

TJ Hallway Traffic Simulation

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Model: Simulation

Efficient

Expandable

Easy to understand

Interactive

Graphical

Structure (Hierarchy)

Driver

```
graph TD; Driver[Driver] --- Buttons[Buttons]; Driver --- Students[Students]; Driver --- SchoolBuilding[School Building]; SchoolBuilding --- Rooms[Rooms]; SchoolBuilding --- Waypoints[Waypoints]; SchoolBuilding --- Objects[Objects];
```

Buttons

Students

School Building

Rooms

Waypoints

Objects

Structure (Classes)

Location

Person

Room

Object

Student

Classroom

Vending
Machine

Control (Buttons)

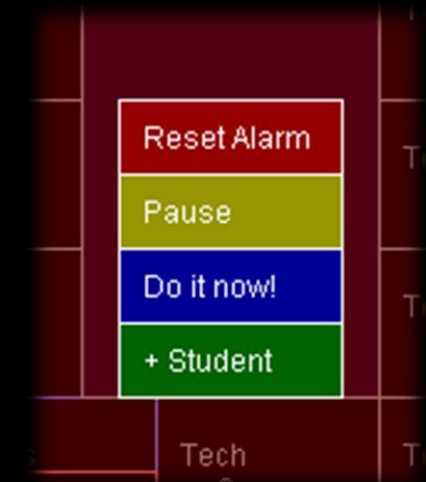
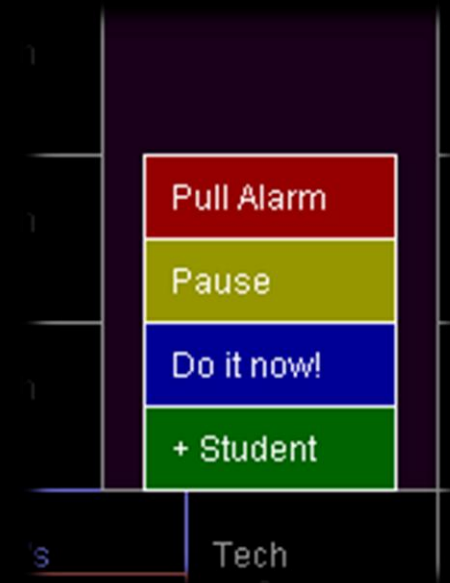
Play/Pause

– Continued **control**

Do it now!

+ Student

Pull Alarm



Control (Keyboard)

