



TJ Hallway Traffic Simulation

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Simulations are...

- Efficient
- Expandable
- Interactive
- Graphical
- Easy to understand

Structure (Classes)

Location

Person

Room

Student

Teacher

ClassRoom

Special
Room

Structure (Hierarchy)

Driver

ArrayList<Buttons>

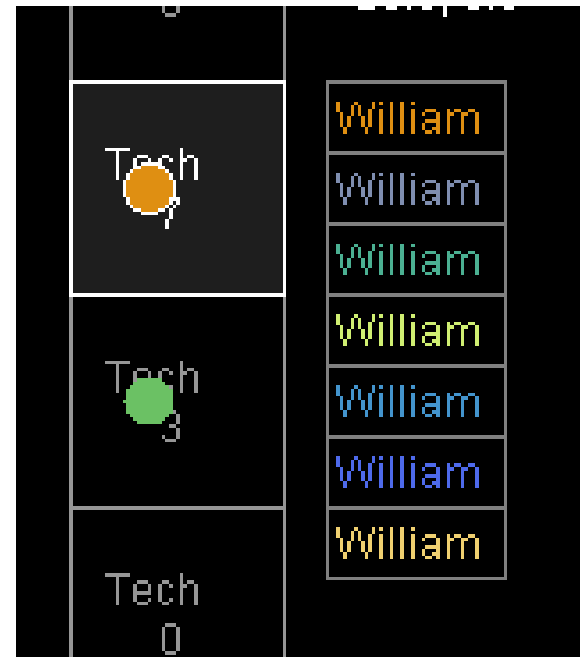
ArrayList<Student>

School Building

ArrayList<Room>

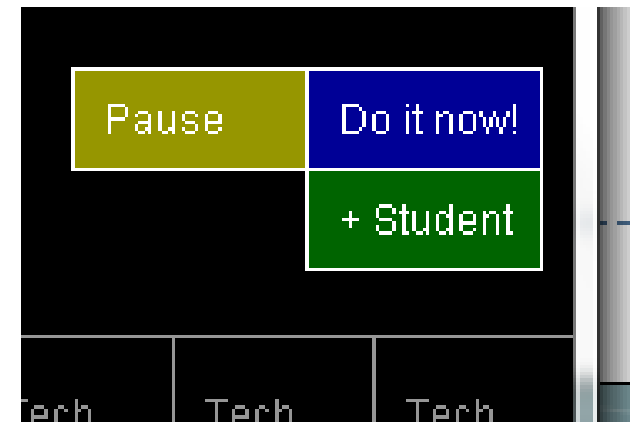
Control (Mouse)

- Left click to select
 - Person
 - Room
 - Button
- Right click to command
 - move



Control (Buttons)

- Play/Pause
 - Continued control
- Do it now!
- + Student

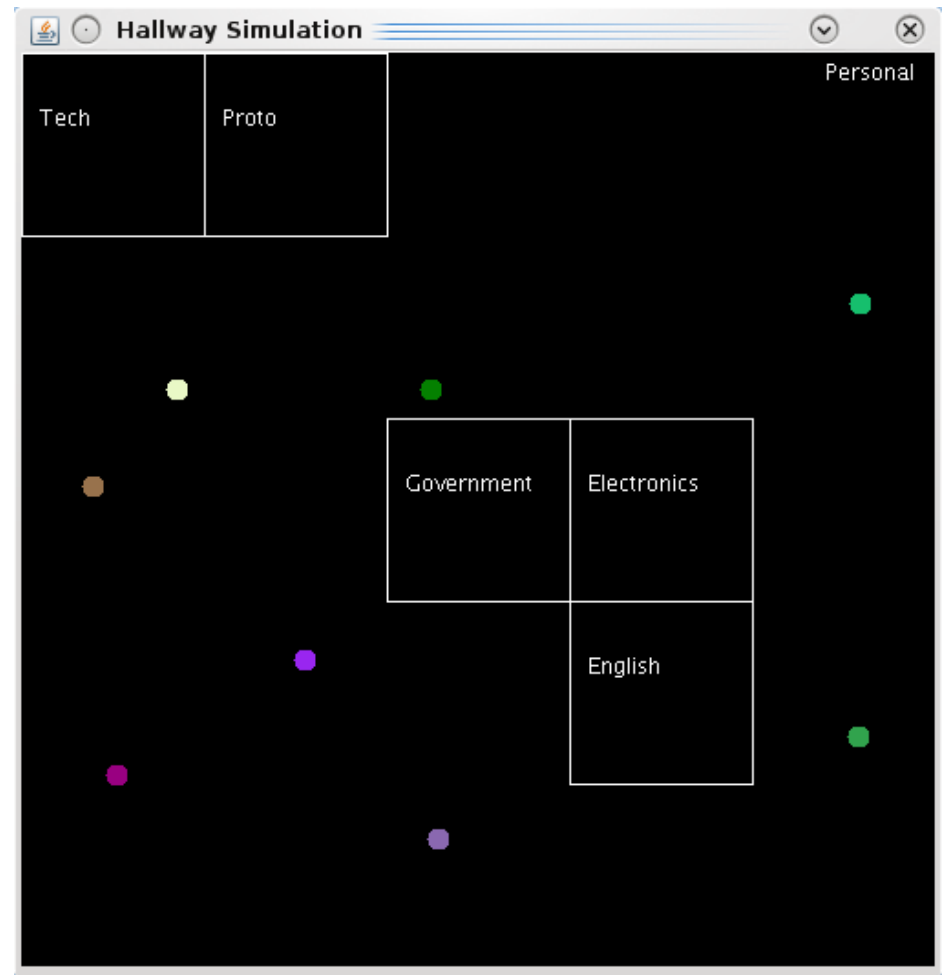


Control (Keyboard)

