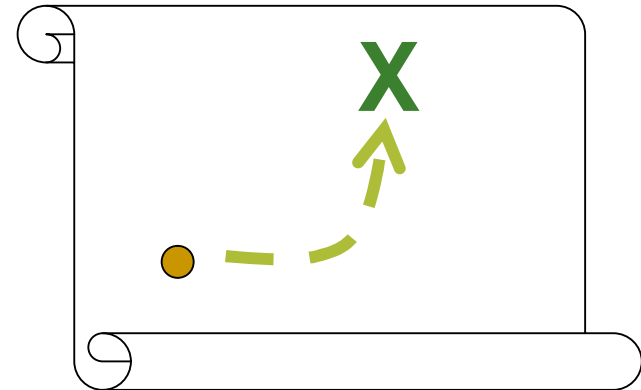

Path Finding Mobile Robotics

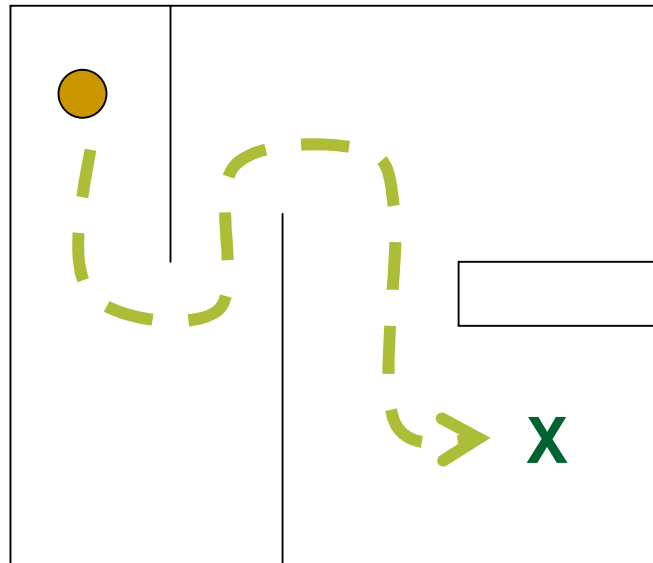
Louie Huang
Advisors: Dr. George Pappas,
Hadas Kress-Gazit



Introduction

- Path-Finding and Motion-Planning
 - Fundamental and Challenging Topic in Robotics
 - Point of Origin and Destination