Up/Down arrow keys

- 8 speeds

Shift

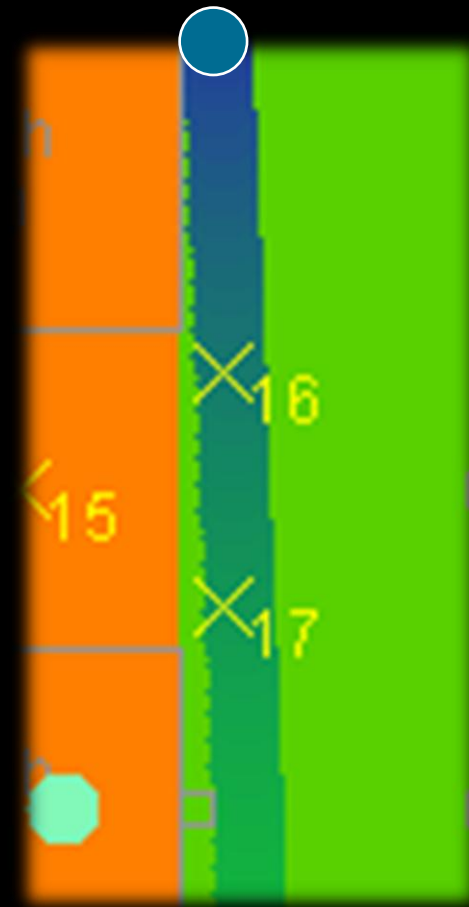
- Elevate action

Toggle View

Randomize destination

Locate selected student

Trace mode



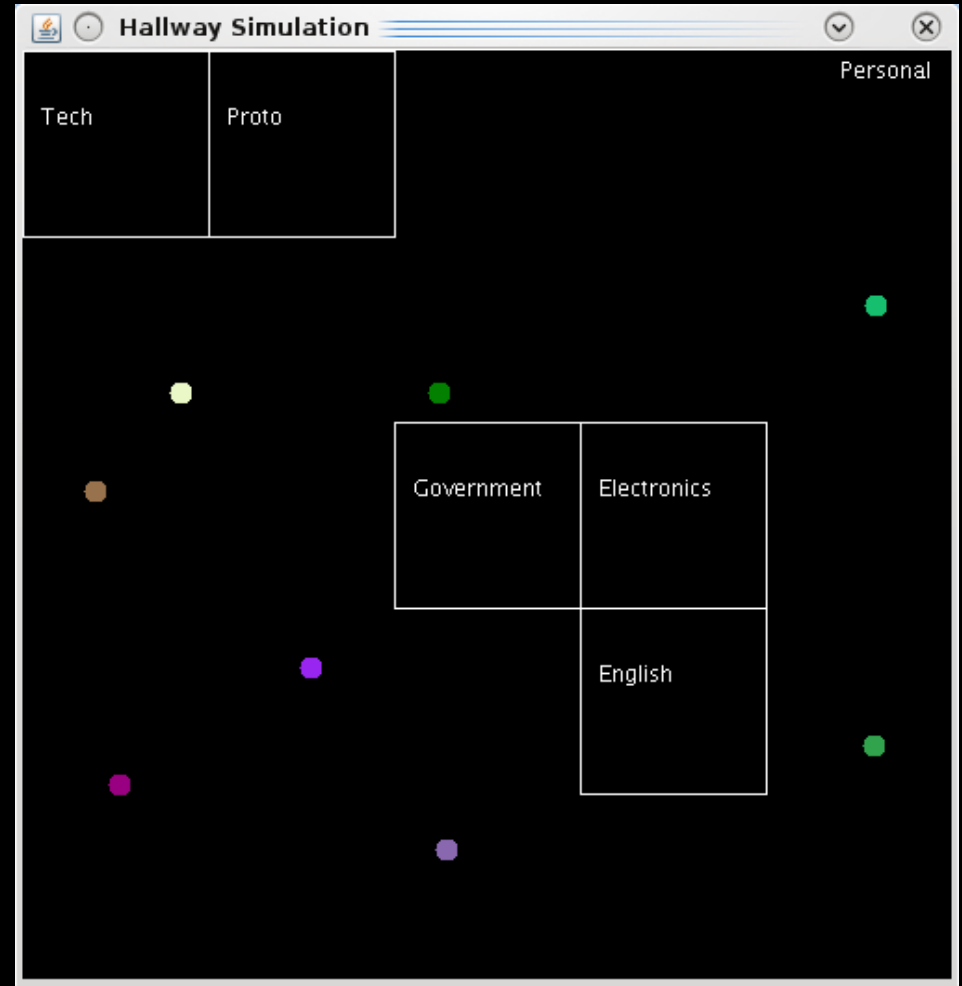
Interface - Evolution