- Up/Down arrow keys
 - 8 speeds (slowest, slow, slower, normal, faster, fast, fastest, ludicrous)
- Shift
 - Elevate action (+ Student, movement)
- Toggle **V**iew
- **R**andomize destination
- **L**ocate selected student

Interface (Q1)

- Barebones
- No buttons
- Incomplete map
- Few students



Interface (Q2)

The screenshot shows a window titled "Hallway Simulation". The interface is a grid of rooms and a central hallway. The top row of rooms contains: Tech 0, Geo (with a purple dot), History 0, Anthro 0, Adv PE (with a cyan dot), Syslab (with a green dot), Math (with a purple dot), Tech (with a grey dot), Tech 0, Tech 0, Tech (with a cyan dot), Tech (with a green dot), and Tech 0. The second row is a large green hallway area with many colored dots and two 'X' marks. The third row contains: Tech 1 (with a green dot), Tech 2 (with an orange dot), Tech 1 (with a yellow dot), Tech 2 (with a grey dot), Tech 0, Tech 0, Tech 0, Tech 0, Tech 1 (with a yellow dot), Tech 0, Tech 1 (with a cyan dot), Tech 0, and Tech 1 (with a purple dot). The bottom section of the interface is divided into several panels. On the left, it displays coordinates: 654.0, 528.0 and 121. On the right, a tooltip for "Personal William" is shown, indicating a speed of 1.2. Below the tooltip, it shows a path: "hall (469.58977292815786, 19.247875806206169)" and "Destination (413.0, 113.0)" with a distance of "56.589772928157856, -10.57124193793831". At the bottom right, it shows "Counter: 264", "Period: 2", and "Tick speed: normal". At the very bottom, there are two buttons: "Pause" and "Do it now!".

654.0, 528.0
121

Personal
William
Speed: 1.2

hall (469.58977292815786, 19.247875806206169)
Destination (413.0, 113.0)
56.589772928157856, -10.57124193793831

Counter: 264
Period: 2
Tick speed: normal

Pause Do it now!

Interface (Q2)

The screenshot shows a window titled "Hallway Simulation". The interface is a grid of rooms and a central hallway. The top row of rooms contains: Tech 0, Geo (with a purple dot), History 0, Anthro 0, Adv PE (with a cyan dot), Syslab (with a green dot), Math (with a purple dot), Tech (with a grey dot), Tech 0, Tech 0, Tech (with a cyan dot), Tech (with a green dot), and Tech 0. The second row of rooms contains: Tech 1 (with a green dot), Tech 2 (with an orange dot), Tech 1 (with a yellow dot), Tech 2 (with a grey dot), Tech 0, Tech 0, Tech 0, Tech 0, Tech 1 (with a yellow dot), Tech 0, Tech 1 (with a cyan dot), Tech 0, and Tech 1 (with a purple dot). The central hallway is a vertical green strip with a white 'X' at the top. A large green area is highlighted in the upper part of the hallway. In the bottom right corner, a blue oval contains the text: "Counter: 264", "Period: 2", and "Tick speed: normal". Below this oval are two buttons: "Pause" (green) and "Do it now!" (blue). On the left side of the grid, the coordinates "654.0, 528.0" and "121" are displayed. On the right side, a "Personal" window shows the name "William", "Speed: 1.2", and coordinates for "hall" and "Destination".

654.0, 528.0
121

Personal
William
Speed: 1.2
hall (469.58977292815786, 19.247875806206169)
Destination (413.0, 113.0)
56.589772928157856, -10.57124193793831

Counter: 264
Period: 2
Tick speed: normal

Pause Do it now!

Interface (Q2)

The screenshot shows a software window titled "Hallway Simulation". The interface is a grid-based simulation environment. At the top, there is a header row with room names and their current state: Tech 0, Geo (with a purple dot), History 0, Anthro 0, Adv PE (with a cyan dot), Syslab (with a green dot), Math (with a purple dot), Tech (with a grey dot), Tech 0, Tech 0, Tech (with a cyan dot), Tech (with a green dot), and Tech 0. Below this is a central hallway area, highlighted in green, containing many colored dots representing agents. A blue circle highlights a specific agent in the hallway. To the right of the hallway, there is a panel with the following information: "Personal", "William", "Speed: 1.2", "hall (469.58977292815786, 19.247875806206169)", "Destination (413.0, 113.0)", and "56.589772928157856, -10.57124193793831". At the bottom right, there is a "Counter: 264", "Period: 2", and "Tick speed: normal". At the very bottom, there are two buttons: "Pause" (yellow) and "Do it now!" (blue).

