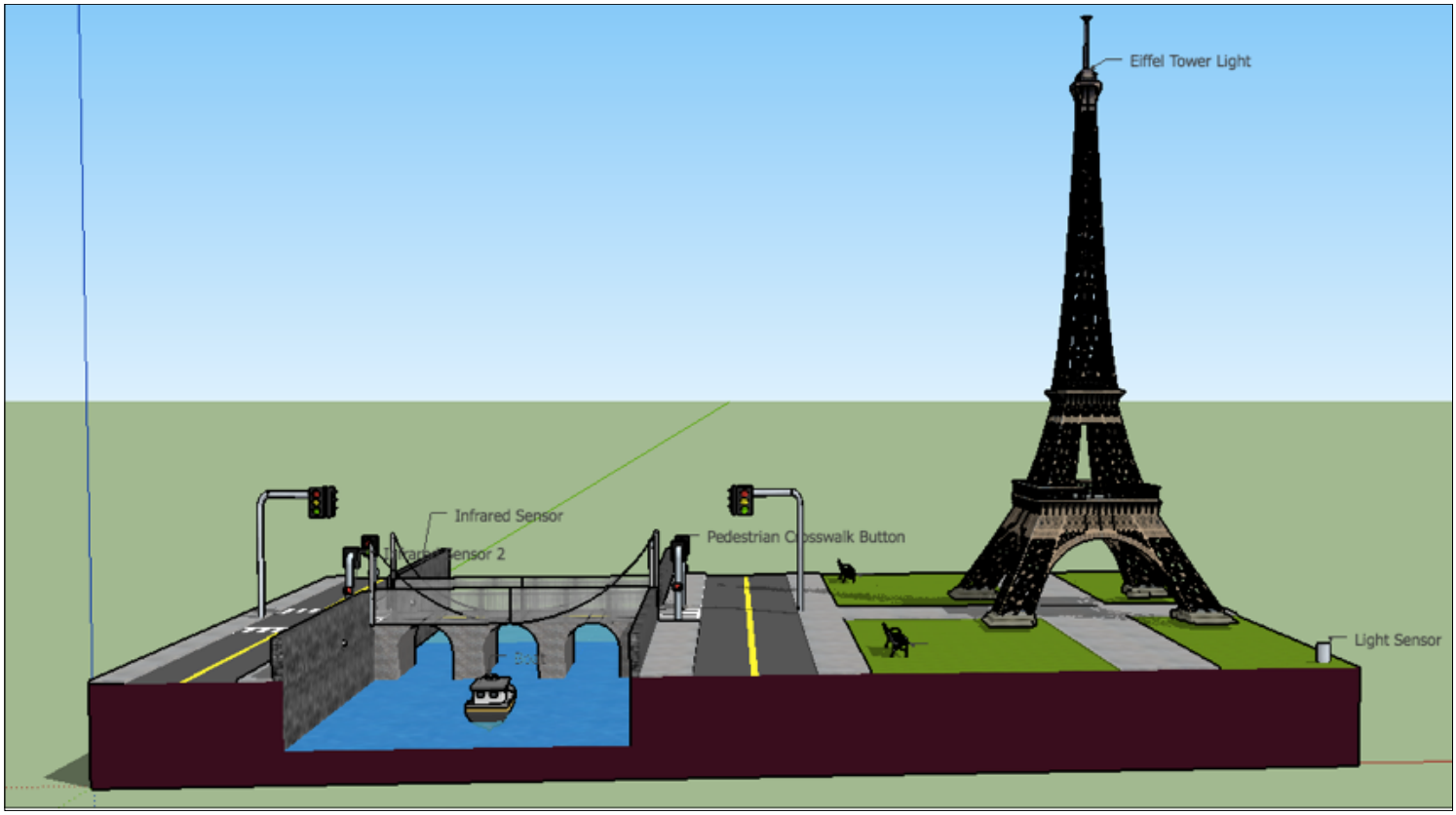


COMPUTER ENGINEERING ISP FINAL REPORT

Prepared for: Mr. Wong

Prepared by: Sophia Weng, Jinansh Shah & Lior Levy

Date: June 8, 2015

Course Code: TEJ3M3

EXECUTIVE SUMMARY

INTRODUCTION

This project is a traffic light system, on a T-intersection, near a photocell controlled light inside the Eiffel Tower and an infrared sensor controlled draw bridge. We created this traffic light system to enhance our learning with regards to boolean algebra, wiring, programming an Arduino Uno microprocessor and working collaboratively. This traffic light system will be made by a leading group of computer engineering students from the Mackenzie Institute of Technology (MIT). These innovative scientists go by the name of Jinansh Shah, Sophia Weng and Lior Levy. The model will be created using a wooden box for the foundation platform,, 11 LED lights, a combination of bristol board and straw for the traffic lights a house model from Dollarama and construction paper for the grass, sidewalks, road and river.