Barebones

No buttons

Incomplete map

Few students



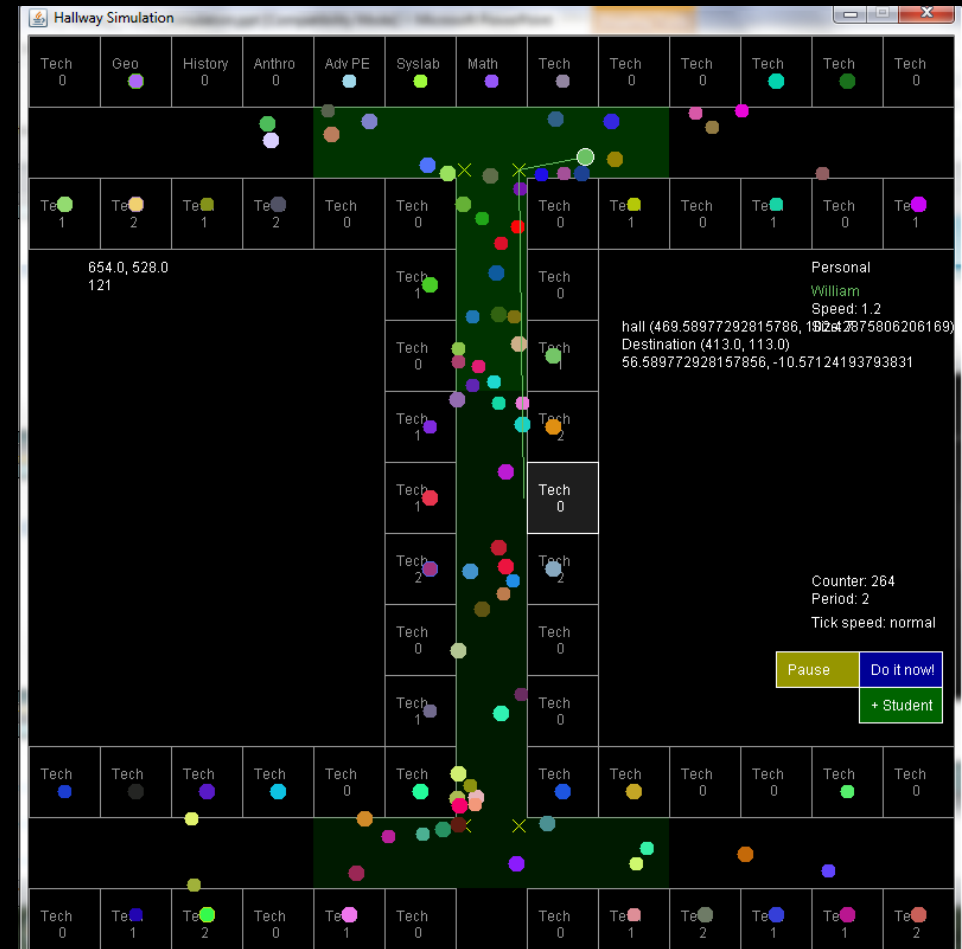
Interface - Evolution

Incomplete map

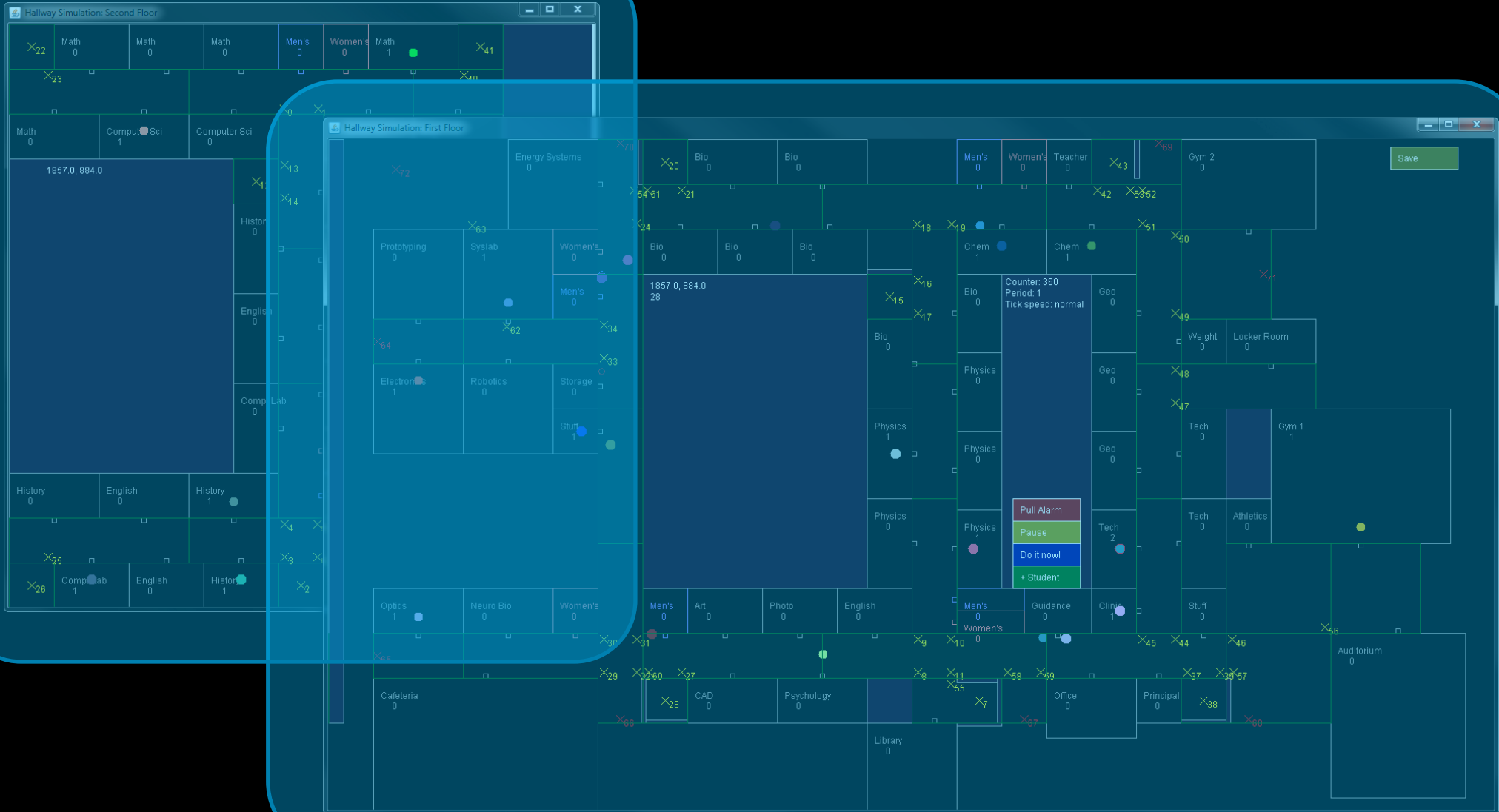
Identical rooms

One floor

