MIDDLE EAST TECHNICAL UNIVERSITY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

EE 494-DESIGN STUDIO 2

REVIEW ON THE DELIVERABLES OF GIMME FAST PROJECT

revolusys

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1. Introduction

Engineering requires assessing risks and coping with the unexpected situations. Today, we face with an unexpected severe epidemic that affects the course we follow throughout the year to complete "Gimme Fast" project. After serious consideration and reviews together as teammates, several changes are made on the plans and deliverables of the project. In this report, the deliverables that Revolutionary Systems Incorporation plans to submit at the end of the semester are explained.

2. The General Simulation

When the undesired epidemic caused our university to be closed for a period of time, the next and maybe the most important job of the whole year in our agenda was to complete the integration of subsystem that we developed and built throughout the course. Since physical integration of subsystems is no longer possible, at least we can integrate them in computer environment as a simulation.

This simulation will be constructed using the following data and tools:

- The experimental results of transmitter and receiver circuit as the environmental light condition and the distance between receiver and transmitter vary at specific communication speed i.e. baud rate.
- The experimental results of transportation subsystem; the speed of the car and the variation of the stopping distance of the moving vehicle.

Upon capturing picture via image acquisition subsystem, it will be transferred to the communication subsystem. At this stage, a random error will be created depending on the selected environmental light condition and the distance between transmitting terminal and the vehicle (note that this distance is variable since there is small amount of variation at the stopping distance of moving vehicle). The communication between two terminals will be done directly from Raspberry to Raspberry. At the receiving end, error correction algorithm will work. After all data is successfully transferred and displayed, the communication time will be added to the transportation time calculated using speed of vehicle and the distance that vehicle should pass along the way therefore we will be able to see whether the process can be completed under 2 minutes or not.

This simulation is still work in progress so details about it will be clearer in the following weeks.

3. Deliverables in Communication Subsystem

The Revolusys Group will deliver a functional communication software which successfully communicates between two Raspberry Pi's. The software will be able to receive a picture and then divide it into five pieces as if it was going to be transmitted via car. Then it will transmit each of these five pieces by further dividing them into 1 kB packets. This is done in order to implement error detection code to each of these packets.

As an error detection method, checksum will be utilized. The 1 kB packets will have their checksum result and their sequence numbers attached at the transmitter parts. Receiver parts of the project will control the checksum data and if the resultant checksum of the received

data is different than the one attached at the transmitter part, the packet with its sequence number will be dropped and asked to the transmitter part to resend it.

4. Deliverables in Transportation Subsystem

The Revolusys group is going to deliver a properly working transportation subsystem by itself. There will be an Arduino Uno controlled four-wheel drive vehicle which is able go back and forth between two obstacles that represent the receiver and transmitter terminals. The vehicle will be able to stop at least 5 cm away from each terminal while the distance between the terminals can be varied from 40 cm to 1.5 meters. The average speed of the vehicle, for the case where the terminals are 1.5 m away from each other, will be calculated by measuring the time it takes for the vehicle to complete 5 laps and then dividing it to the total distance covered. So we will be able to prove that our transportation subsystem is capable of meeting our average speed requirement.

However, we won't be able to transfer our vehicle to a rail system. As this requires some shopping, it is not possible for us to construct a rail system in the current conditions. Thus, our final vehicle will be moving on its own wheels without any physical guidance. We will deliver a video of the vehicle in operation along with the vehicle itself.

5. Deliverables in GUI

A graphical user interface will be implemented to control the image capture. On that GUI, also some parameters can be adjusted like image size, virtual communication distance (to account the effect of errors based on previous experimental results). Image and parameters will be forwarded to the following parts to handle the communication. Outline of the GUI will be as follows:

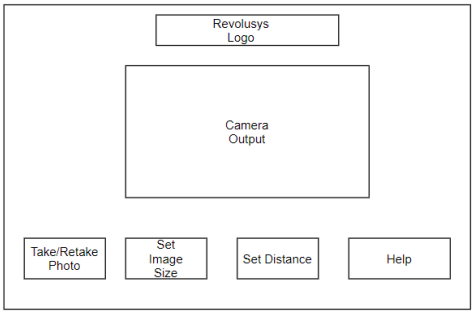

Figure 1: Outline of the GUI Design

6. Conclusion

Various types of deliverables in communication and transportation parts will be presented at the completion of the project. Furthermore, a GUI design will be implemented to better control the system by being user friendly.