Sample 2-D
Environment



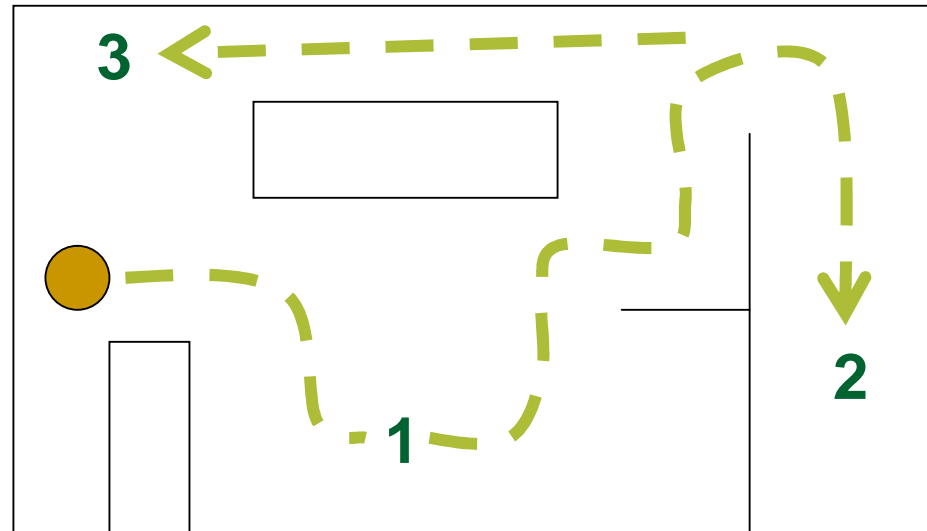
● Robot

X Goal

Project Background

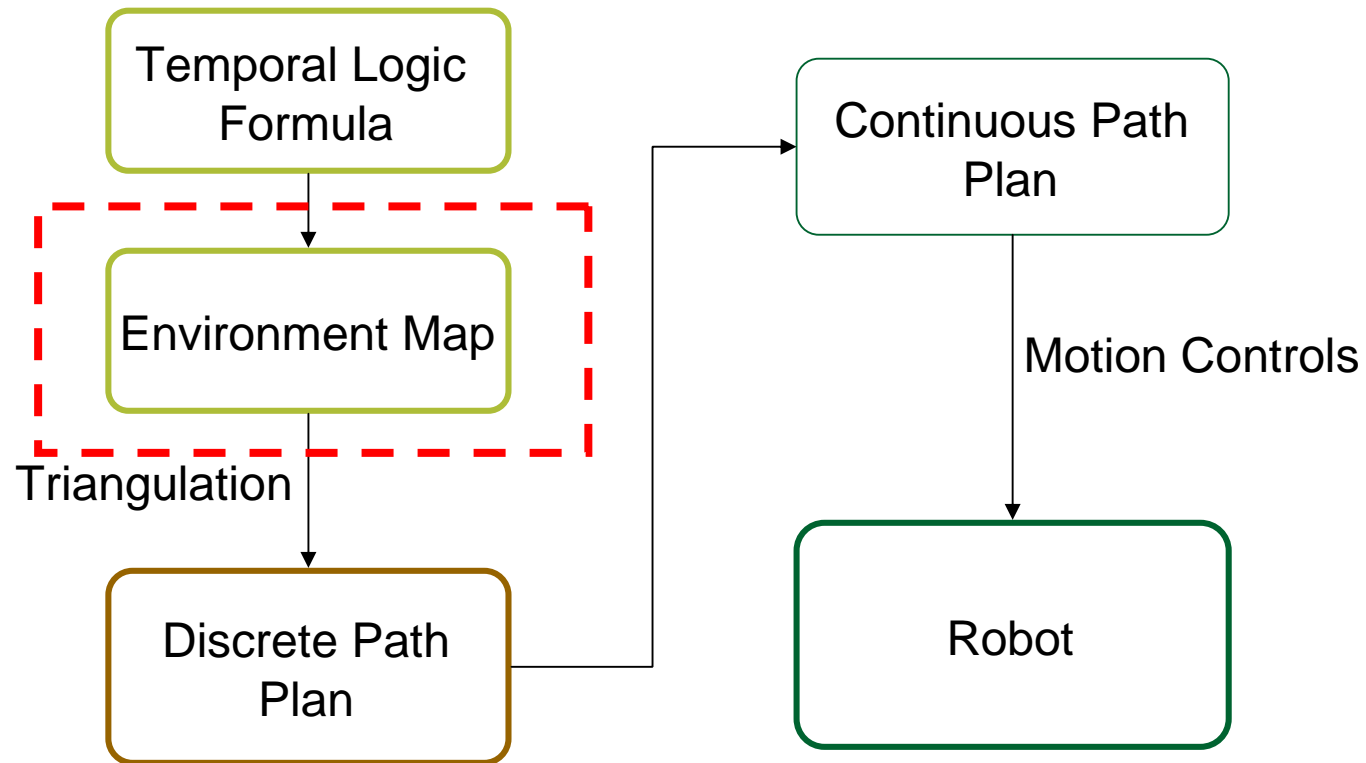
- Specify Directions in Temporal Logic Formula
- Generate Continuous Path Plan