Tech 0	Geo (purple dot)	History 0	Anthro 0	Adv PE (cyan dot)	Syslab (green dot)	Math (purple dot)	Tech (grey dot)	Tech 0	Tech 0	Tech (cyan dot)	Tech (green dot)	Tech 0
Tech 1 (green dot)	Tech 2 (orange dot)	Tech 1 (yellow dot)	Tech 2 (grey dot)	Tech 0	Tech 0	Tech 0	Tech 0	Tech 1 (yellow dot)	Tech 0	Tech 1 (cyan dot)	Tech 0	Tech 1 (purple dot)

654.0, 528.0
121

Tech 1 (green dot)

Tech 0

Tech 0

Tech 1 (purple dot)

Tech 1 (red dot)

Tech 2 (purple dot)

Tech 0

Tech 2 (blue dot)

Tech 0

Personal
William
Speed: 1.2
hall (469.58977292815786, 19.247875806206169)
Destination (413.0, 113.0)
56.589772928157856, -10.57124193793831

Counter: 264
Period: 2
Tick speed: normal

Pause Do it now!

Interface (Q2)

The screenshot shows a window titled "Hallway Simulation". The interface is a grid-based environment with a central hallway. The top row of rooms contains: Tech 0, Geo (with a purple dot), History 0, Anthro 0, Adv PE (with a cyan dot), Syslab (with a green dot), Math (with a purple dot), Tech (with a grey dot), Tech 0, Tech 0, Tech (with a cyan dot), Tech (with a green dot), and Tech 0. The middle row contains: Tech 1 (with a green dot), Tech 2 (with an orange dot), Tech 1 (with a yellow dot), Tech 2 (with a grey dot), Tech 0, Tech 0, Tech 0, Tech 1 (with a yellow dot), Tech 0, Tech 1 (with a cyan dot), Tech 0, and Tech 1 (with a purple dot). The bottom row contains: Tech 1 (with a green dot), Tech 0, Tech 1 (with a cyan dot), Tech 2 (with a brown dot), Tech 1 (with a red dot), Tech 1 (with a red dot), Tech 2 (with a purple dot), Tech 2 (with a blue dot), Tech 2 (with a blue dot), Tech 0, Tech 1 (with a cyan dot), Tech 2 (with a blue dot), and Tech 0. A green highlighted area covers the central hallway and the Adv PE, Syslab, and Math rooms. A blue rounded rectangle highlights a specific area in the hallway. A white 'X' marks a location in the hallway. On the left, coordinates "654.0, 528.0" and "121" are displayed. On the right, a "Personal" window shows the name "William", "Speed: 1.2", and coordinates for "Start" and "Destination". At the bottom right, "Counter: 264", "Period: 2", and "Tick speed: normal" are shown. At the very bottom, there are "Pause" and "Do it now!" buttons.

654.0, 528.0
121

Personal
William
Speed: 1.2
Start (469.58977292815786, 192.27875806206169)
Destination (413.0, 113.0)
56.589772928157856, -10.57124193793831

Counter: 264
Period: 2
Tick speed: normal

Pause Do it now!

Interface (Q2)

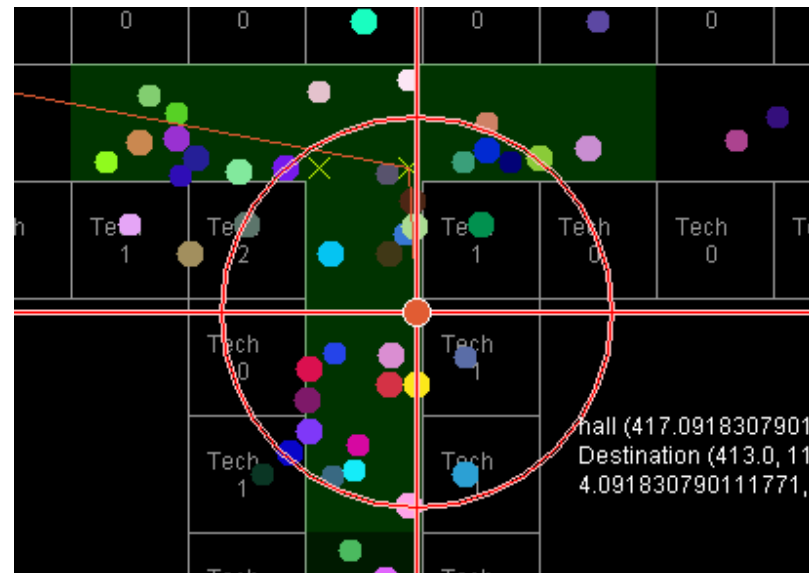
The screenshot displays a software window titled "Hallway Simulation". The interface is a grid-based environment with a central vertical hallway. The top row of rooms contains: Tech 0, Geo (with a purple dot), History 0, Anthro 0, Adv PE (with a cyan dot), Syslab (with a green dot), Math (with a purple dot), Tech (with a grey dot), Tech 0, Tech 0, Tech (with a cyan dot), Tech (with a green dot), and Tech 0. The second row from the top is a dark green hallway area containing several colored dots and two 'X' marks. The third row of rooms contains: Tech 1 (with a green dot), Tech 2 (with a grey dot), Tech 1 (with a yellow dot), Tech 2 (with a grey dot), Tech 0, Tech 0, Tech 0, Tech 0, Tech 1 (with a yellow dot), Tech 0, Tech 1 (with a cyan dot), Tech 0, and Tech 1 (with a purple dot). A blue circle highlights the Tech 1 and Tech 2 cells in this row. The bottom section of the interface is divided into several panels. On the left, a panel shows coordinates: 654.0, 528.0 and 121. In the center, a vertical panel shows a stack of room labels: Tech 1, Tech 0, Tech 0, Tech 1, Tech 1, Tech 2, and Tech 0. On the right, a panel displays agent information: "Personal", "William", "Speed: 1.2", "hall (469.58977292815786, 1912.27875806206169)", "Destination (413.0, 113.0)", and "56.589772928157856, -10.57124193793831". At the bottom right, a panel shows "Counter: 264", "Period: 2", and "Tick speed: normal". At the very bottom, there are two buttons: "Pause" (yellow) and "Do it now!" (blue).

