I. Project Statement

Although this project stems from 621, there has been a significant enhancement in the strategy and thinking, in this semester. The project in 621 concentrated solely on the Forward Collision System and utilized a Driver Vehicle Interface box to warn the driver of a potential danger and if needed bringing a train to a complete stop before the impact.

This semester the concentration is to develop a model mini rail system (possibly on a campus) that utilizes a Major Train Control Logic Center, which controls the movement of the trains between different stations. The idea is to efficiently and safely transport passengers from one station to another. The trains being operated are unmanned and therefore care needs to be taken to avoid any hazards and keep the passengers intact. Intense and accurate coordination is needed between the trains and the control logic center. Trains must be able to avoid accidents by consistently knowing where the other trains are on the tracks. The Control Center itself should have sufficient logic to assign trains at the right time and make sure enough time and distance exists between the trains.

In order to successfully implement and model this system, a two-phase process is needed. **Phase I** (This semester) will concentrate on the following:

1. Define requirements-specifications for the project both at system level and at component level.
2. Looking at the constraints of each of the components and possible scenarios that will be encountered.
3. Ensure proper communication and coordination from
    a. Control Logic Center to trains
    b. Trains to Logic Center
    c. Control Logic to the Remote Panel (located at each station)
    d. Control Logic to track sensors, Etc.
4. Performing Optimization and Tradeoff Analysis on
    a. Type of Signals from and to Control Center (RF, Antenna, GPS, Bluetooth)
    b. Sensors on Tracks
    c. Forward Collision System
    d. Trips (slow, stop trains before a station)
5. Performing traceability matrices to show how individual requirements have been taken into account in system-level design and why each system-level component is needed.
6. Performing Measure of Effectiveness with regards to how system is evaluated and what are the difficulties in the evaluation.

II. Examples

An example activity diagram portraying a high level viewpoint of the communication between Control Logic Center and user (CLC to User), Figure 1, and as well as the communication from the train to Control Logic Center (Train to CLC), Figure 2, is shown below:

CLC to User:

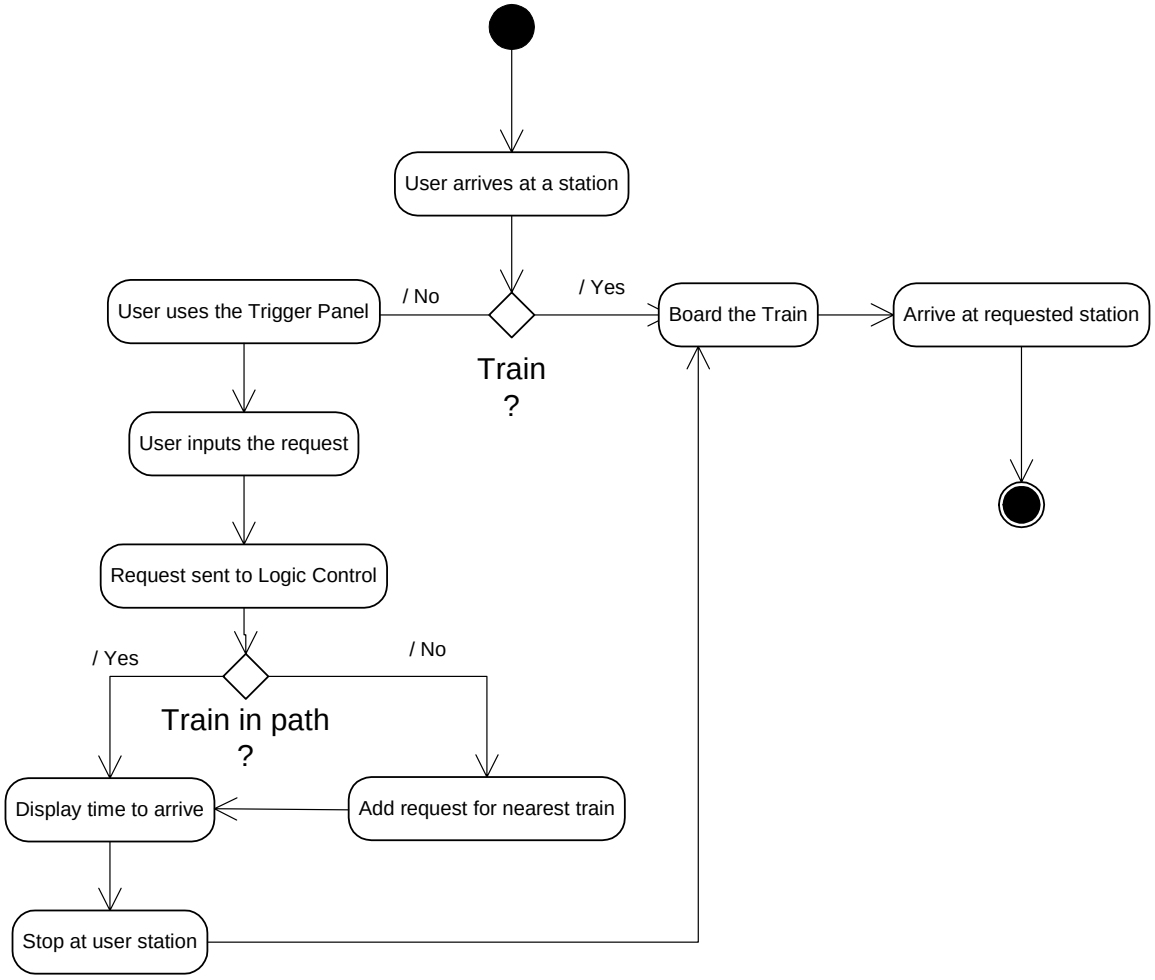

Figure 1

From Train to CLC:

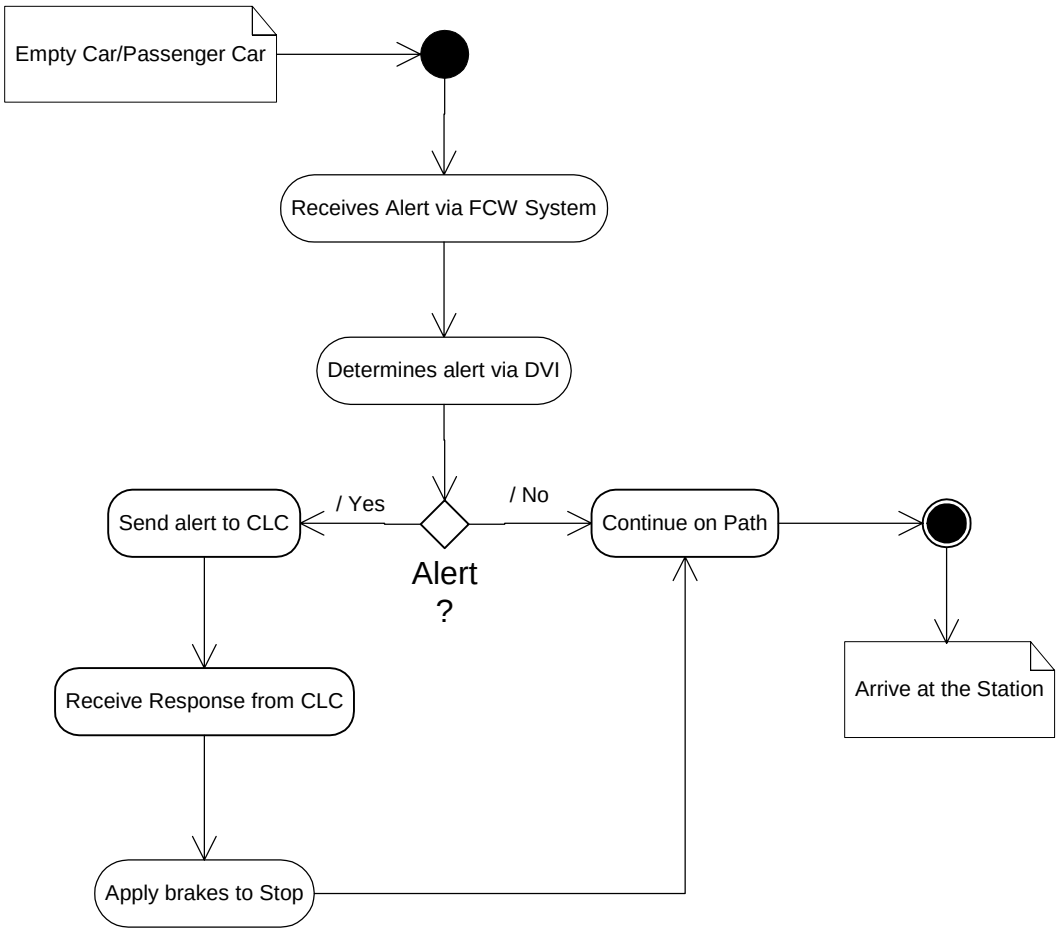

Figure 2

III. Methods used

The project will utilize most of the methods learnt in 621 and 622.

1. From 621 – Use Case models, Activity Diagrams, State Diagrams, Traceability, System behavior, etc.
2. From 622 – DSM, FSM, Optimization and Tradeoff Analysis, Measure of Effectiveness will be performed.
3. Overall the purpose of the project will be to set a stage where a model can be designed and eventually this mini rail project can be extended to accommodate larger metro rails.

IV. Next Class

Phase II (Next Semester) will concentrate mostly on:

1. Constructing a model design.
2. Simulations.
3. Validation and Verification of the model.