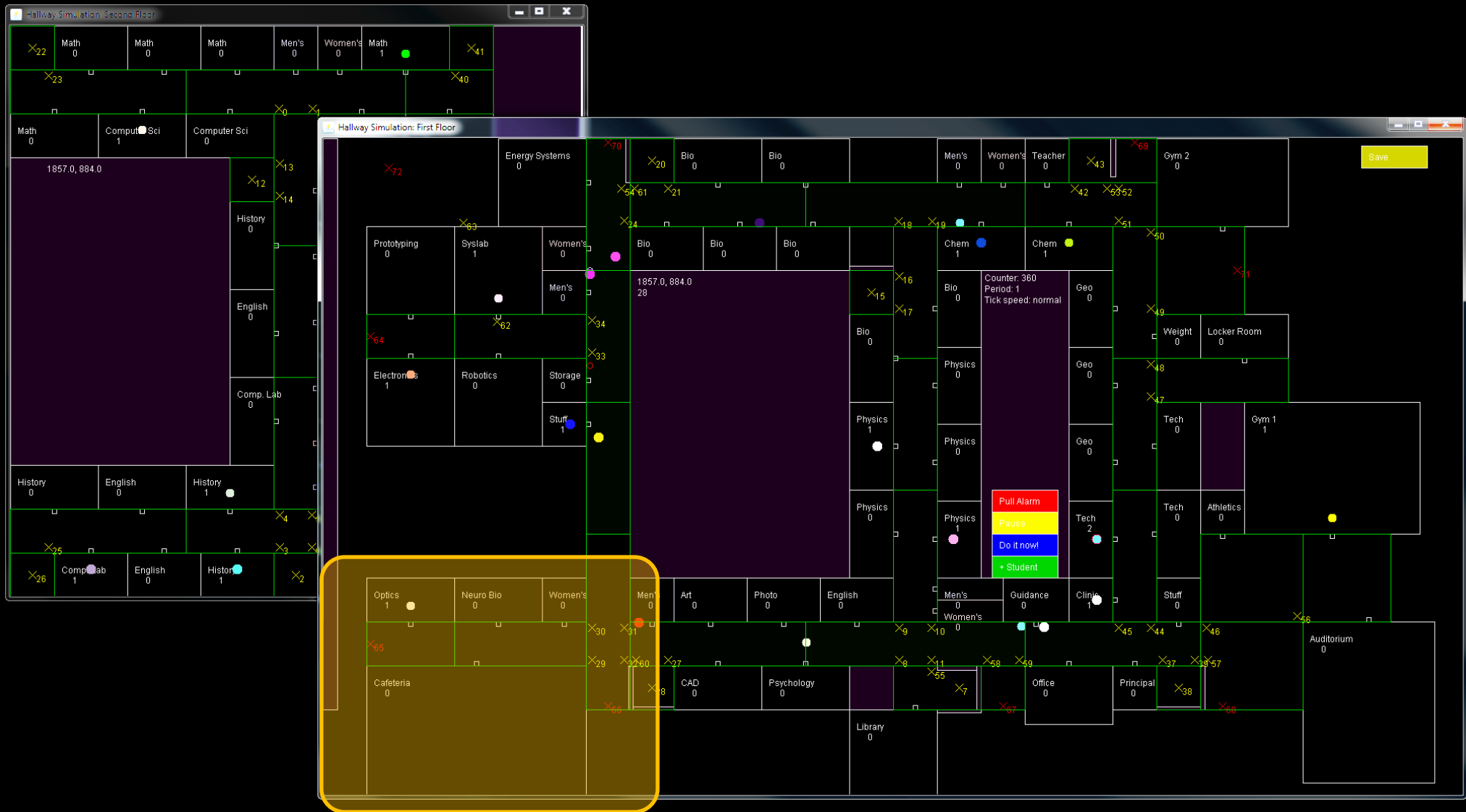
No entrances



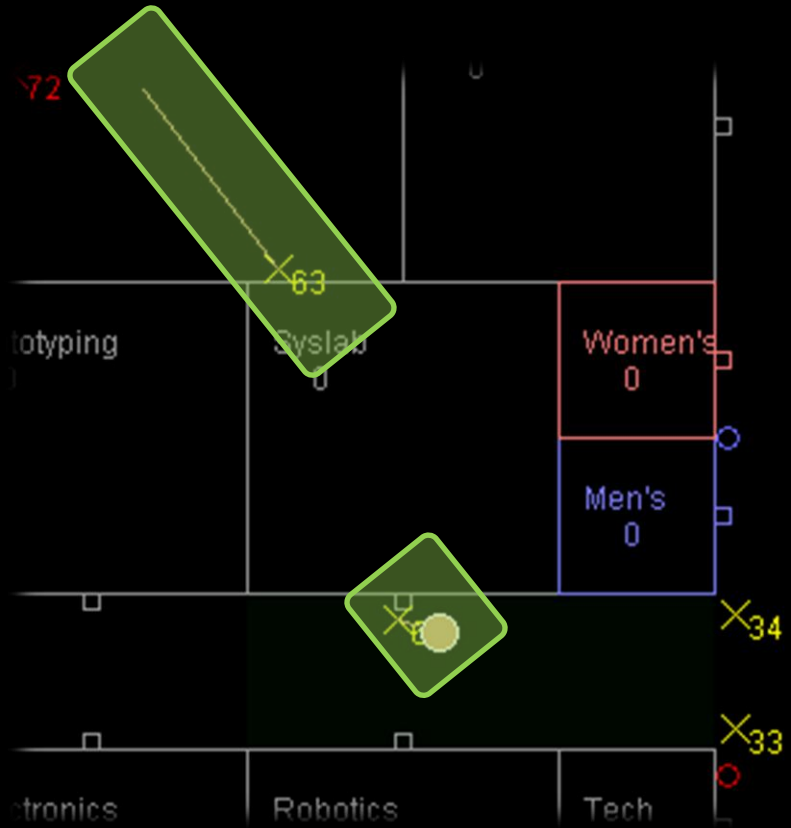
Interface – Windowing



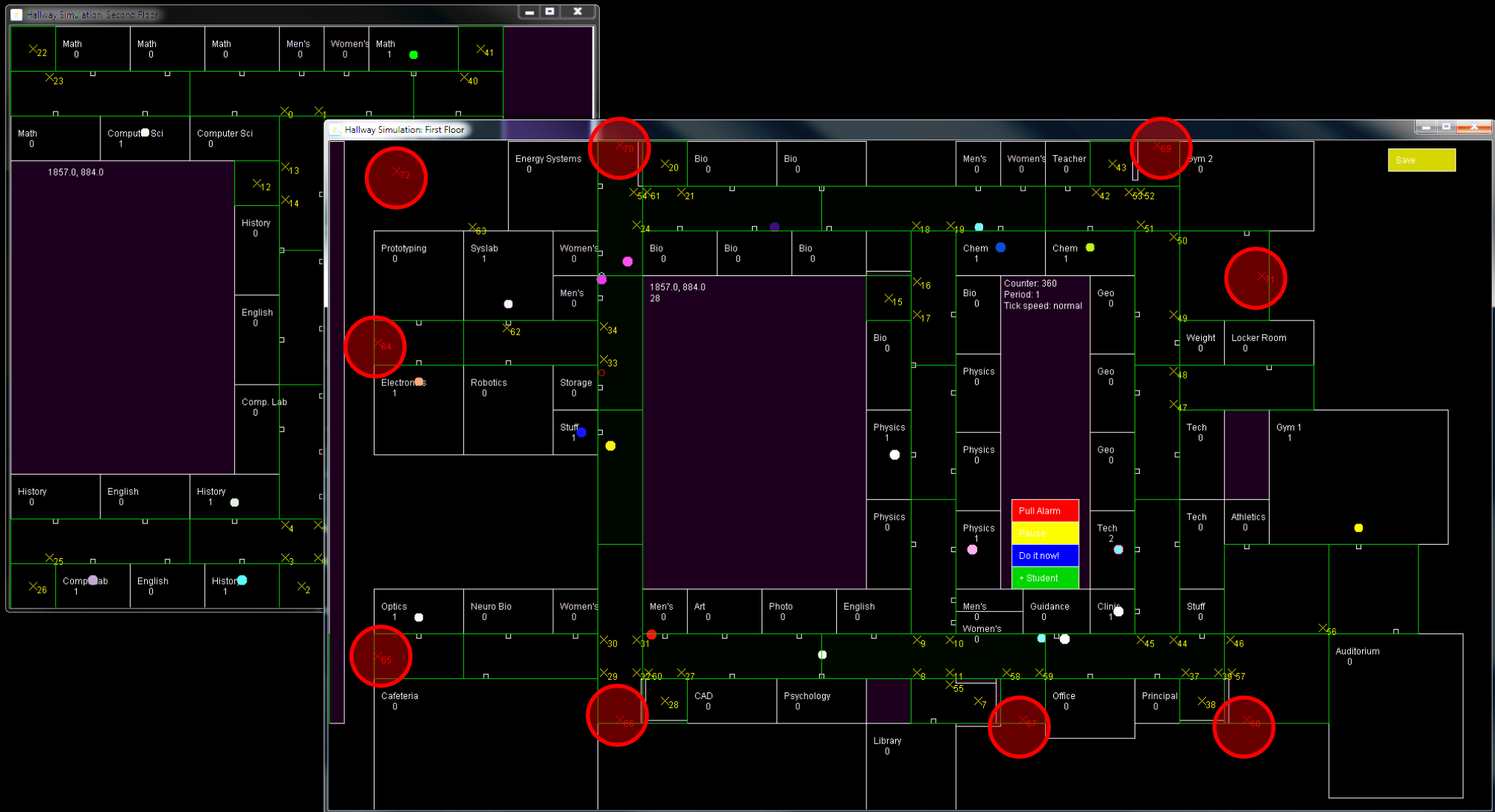
Interface – Rooms



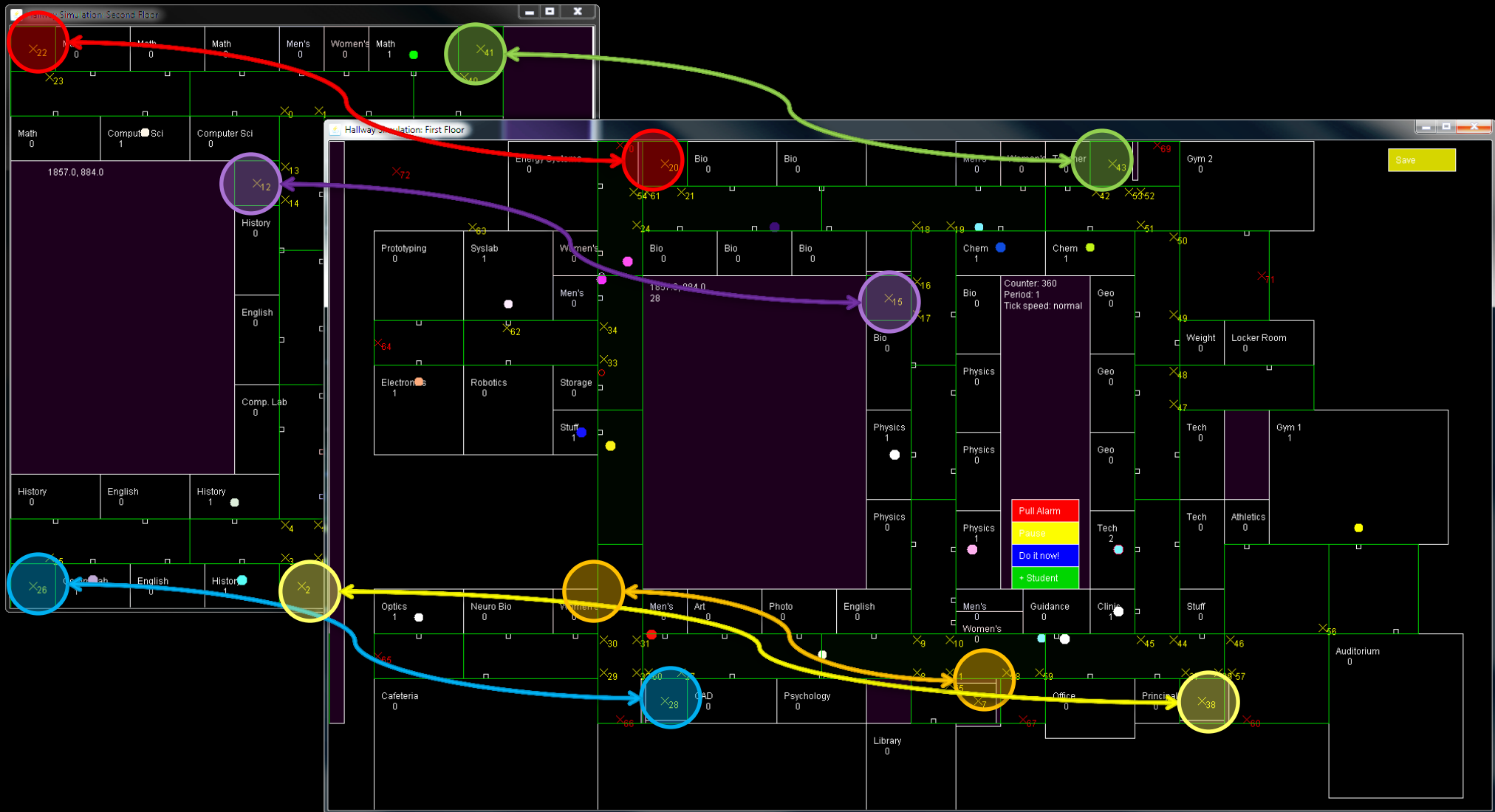
Interface – Multiple Doors