Sample 2-D
Environment



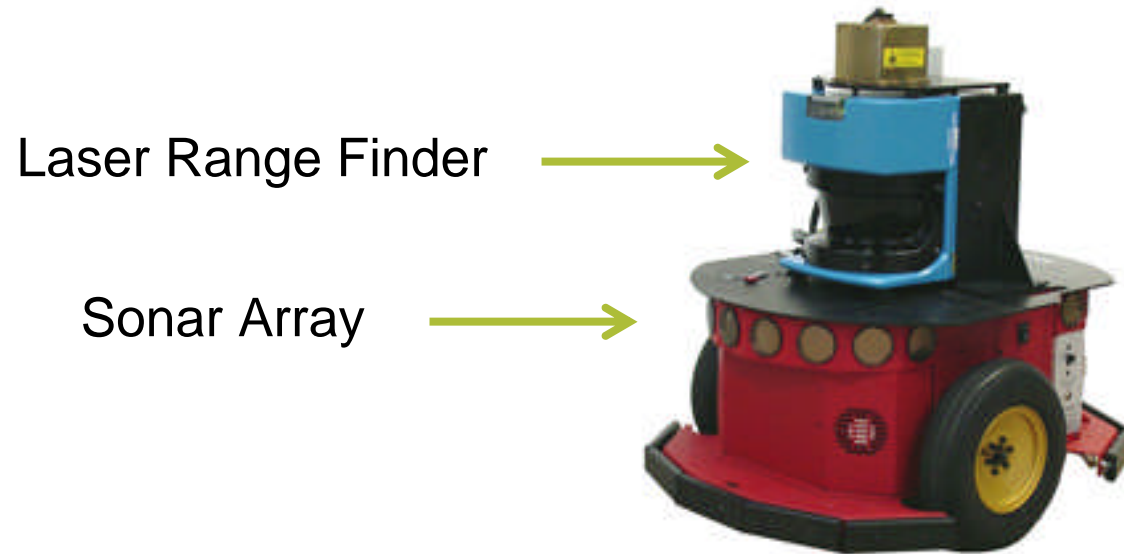
● Robot
1,2,3 Areas

Overview on Continuous Path Generation



Robot Platform

- ActivMedia Robotics Pioneer 3-DX

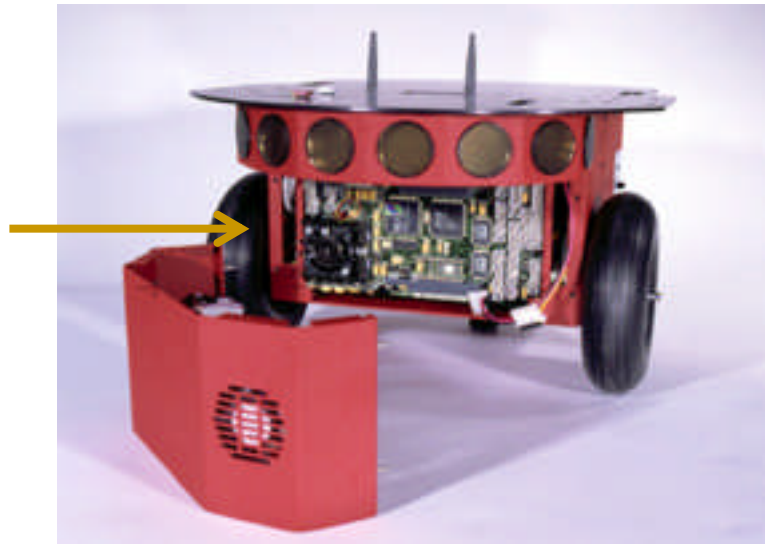


Capable of Localization

Robot Behaviors

- Shortest Path to Destination
- Obstacle Avoidance
- Custom Behaviors

On Board PC



Programming Custom Behaviors

- ActivMedia Robot Interface Application (ARIA)
 - Saphira Environment with Colbert
-

Programming Custom Behaviors

The screenshot displays a control panel on the left and a 2D environment on the right. The control panel includes the following data:

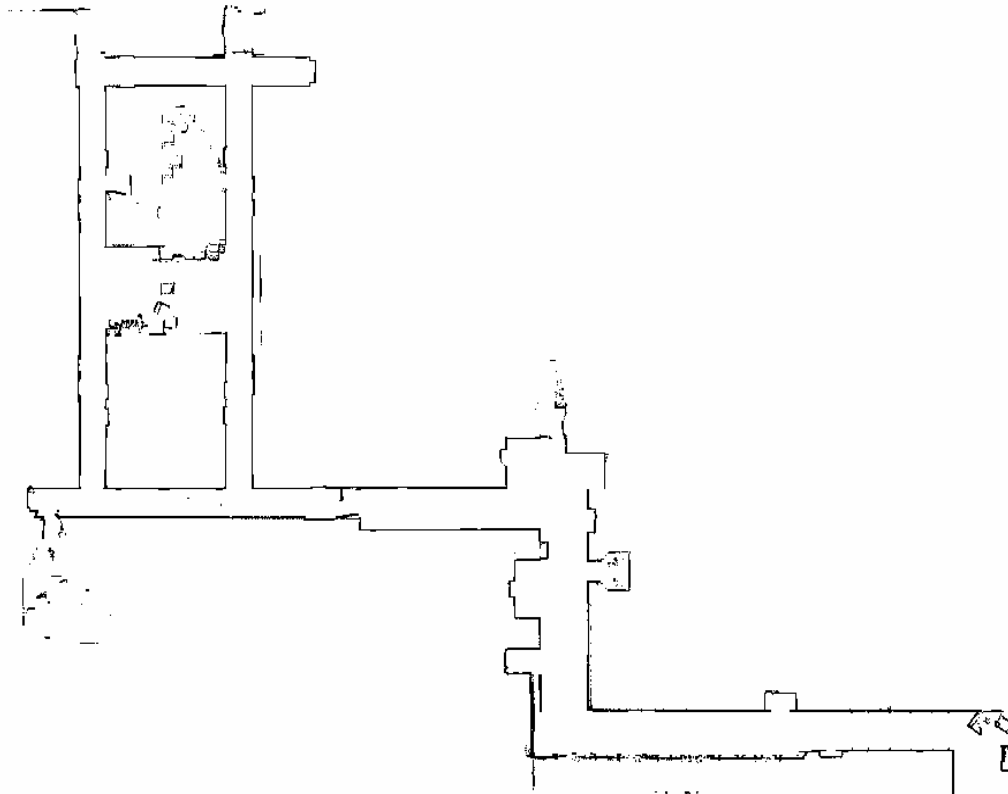
- X: 30000
- Y: 860
- Th: 0
- power**
- TV: 0
- RV: 0
- Mpac: 9
- Spac: 18
- Vpac: 9
- Bat: 13.0

Below the data are two buttons: "Behaviors" (with a yellow square icon) and "Motors" (with a dotted border).

The 2D environment shows a robot (a small blue square) positioned on a horizontal line. The environment contains several obstacles, including a large octagonal shape and a red rectangle. Scattered throughout the environment are numerous small squares, some blue and some green, representing data points or objects. A green dashed line is visible on the horizontal line, possibly indicating a path or sensor range.