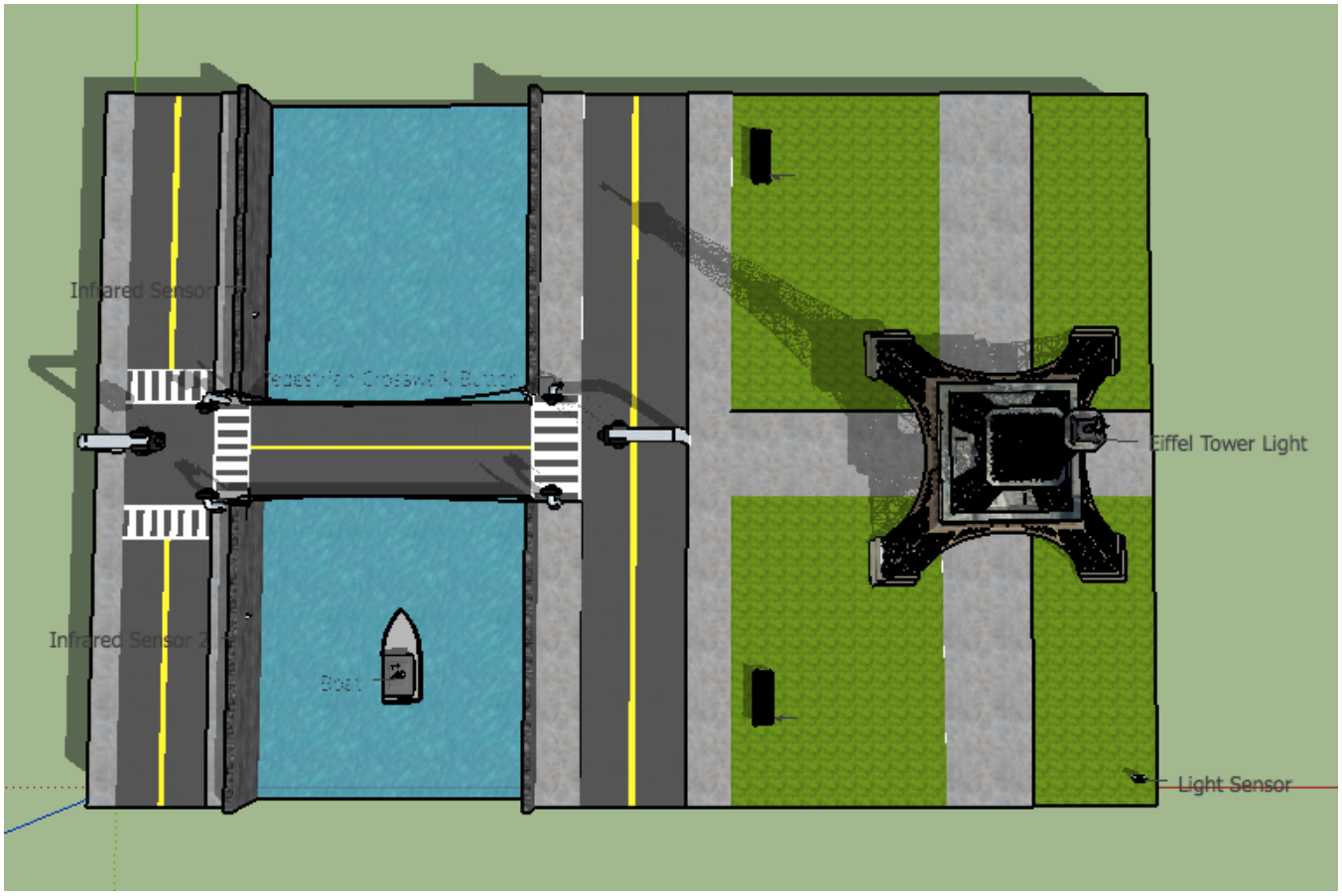
EXPLANATION

A traffic light system is timed so that there is a repeating sequence of green (go), yellow (slow down) and then red (stop) respectively. When a given traffic light is green or yellow, the perpendicular traffic light is always red in order to prevent automobile crashes. The reverse is also true.

A pedestrian light corresponds in colour to its parallel overhead traffic light but does not have a yellow light. Instead it is green when the parallel light is green, and red when the parallel light turns yellow (our traffic light system will not have a countdown).

A manual switch serves to speed up the sequence by decreasing the delay time in between code lines. The street lamp will be turned “ON” when it is “dark” as in something covers the photocell from any light sources and the street lamp will be turned “OFF” when it is “light” as in the photocell receives light. The infrared (IR) sensor works by emitting infrared light and when it bounces back into the sensor due to something being in front of it, it is turned “ON” thereby raising the draw bridge. Similarly, if there is nothing in front of the IR sensor, the IR light won’t bounce back into the sensor and it will remain “OFF”.

FINAL REPORT



CHALLENGE