Interface (Q2)

The screenshot displays a software window titled "Hallway Simulation". The interface is a grid-based simulation of a hallway system. At the top, a row of room labels includes "Tech 0", "Geo", "History 0", "Anthro 0", "Adv PE", "Syslab", "Math", "Tech", "Tech 0", "Tech 0", "Tech", "Tech", and "Tech 0". Each label is accompanied by a small colored dot. The main area is a grid of rooms, many labeled "Tech" with a number (0, 1, or 2). A central vertical hallway is highlighted in green, with a blue path leading through it. Numerous colored dots representing agents are scattered throughout the grid. In the bottom right corner, a panel displays simulation statistics: "Counter: 264", "Period: 2", and "Tick speed: normal". Below this panel are two buttons: "Pause" (yellow) and "Do it now!" (blue). On the right side, a text box shows details for a selected agent: "Personal", "William", "Speed: 1.2", "hall (469.58977292815786, 19.2427875806206169)", "Destination (413.0, 113.0)", and "56.589772928157856, -10.57124193793831".

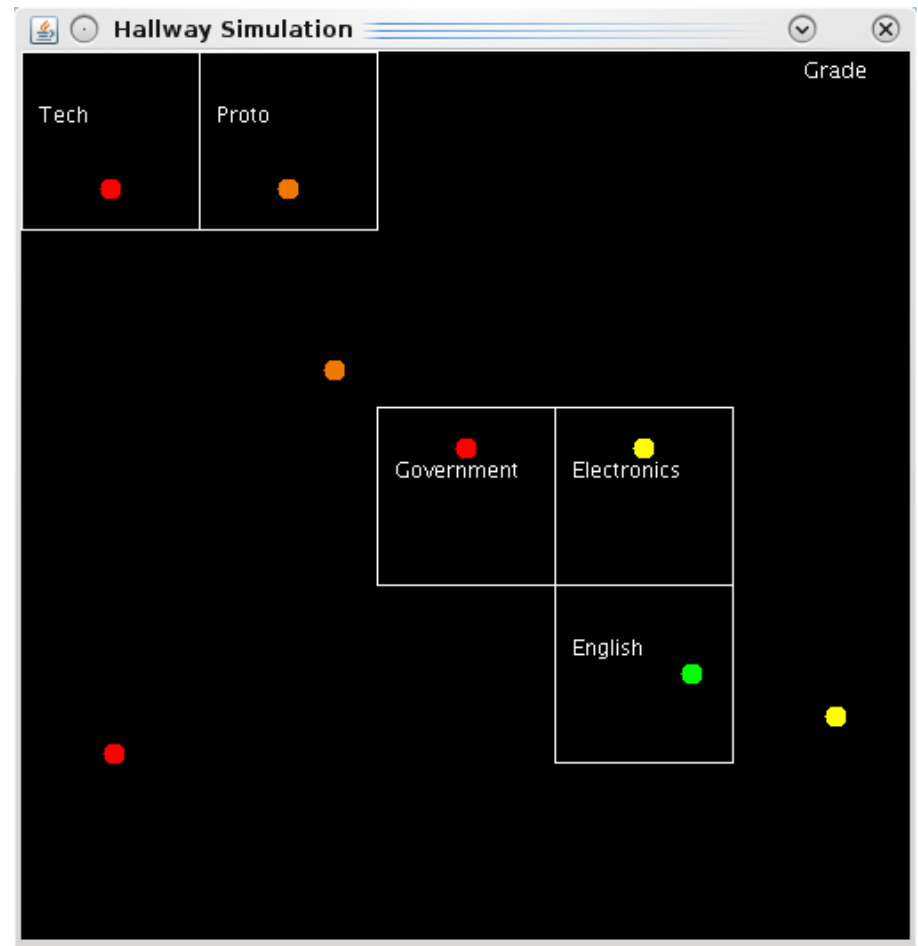
Interface (Q2)