Mapping Environment

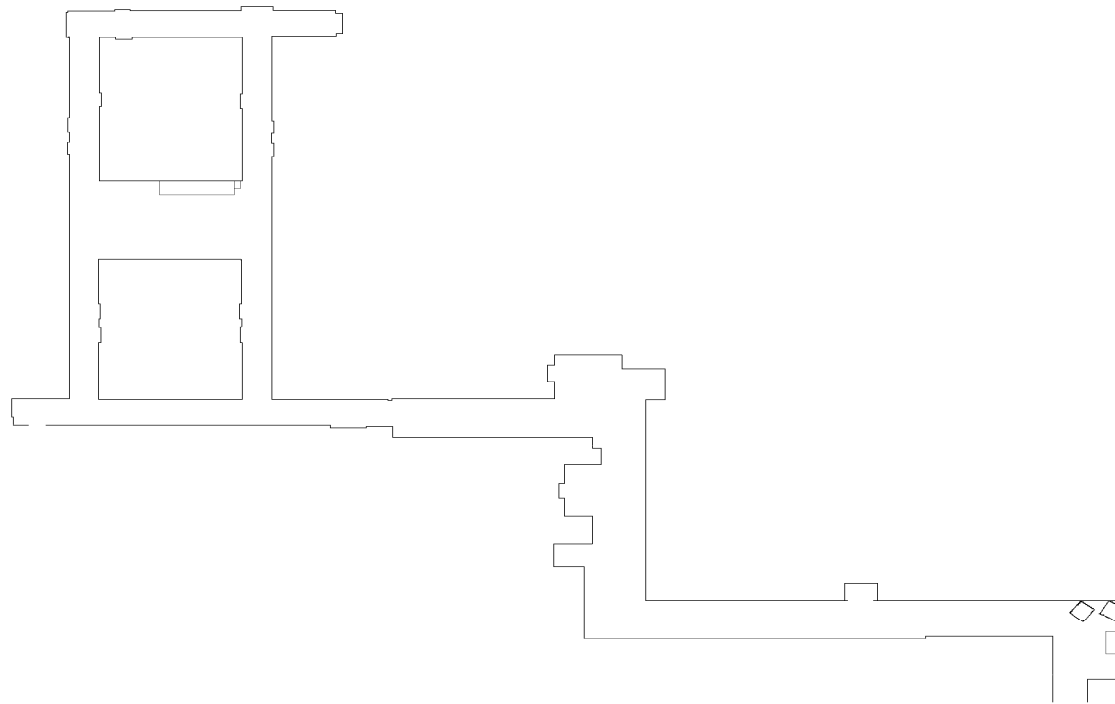
- Environment Mapped Prior to Implementation