We were assigned to design, code for and build a T-intersection traffic light system& pedestrian traffic light system both of which can be sped up by a button activated by the user, an LED light that can be controlled by a photocell and a gate controlled by a motor activated by an infrared (IR) sensor. The code was to be programmed onto an Arduino Uno microprocessor and connected to a wooden box model of dimensions 40 cm by 25 cm by 12.5 cm (L x W x H).

Initially, it was difficult to teach ourselves to code the Arduino Uno and decipher how each command affected the output although it's similar to C++. In addition, we encountered several hardware problems such as a malfunctioning breadboard which had to be replaced, a weak photocell for which we had to adapt the code to and LED lights that seemed to turn on without even being powered.

INVESTIGATION

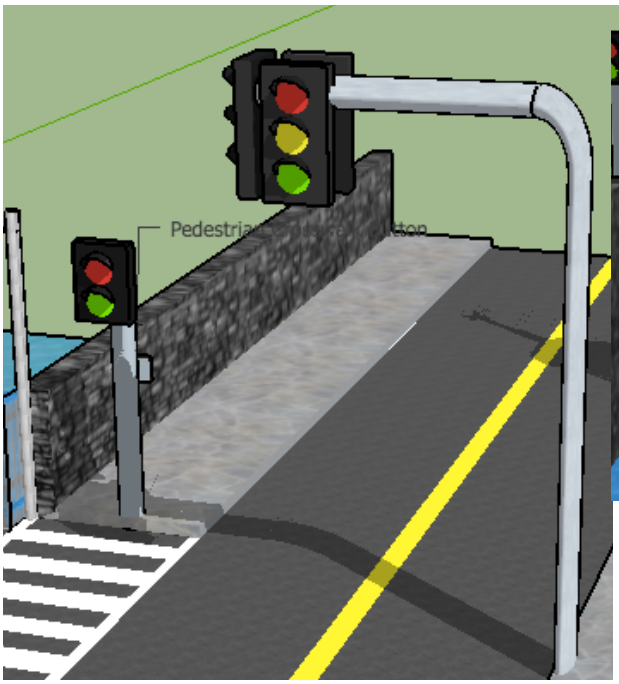
The three of us began the project by completing the code in order to assure that if any future complications were to occur, we could be certain that it was the hardware component of the project. By doing research on reliable sources specializing in Arduino Uno codes and hardware tutorials we managed to complete the code in about two weeks. Mr. Wong supplied a drill, electric saw, wood glue, soldering materials and electricity.