- Location tracker
 - Easy to locate a student



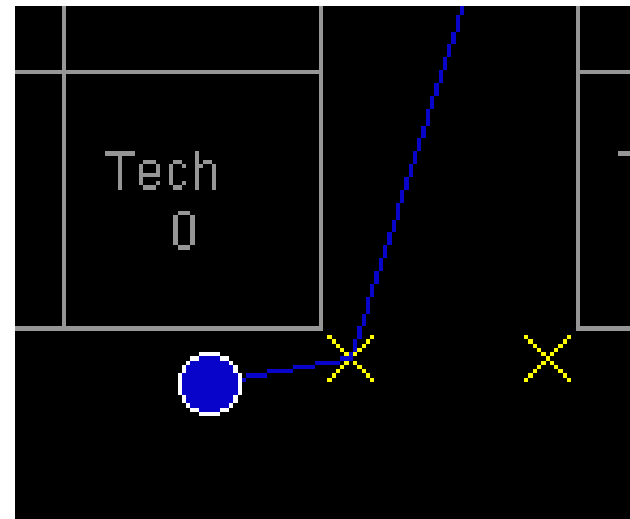
Background (Q1)

- Integer-based grid
- One pixel movement along axes.
- No path-finding
- No inter-student interactions



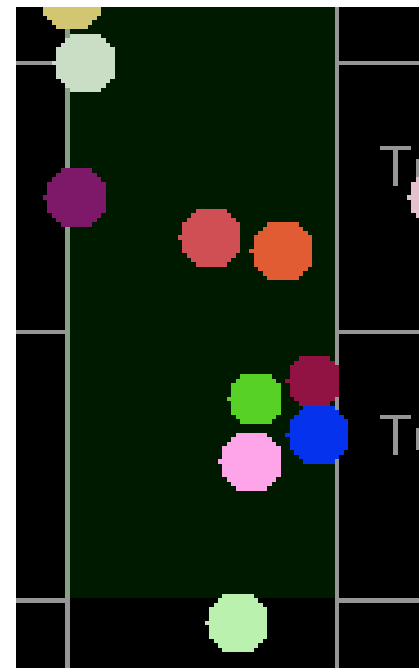
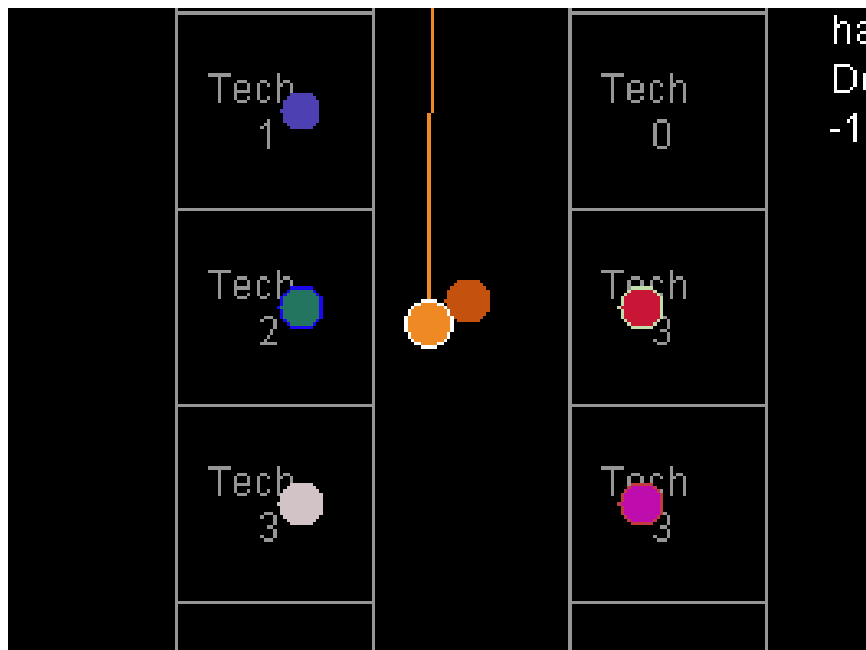
Background (Q2)

