**GSP 295 – Data Structures**

**Week 8 Lab**

***Due: Beginning of Class Week 8***

Techniques Used: Priority Queue, A\*, Has Table, Finite State Machine, Event Driven Design

* Create an object that has a unique ID
* Use a Hash Table (map) to store a pointer to the object using its ID as a key
* Create a Graph that can be used for pathfinding
* Create a Priority Queue that can hold messages sorted by delivery time
* Create a finite state machine for the object that has the following states
  + Follow Path
  + Death
* Upon initialization of program create one entity and place in Follow Path State
* While in the Follow Path state, the following actions should occur
  + Object should be green
  + Enter:
    - object should get a path to follow through a graph using A\*
      * Path should from a random start and finish point (i.e. every object that enters this state should get a different path)
    - Object is colored Green
    - Call Execute
  + Execute:
    - Object will move to next node in path
    - Object will test to see if has reached destination
      * If Yes, goes to Exit
      * If No, send a message to check back in 1s
  + Exit:
    - Object should transition to Death State
* While in Death State, the following should occur
  + Enter:
    - Object should be turned black
    - Call Execute
  + Execute
    - Create another object and initialize it to Follow Path State
    - Call Exit
  + Exit
    - Delete object from memory and remove from screen
* You can alter this project as long as the following items are demonstrated
  + A\*
  + FSM
  + Event Driven
    - objects change states via an event driven message system
  + Minimum of two states
  + Store messages in a priority queue
  + Use some sort of map/hash table to obtain a pointer to object from an ID
* Submit project in dropbox