Digital Twin Simulation Environment Development for Smart Cities

Abigail Joseph, REU | Florida Atlantic University

Dr. Jinwoo Jang | Florida Atlantic University
Digital Twin

"A digital twin is a dynamic virtual copy of a physical asset, process, system or environment that looks like and behaves identically to its real-world counterpart."¹

This project aims to develop data-enabled agent models and virtual simulation environments.

**Objectives**

- **Develop**
  - Develop a *city infrastructure environment* based on real 3d data

- **Define**
  - Define *pathfinding behaviors* of agents
Digital Twin Environment

Created using **real, 3d data:**

- **City of West Palm Beach**
- 3d mapping (x, y, and z axes)
- Photogrammetry
Defining Agent Behavior

*Waypoint Pathfinding*

- Place game objects which *map the agent’s route* & avoid objects
- Each waypoint is connected
- Path is mapped, taking into account *how far the agent has traveled + distance to its destination*
Agent Interactions

Other behaviors

- Pausing before crossing the street
- Walking
- Running

Adjusting the radius around an agent can determine its avoidance of other agents (and vice versa)

larger radius (3) - less effective avoidance (stalling)

small radius (0.5) - optimal
Conclusion

**Future Applications**

- Pedestrian – vehicle interactions

**A more realistic virtual environment**

- Crowds/groups of pedestrians on certain days and times (morning, afternoon, evening)

- Detailed sidewalks, trees, etc.

**More pedestrians, behaviors and interactions (children, wheelchairs and canes, guide dogs, etc.)**
Questions & Feedback