- Float-based grid
- Different speeds
- Movement in any direction



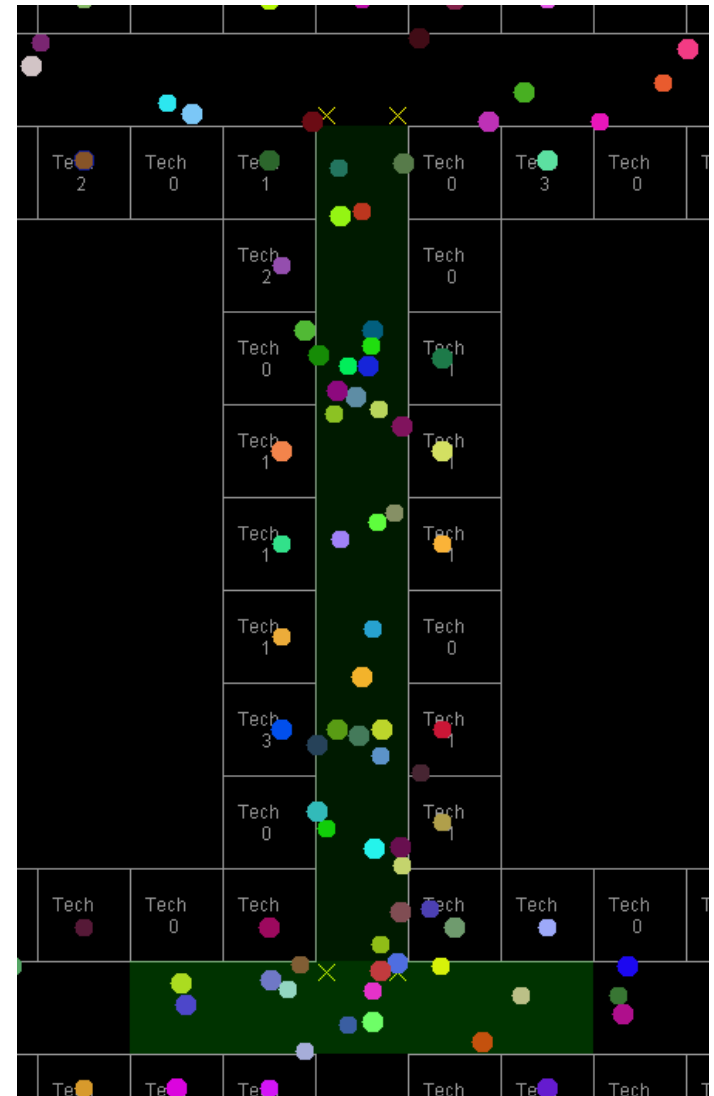
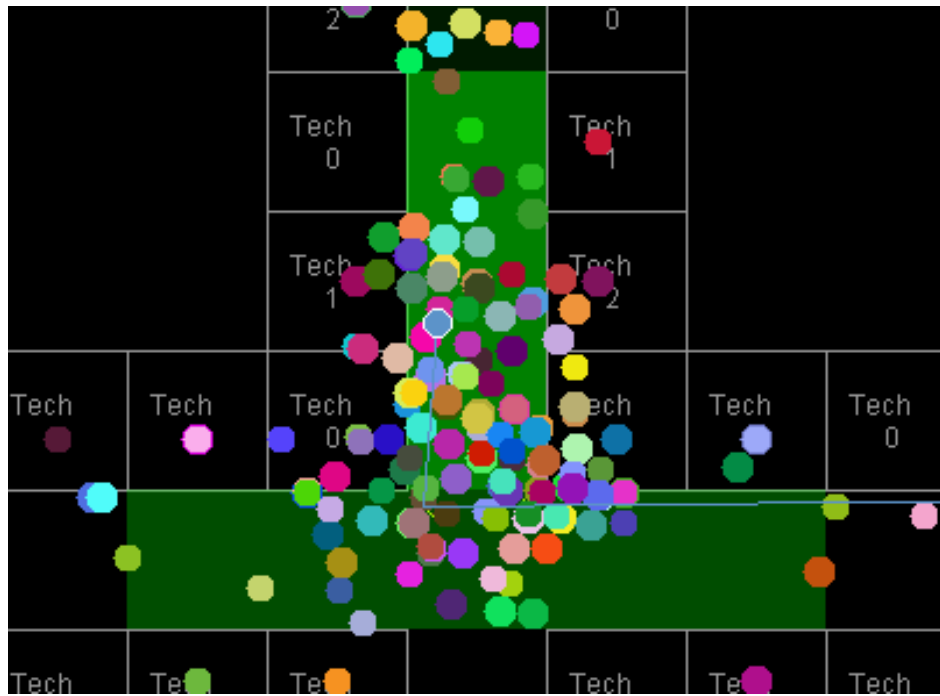
Background (Q2)