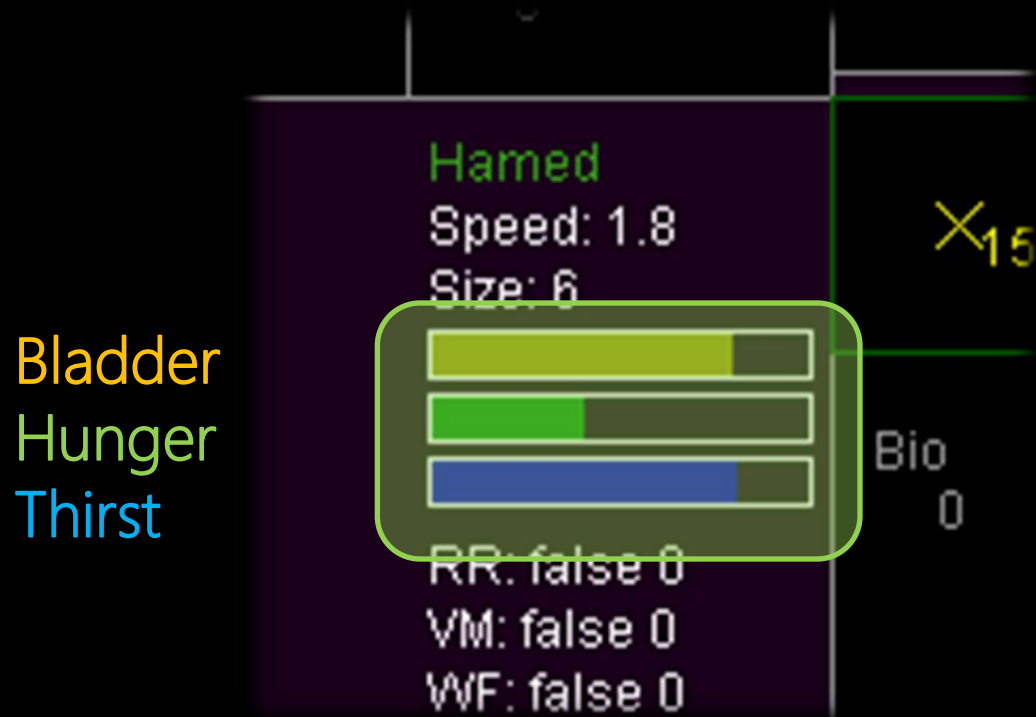
Interface – Entrances/Exits



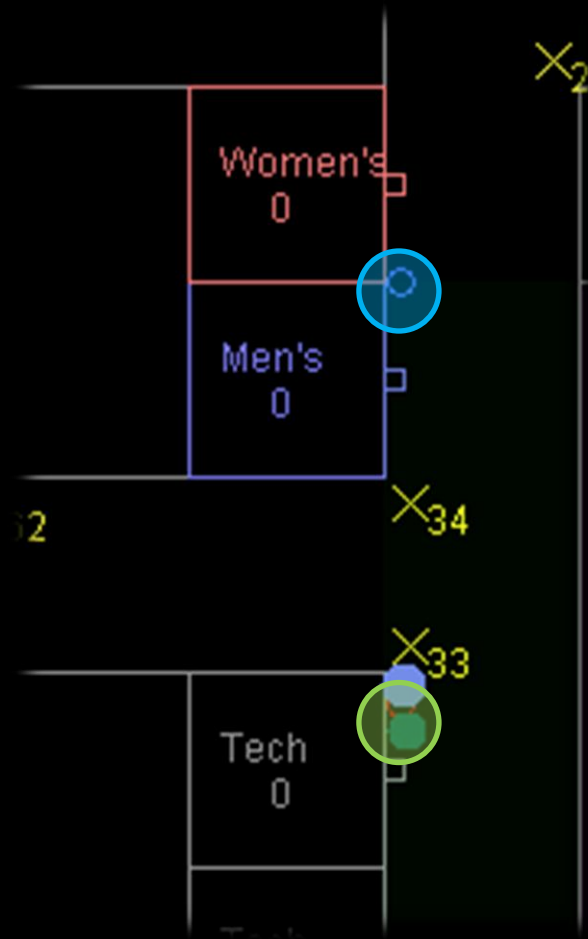
Interface – Staircases



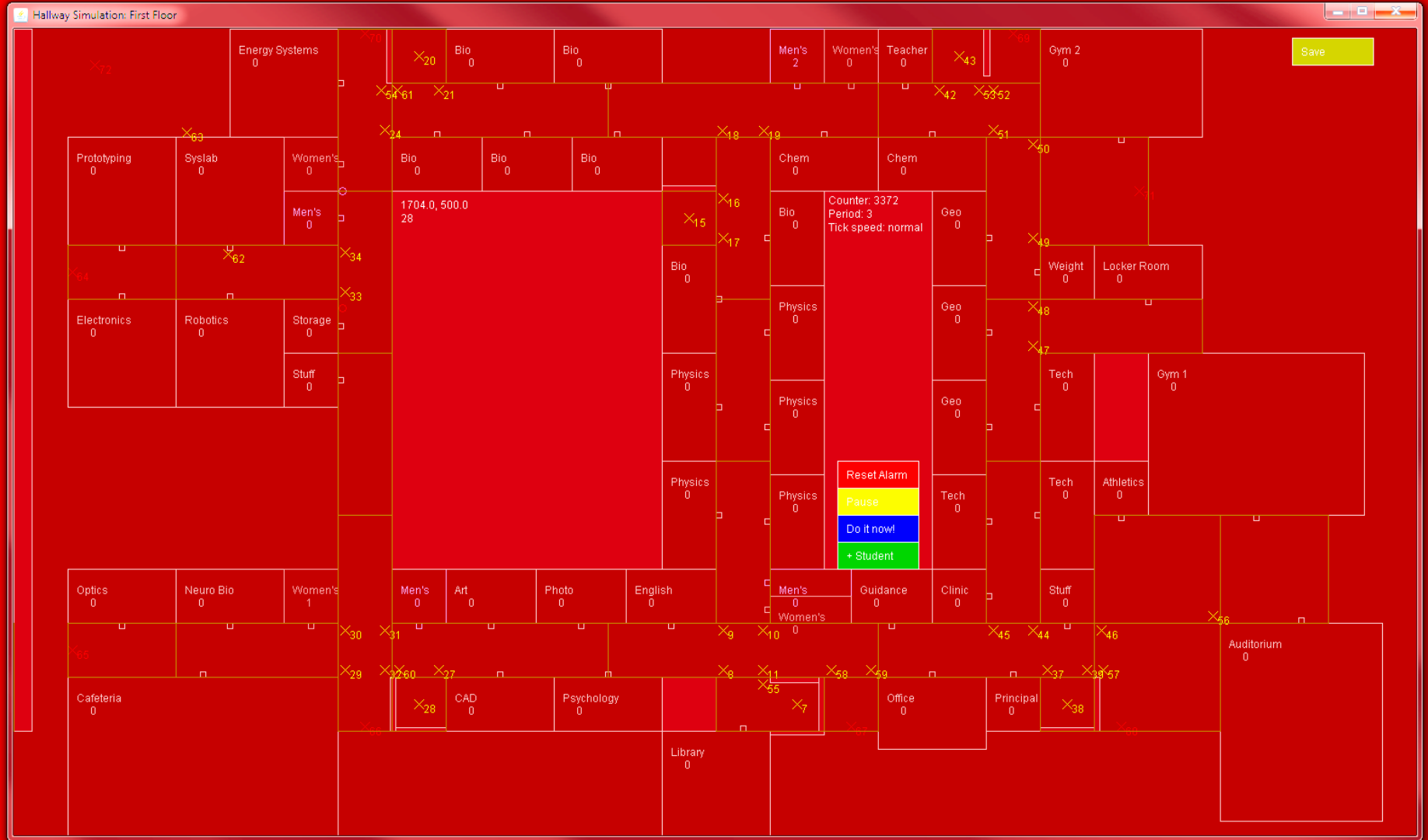
Interface – Meters



Interface – Foodstuffs



