RapidEMS Progress Report 1

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This report outlines progress on RapidEMS, a system improving emergency vehicle response in cities. We use RapidGLD, a version of Greenlight District Simulator, for simulations. Steps include updating GLD, creating an EMS vehicle model, and simulating road systems. We will analyze data for response times and traffic trends in five urban locations. For software, we use Python with GPS for accurate tracking. The goal is to link two computers representing vehicles and alert drivers. Physical materials include Raspberry Pi 4 computers, GPS modules, and a SanDisk Dual 64GB MicroSD Card. Future plans involve testing and calibrating the system.

I. INTRODUCTION

This progress report outlines the developments and preparations made for our project, focusing on simulations and materials for the implementation of RapidEMS—a system designed to improve emergency vehicle response efficiency in urban areas. The simulation aspect involves the use of Greenlight District Simulator (GLD), specifically our adapted version named RapidGLD. This microscopic-model vehicle and traffic simulation facilitates data collection and analysis, allowing us to simulate real-world traffic scenarios and extract valuable information about the response times of EMS vehicles.

II. TESTING

Data will be collected via a revised and updated version of Greenlight District Simulator (GLD), a microscopic-model vehicle and traffic simulation developed in Java. GLD will be used because of its expandability and data analysis capabilities. The version of GLD that we have developed is named RapidGLD. Several steps have or will be taken to setup RapidGLD:

1. Download GLD and its related HTML documentation from an online source. We have attained GLD from SourceForge [1].
2. Update GLD to support modern versions of Java.
3. Create a new RoadUser that fits the requirements of an EMS vehicle.
4. Create road systems to simulate real-world traffic.
5. Test over a period of time and extract data.

A. Data Analysis

Analysis of data outputted from RapidGLD may reveal trends of traffic simulated. Furthermore, the data will act as quantitative data for our hypothesis.

B. Locations

We have decided to use five different locations, all located in urban areas. The locations were chosen randomly and all lead to their own respective nearest hospital in their area. With RapidGLD, we will be creating effective ways to get to those hospitals efficiently and with ease. The five locations and their corresponding hospital are as follows:

- 025 Atlantic Ave, Brooklyn, NY 11235 to NYC Health + Hospitals/Woodhull
- Acacia Ave, Staten Island, NY 10308 to Staten Island University Hospital
- 285 Fulton St, New York, NY 10007 to The Brooklyn Hospital Center
- 2 Bank St, New York, NY 10014 to The Brooklyn Hospital Center
- Times Square, Manhattan, NY 10036 to New York-Presbyterian/Weill Cornell Medical Center

III. MATERIALS

For the software of RapidEMS, we will be using Python with certain GPS and Signal extensions to accurately track the latitude and longitude coordinates needed for distance sensing. The general objective for our software is linking 2 computers that represent the vehicles and some type of alert is shown to the driver of the civilian vehicle to alert the presence of an ambulance. The initial version that is currently in development has a bare bones interface that shows a simple message that an emergency vehicle is en route.

In terms of physical materials for our physical simulation. We sent our order request in for the following

- Raspberry Pi 4 (4GB Ram)
  - $62.90
  - QTY: 2
  - These tiny computers run off USB power and are perfect to run python scripts. With built-in wireless connectivity, they can communicate with other PI's over Bluetooth, radio, or Wi-fi. One will represent a civilian, the other will represent an emergency vehicle.
- Raspberry Pi GPS Modules

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  - $18.98
  - QTY: 2
  - These GPS modules allow full coordinate tracking and offline geo-location on the pi. For our case, we will use this to determine if the emergency vehicle is approaching by reading the longitude and latitude values.
- SanDisk Dual 64GB MicroSD Card
  - $14.35
  - QTY: 1
  - This is simply the storage devices that Raspberry Pi's use to hold their operating system and applications.

IV. FUTURE PLANS

Once our items arrive, we will do software testing and make sure all the radios and GPS modules are properly calibrated and ready for use. We then will preform mock tests to ensure that the system communicates correctly and with as little delay as possible.

[1] https://sourceforge.net/projects/stoplicht/.