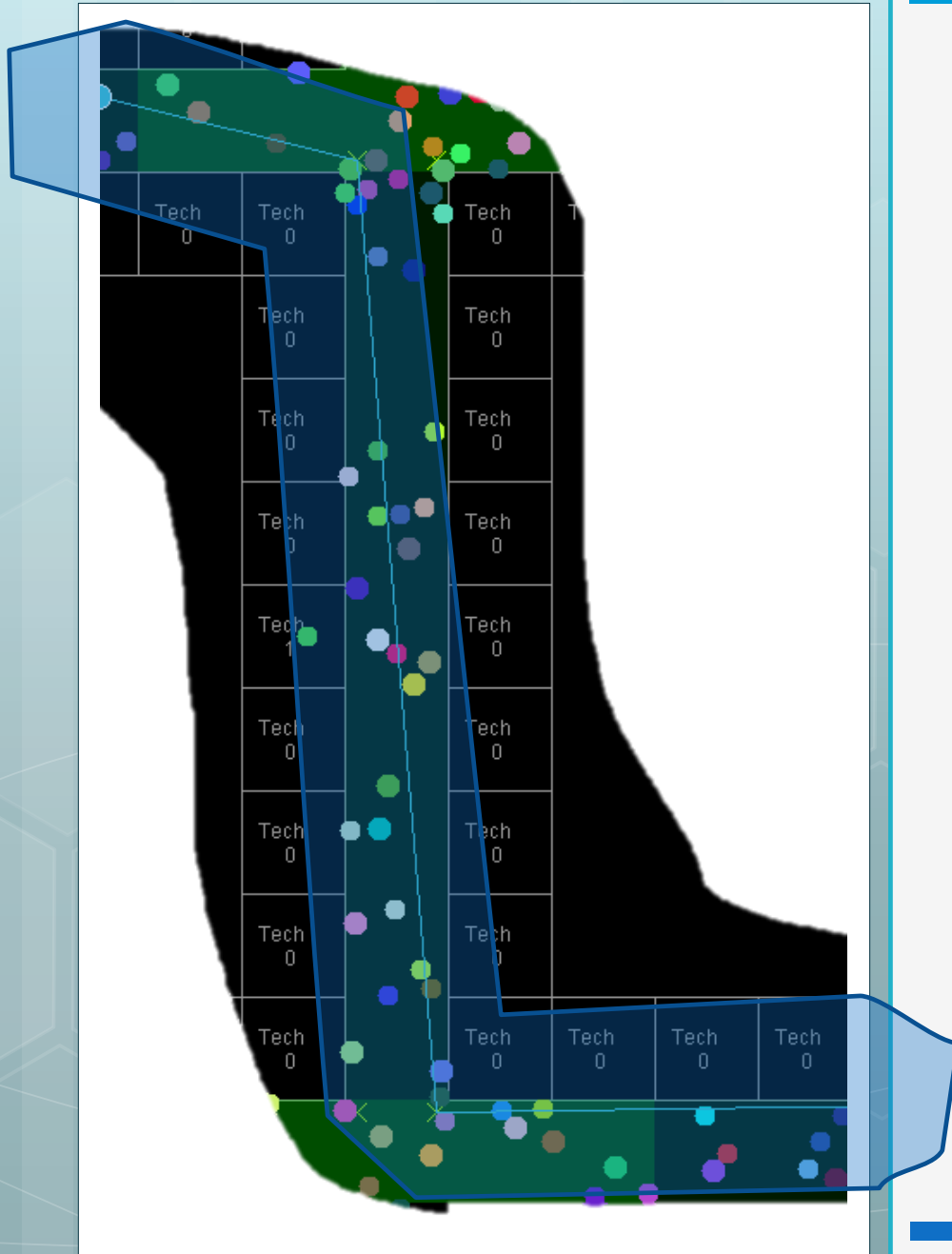
- Collision detection



Background (Q2)

- Quantifying information





Background (Q2)

- Path-finding
 - Breadth-first search with iterative deepening

Background (Q2)

- Schedules

- `public Room[] generateSchedule()`

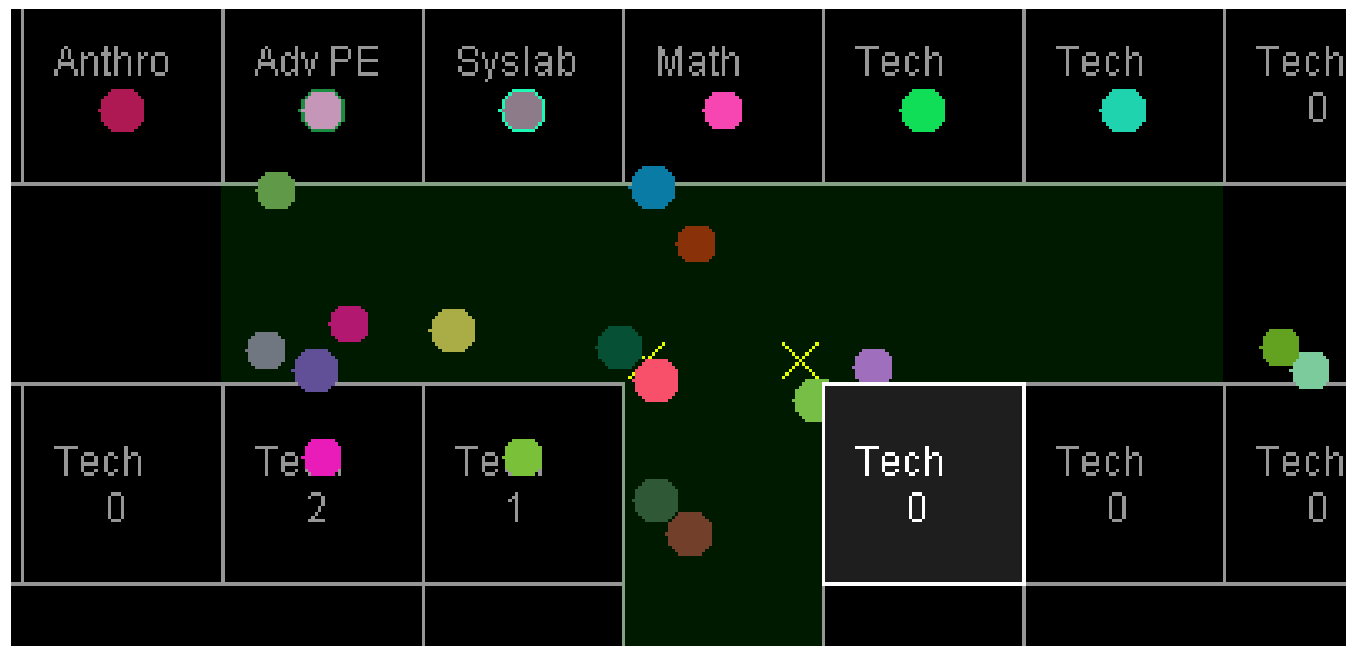
```
{
    Room[] s = new Room[numPeriods];
    for(int n = 0; n < numPeriods; n++)
        s[n] = getRandomClassRoom();
    return s;
}
```