Interface (Q3) – Fire Drill



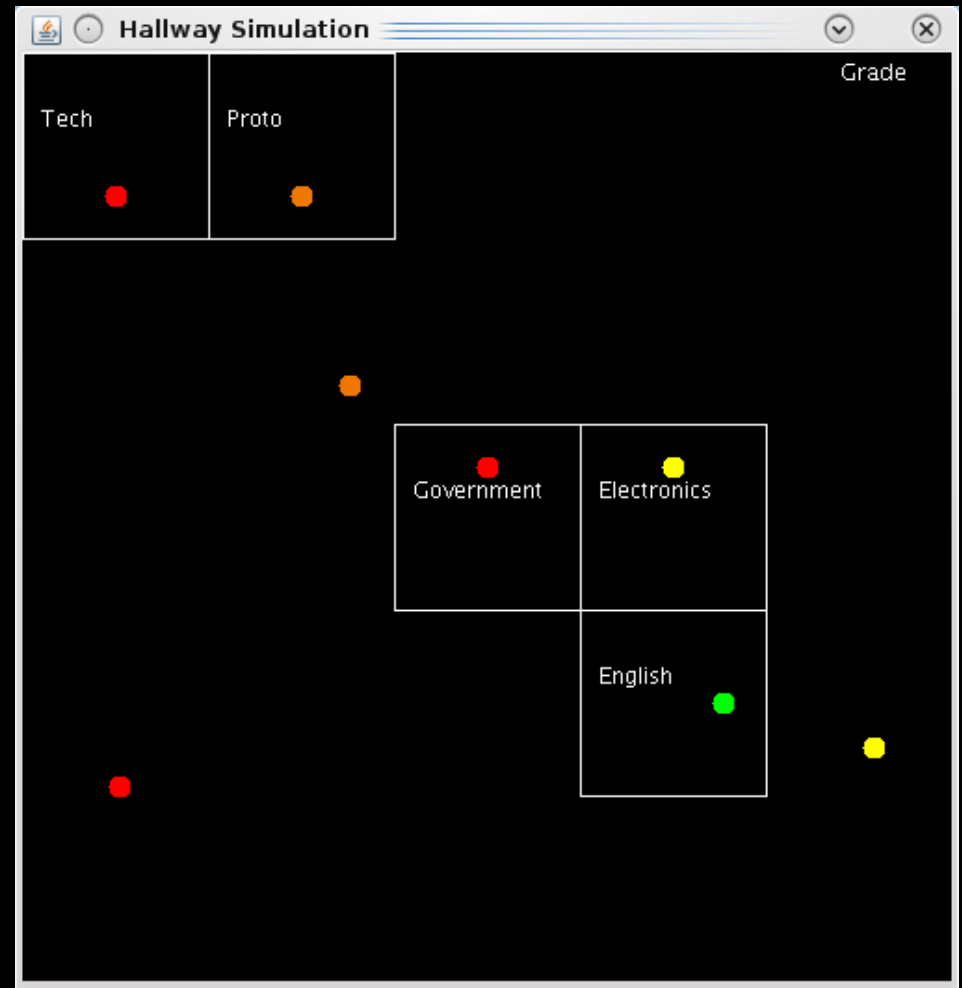
Background (Evolution)

Integer-based grid

One pixel movement along axes.

No path-finding

No inter-student interactions



Background (Evolution)