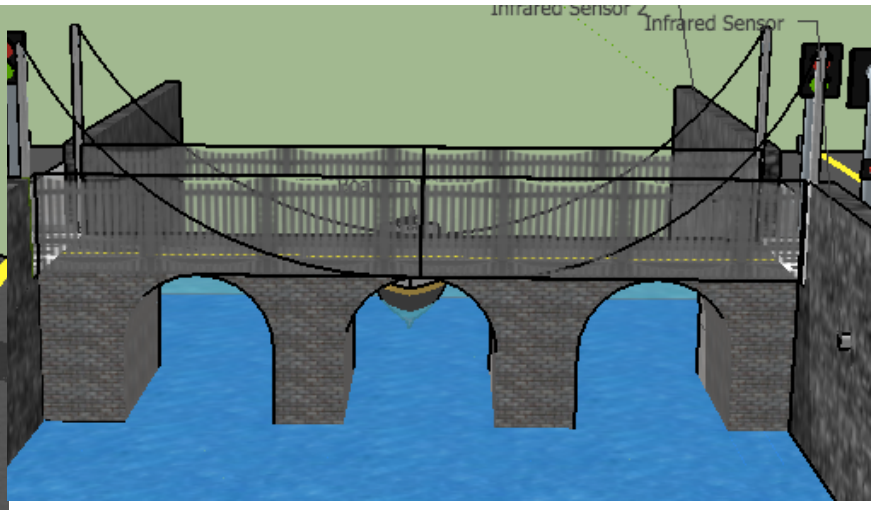
We attained our materials from a local Home Depot as well as the construction paper and house from our homes. This helped to minimize the cost. The wooden planks measuring 12.5 cm by 40 cm and 12.5 cm by 25 cm and 25 cm by 40 cm (1/8 inch in height) were cut and glued together by ourselves using supplies from Mr. Wong's class.

The traffic lights below (**Figure 1**) include straw poles wrapped in black masking tape, a bristol board casing for the LED lights and a button near the pedestrian light. These LED lights and button are wired to the Arduino Uno microprocessor underneath the ground. The button which controls the speed of the traffic lights was provided by Mr. Wong.

The bridge on the right (**Figure 2**) was not constructed and gates leading to the house were made instead. The way the motor works to move both gates in opposite directions is shown below in **Figure 3**. Strings are connected to opposite ends of the opposite gate so that as one side furthers away from the middle, it pulls on the string to pull the other side of the other gate closer and vice versa. The gates themselves are black construction paper which was the ideal material due to its light weight. The gates are controlled by an IR sensor which is located a few centimetres over which can detect if a car is in its path and opens accordingly. In real life, another IR sensor would be on the other side of the gates. Potentially, a number code of thumb print system could be put in place in order to prevent any unwanted visitors.

Finally, there is one less T-intersection and three less pedestrian lights compared to the original model not to waste materials and jus to what is required for this project while still going above and beyond in our execution and physical appeal. Also unnecessary sidewalks, benches, IR sensors and river boundaries were also removed.





EVALUATION

Our project was a huge success and was handed in three days prior to the deadline. If done again, we would do absolutely nothing differently as our model executes its purpose perfectly. If there was an error or inaccuracy in our code, hardware materials or model, we would have fixed it already. The plan was changed to accommodate for any unnecessary obstacles such as the bridge in the river and Eiffel Tower through which we could not have discretely stringed the wire for the photocell operated LED light.

Of course were we to do it again we would make sure the plan was feasible and efficient with the time and materials available to us. Possibly the traffic lights can also be more to scale as they are very close to each other which is unsafe and not life-like. Also, there are glue marks on the large traffic light. Although unconventional, we thought it would be better to have the button on the ground so that people could step on it with their foot and avoid any hygiene issues that is common in today's pedestrian lights. While we used a better system, in order to simiulate a more real traffic light system, we should have put the button on the pedestrian light post.

We would like to acknowledge our parents for financial and moral support as well as Mr. Wong for always believing in us from the beginning and being our good luck charm. Thank you for a wonderful semester. This project could not have been done without you.