- `public void incrementPeriod(double percentage)`

```
{
    for(Student s : students)
        if(!s.isMoving && Math.random() < percentage)
            if(!s.getSchedule()[period-1].contains(s.getLoc().getX(),
                                                    s.getLoc().getY()))
                s.forceNewDestination(s.getSchedule()[period-1], school);
}
```

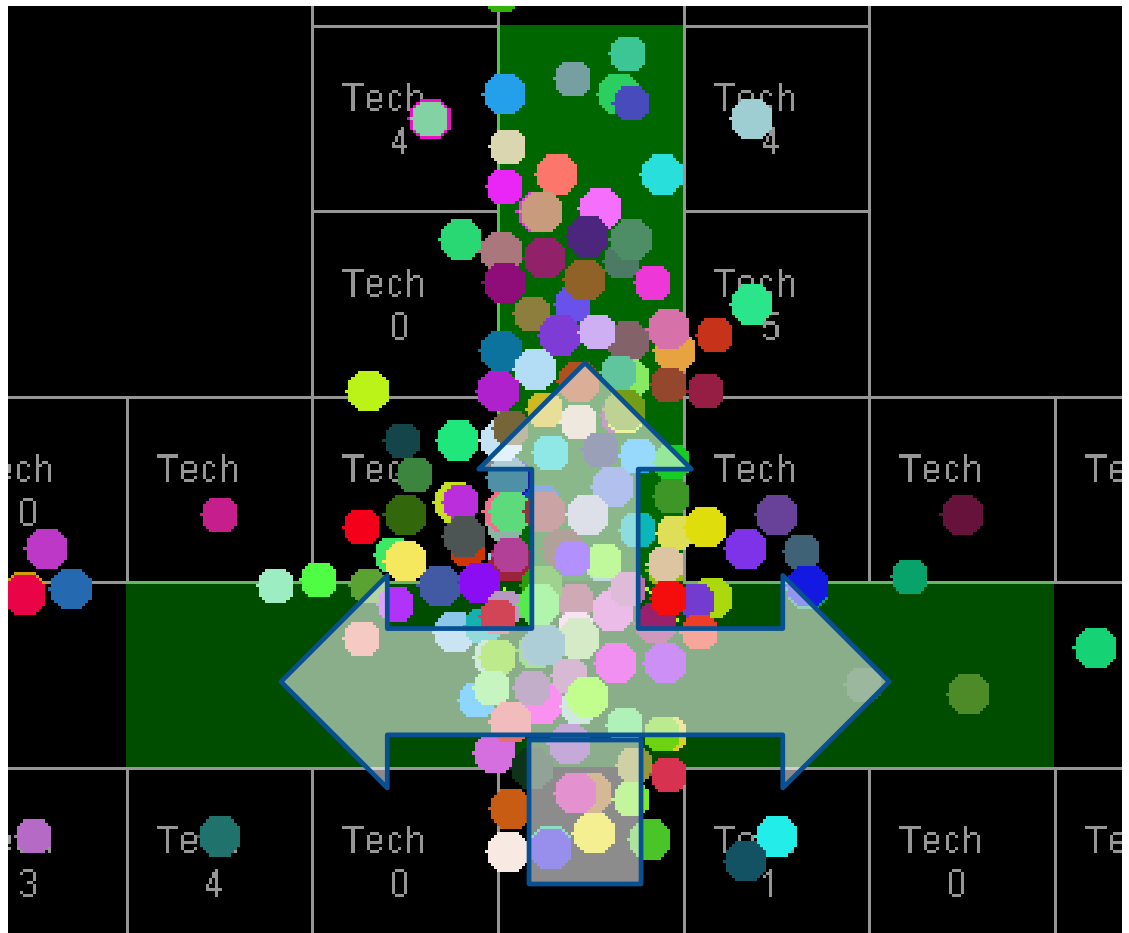
Background (Q2)

- Staggered releases



Background (Q2)

- Spawn locations



Summary (Q2)

Control

- Mouse (improved)
- Buttons
- Keyboard commands

Interface

- Buttons
- Contextual information (improved)
- Visual cues
- Quantitative output

Framework

- Path-finding
- Collision detection
- Precise grid
- Staggered releases
- Realistic spawn points
- Student-specific scheduling

What's Next?

- Fix collision detection
- Social interactions
- Complete school map