Levine 4th Floor

Mapping Environment

- Resulting Map After Cleanup

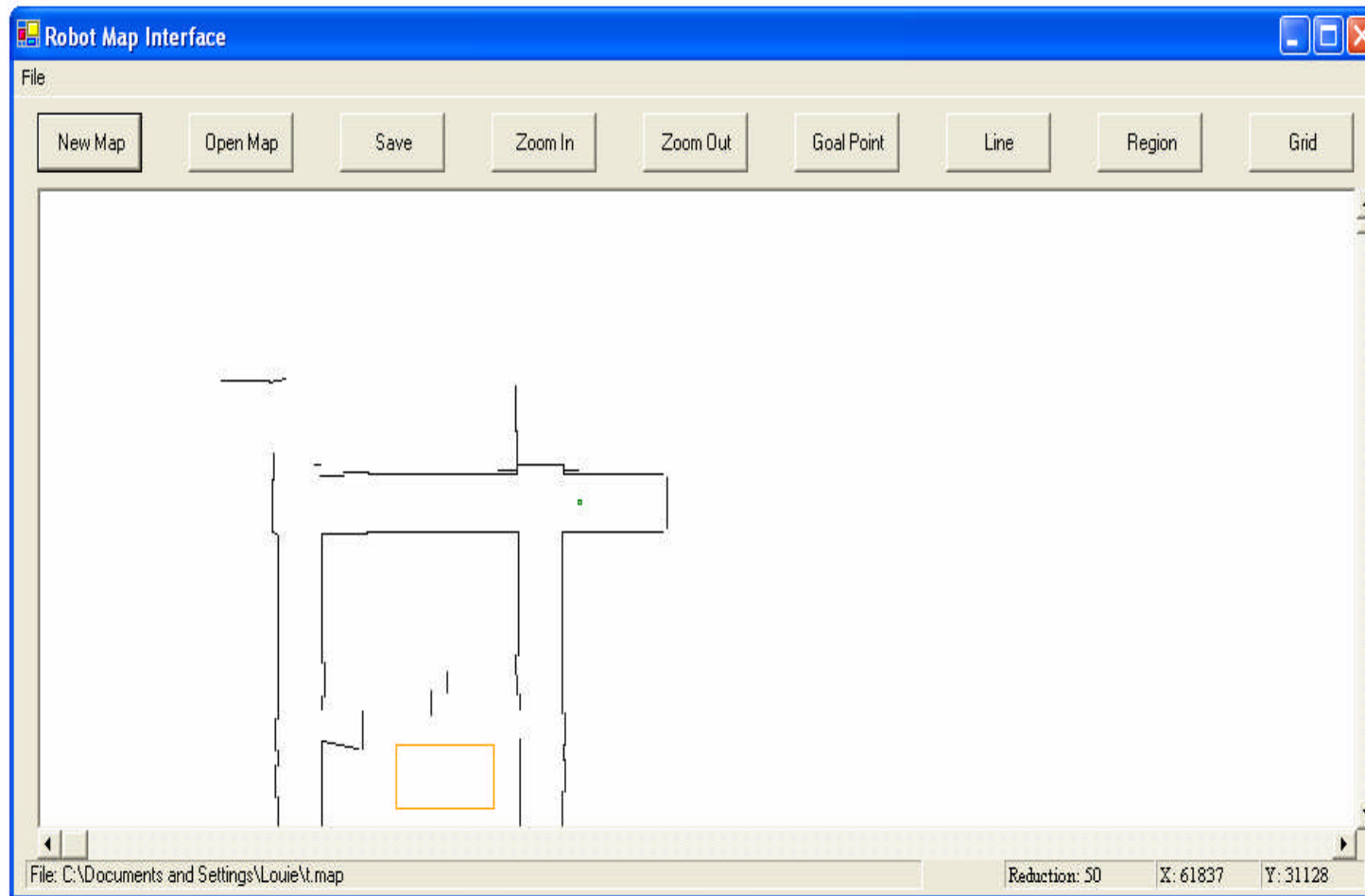


Levine 4th Floor

Robot Map Graphical User Interface

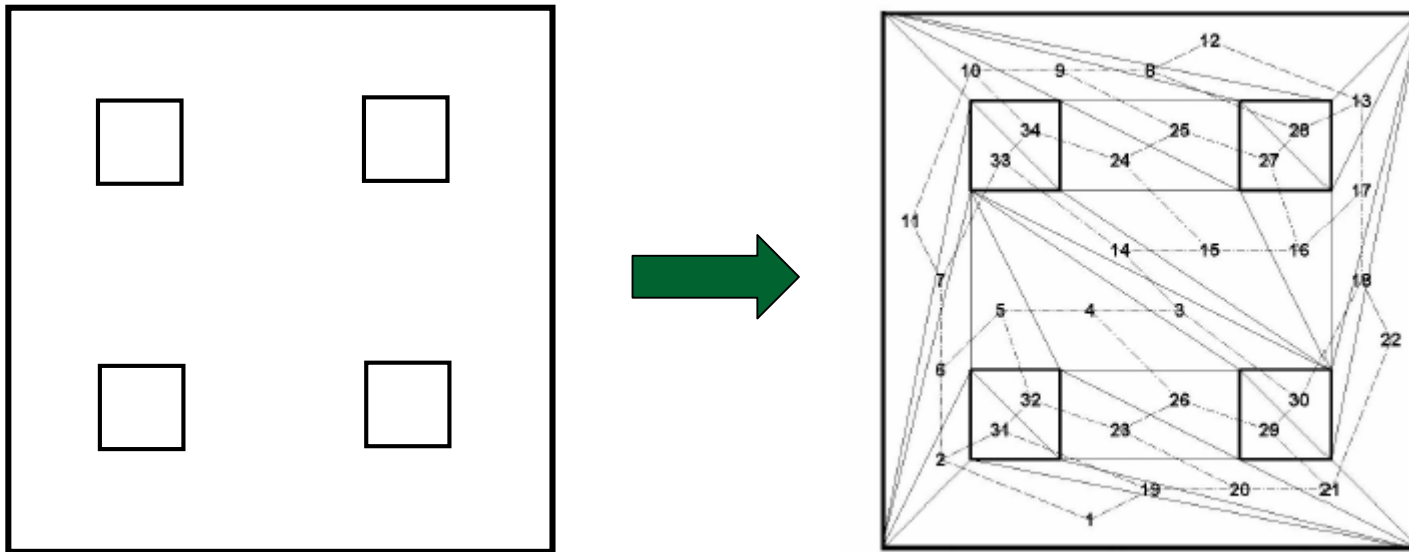
- Develop New Maps
 - Modify Existing Maps
 - Add Regions of Interest
-