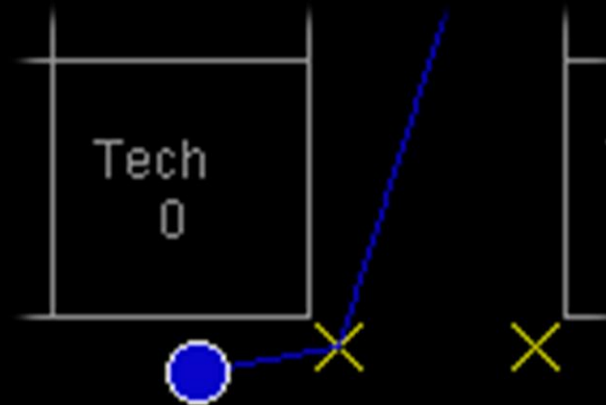
Float-based grid

Different speeds

Movement in any direction

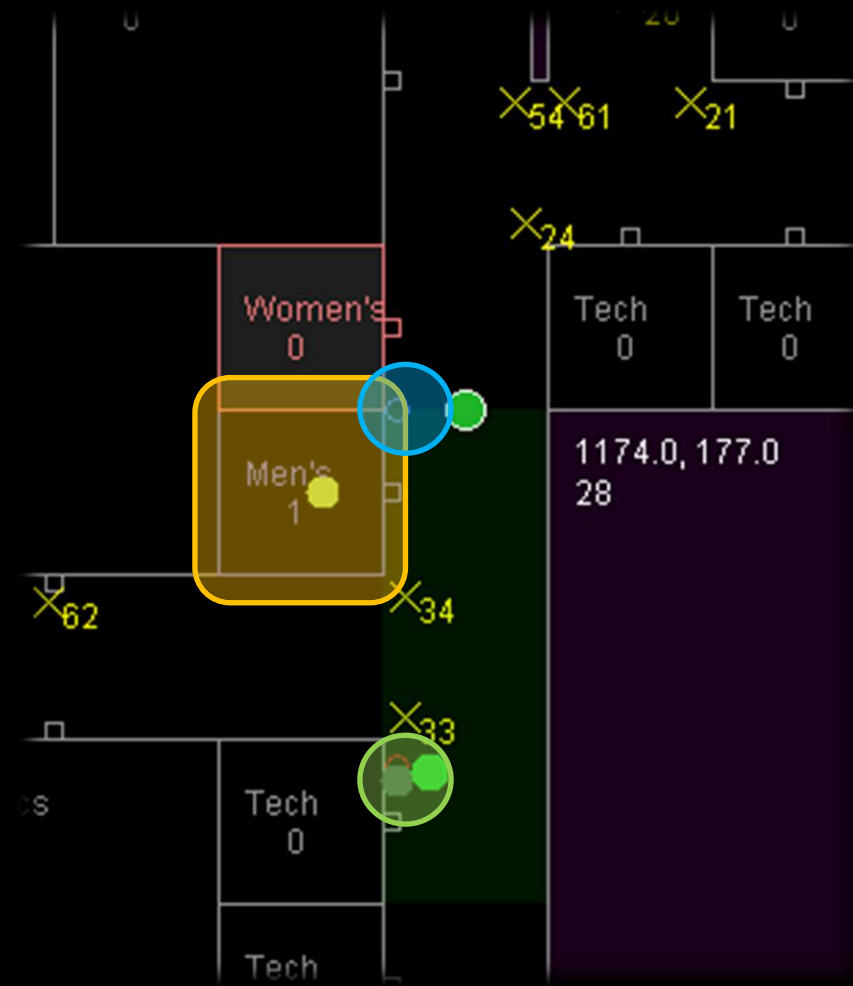
Collision detection

Hallway density



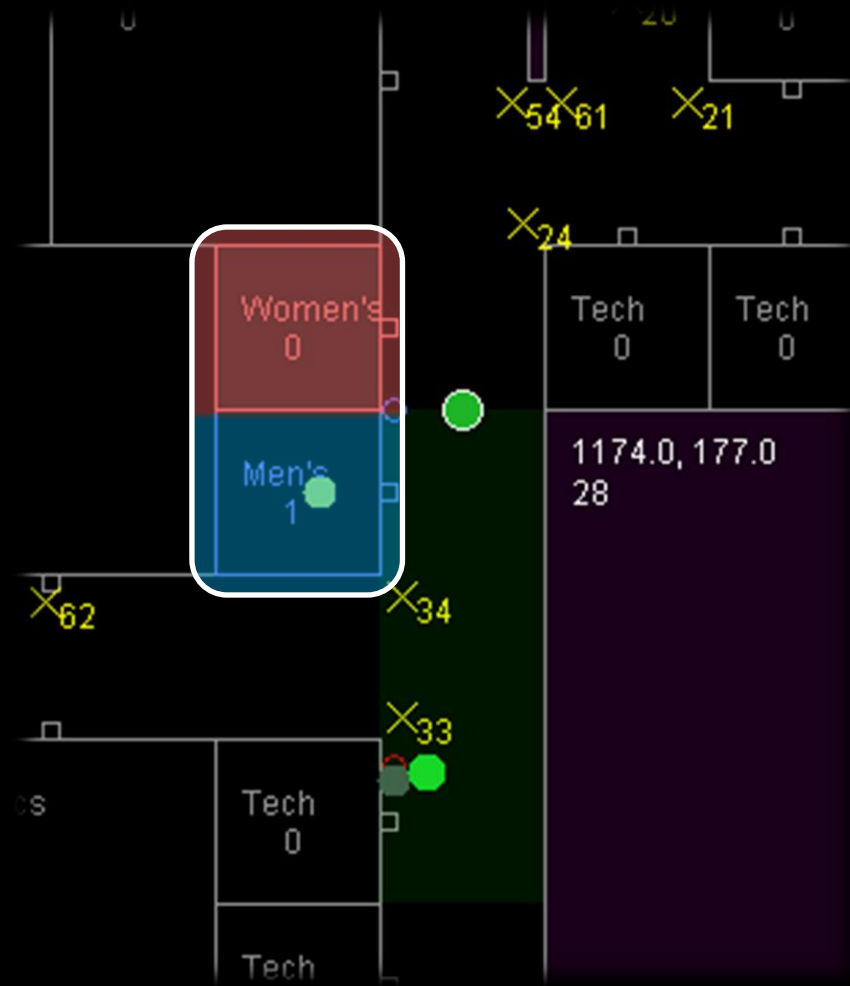
Background (Q3) - Intra-student Calculations

