and push button.
- Thank you to Victoria University and its teachers Alec and John, they have taught us valuable learning experience during a limited range of time. Over the week they have been patient and applied all their experience from this area to make sure this project would be successful.
- Thank you to Victoria University Workshop staff who built the final prototype product, without them there wouldn't even be a final product.