Robot Map Graphical User Interface

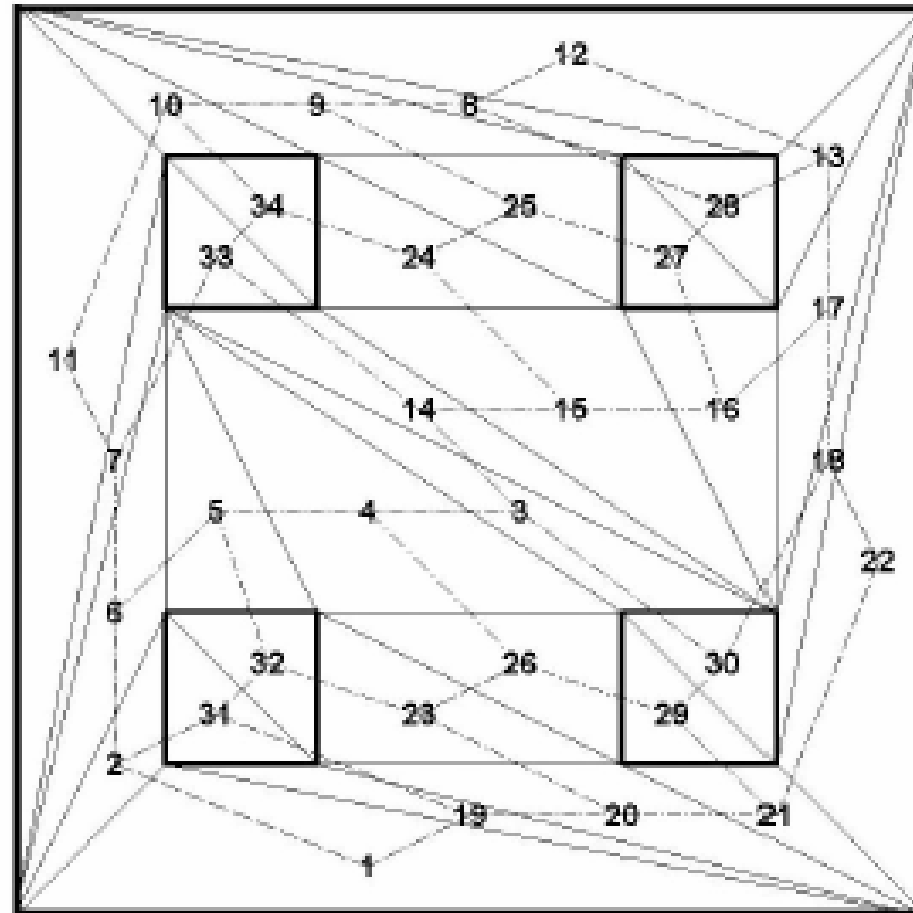


Further Development

- Next Step: Triangulation Function



Further Development



Further Development

- Additional Functions
 - Continuous Path Generation
 - Temporal Logic Formula Input
- Expand to Higher Level Directions



Acknowledgements

- Project

- Professor George Pappas
- Hadas Kress-Gazit

- SUNFEST

- Professor Jan Van der Spiegel
 - Shelley Brown
 - National Science Foundation
-