Different rates



Background (Q3) - Restrooms

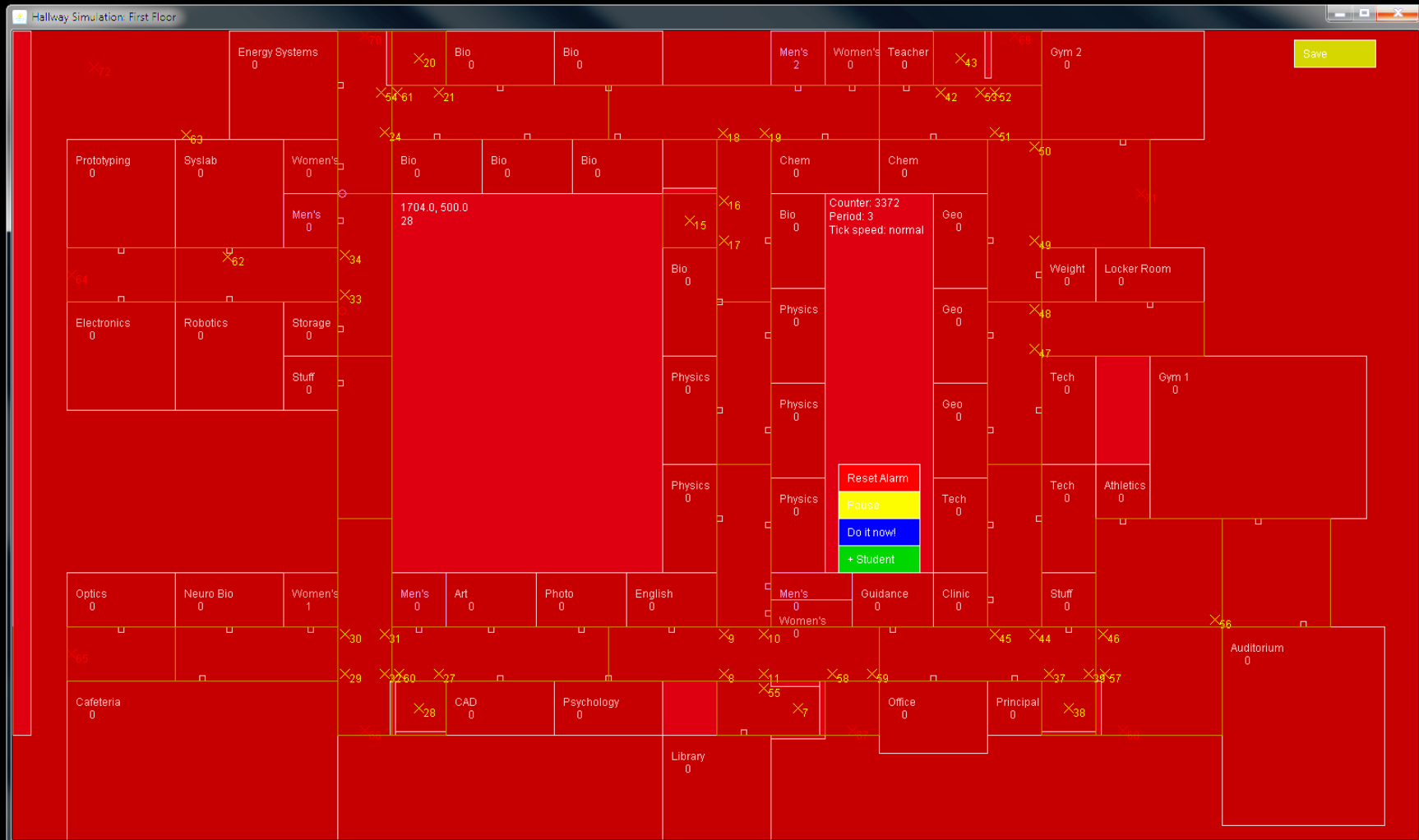
Gender differentiation



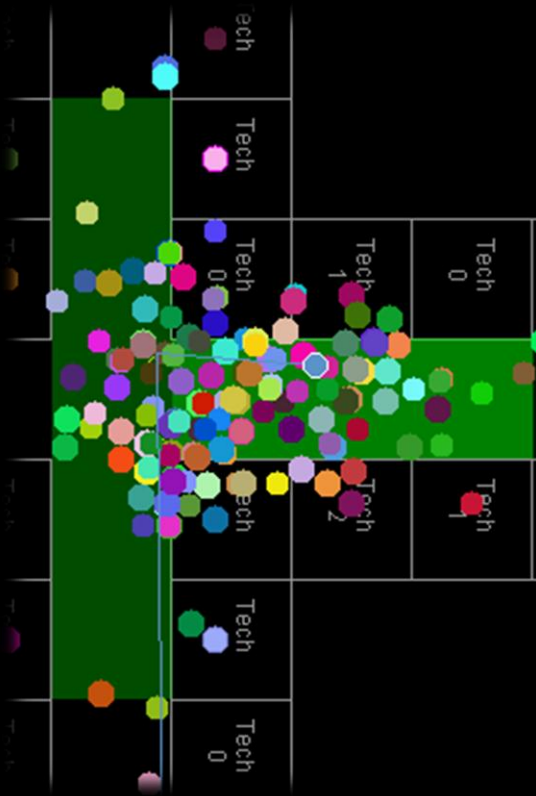
Background (Q3) – Fire Drill

Closest exit

Per room calculations

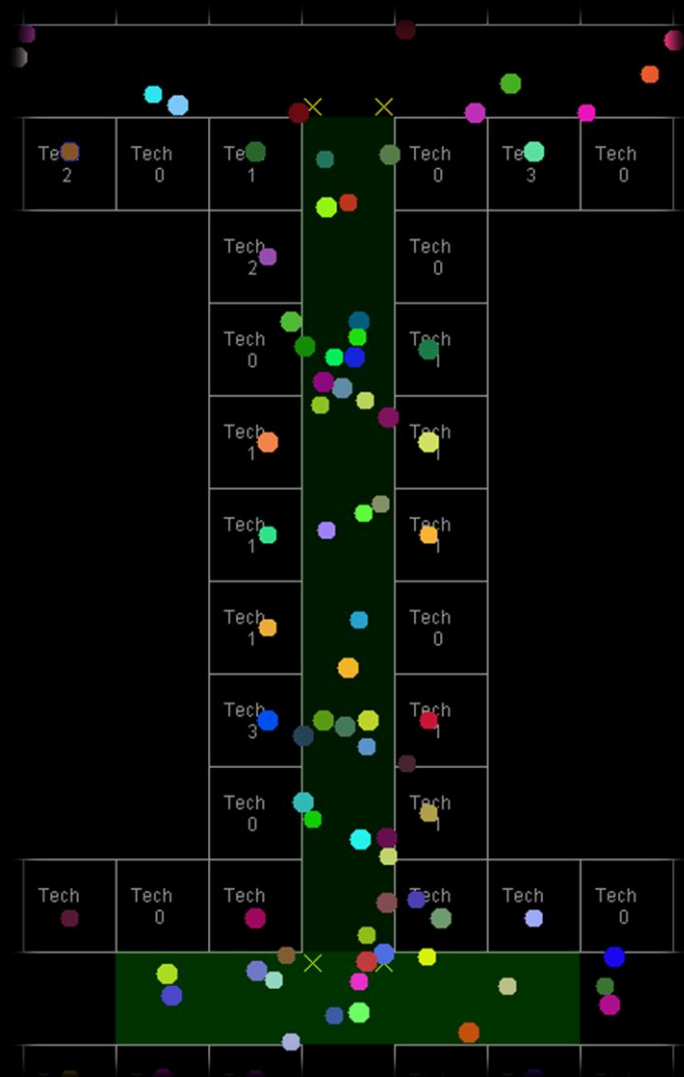


Background – Hallway Density



Percentage-based

Density-based



Background – Path-finding Mesh



Halaa

Background – Path-finding Mesh



Path-finding Grid

Background – Path-finding Mesh



Path-finding Mesh

Background – Path-finding Mesh



Background – Path-finding Mesh



Background – Path-finding Mesh



74

Path-finding Mesh Nodes

909

Path-finding Mesh Nodes Connections

Background – Algorithms

A-Star search (distance over nodes)

3-Dimensional path-finding

Radial collision

Summary

Control

- Mouse
- Buttons
- World domination
- Keyboard commands

Interface

- Buttons
- One window per floor
- Student meters
- Quantitative output
- Differentiated rooms
- Fire drill
- Vending Machines,
Water Fountains,
Restrooms

Framework

- 3D Path-finding with A*
- Collision detection
- Student meters
- Entrances and exits
- Spawn points at
entrances
- Student-specific
scheduling
- Multiple entrances per
room
- Time control
- Saving and loading

Extensions

Better evacuation

Lunch period

Social interactions