



# User Manual

Beta Version 1  
June 2020

IR as the program is called, is Spanish meaning "to go." I found this being an appropriate name mainly for its simplicity but also for the meaning of movement. We are all trying to get somewhere and the process and paths we take will influence the journey as a whole.

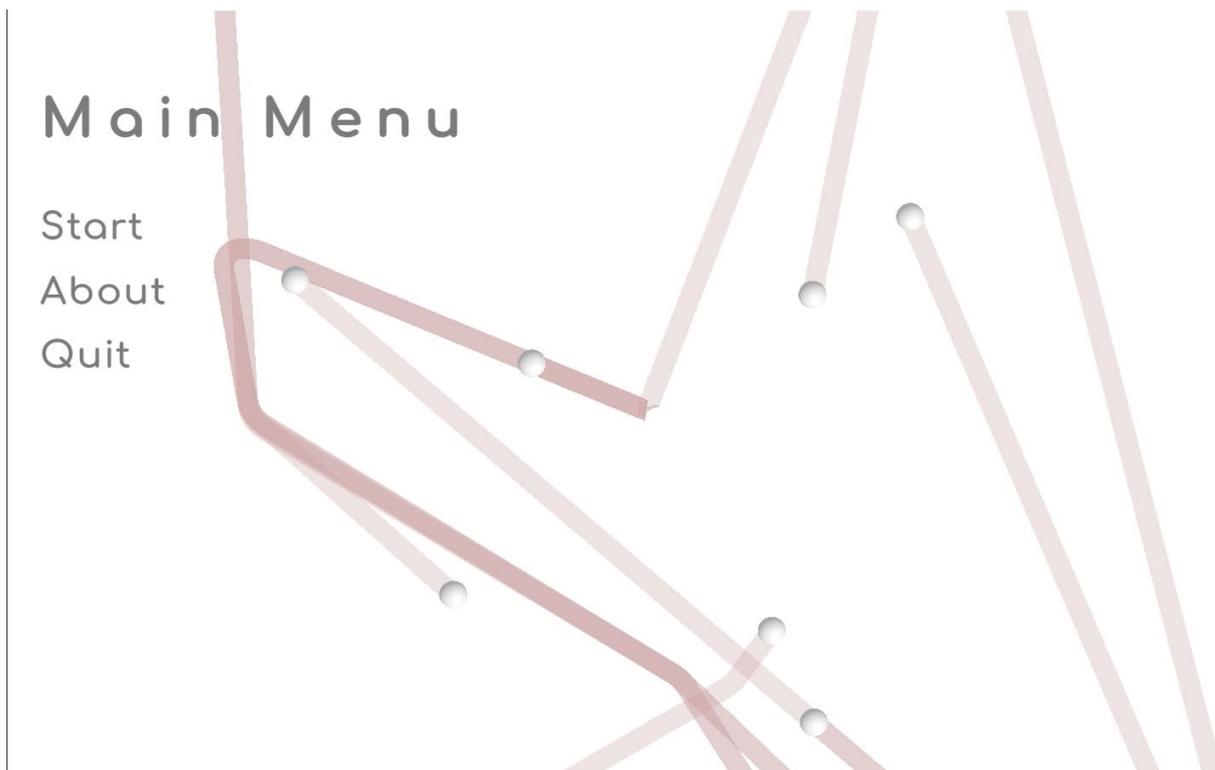
This Navigation Application is meant for you to begin visualising how people will be moving around your space. This can be a floor plan layout, a whole building, or the urban environment. The program will allow for as large of a scale as you need.

Simulation Developed and  
Programmed by: Anthony Alvidrez

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# Intro/Main Menu



After the opening animations you will be at the Main Menu Screen. Here you will find three buttons:

**Start:** This takes you to the screen where you will begin the simulation

**About:** This takes you to a page for an introduction to the program, a quick overview of what is contained in this manual.

**Quit:** Will close the application.



## About

IR as the program is called, is Spanish meaning "to go." I found this being an appropriate name mainly for its simplicity but also for the meaning of movement. We are all trying to get somewhere and the process and paths we take will influence the journey as a whole.

This Navigation Application is meant for you to begin visualising how people will be moving around your space. This can be a floor plan layout, a whole building, or the urban environment. The program will allow for as large of a scale as you need.

When inputting your geometry, the application can only take in .OBJ files currently. So, you can export this file type from rhino, or Revit through Rhino.Inside. Following the in-screen instructions as well as the PDF manual included with you download. You will import geometry, then place markers for the entrances of the space as well as destinations.

The entrances are coloured in green; these will represent the point a person will walk into your space. The starting point.

The destinations are coloured in red; these will represent the destination areas in which people will be traveling to and in between from. Example of these within an architectural space would be desks, offices, meeting rooms, break rooms, and so on.

Within the game controls, located on the side of the screen you will find input for your own personal needs. These range from Number of Agents, The speed at which they move, The number of destinations they must visit before exiting the simulation, Social Distancing

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# Exporting a File

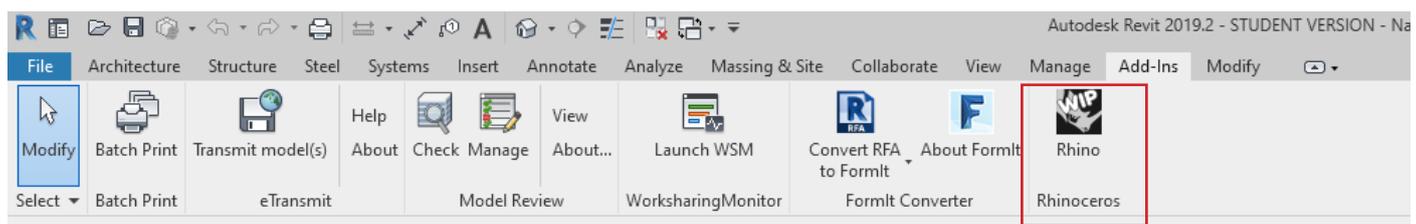
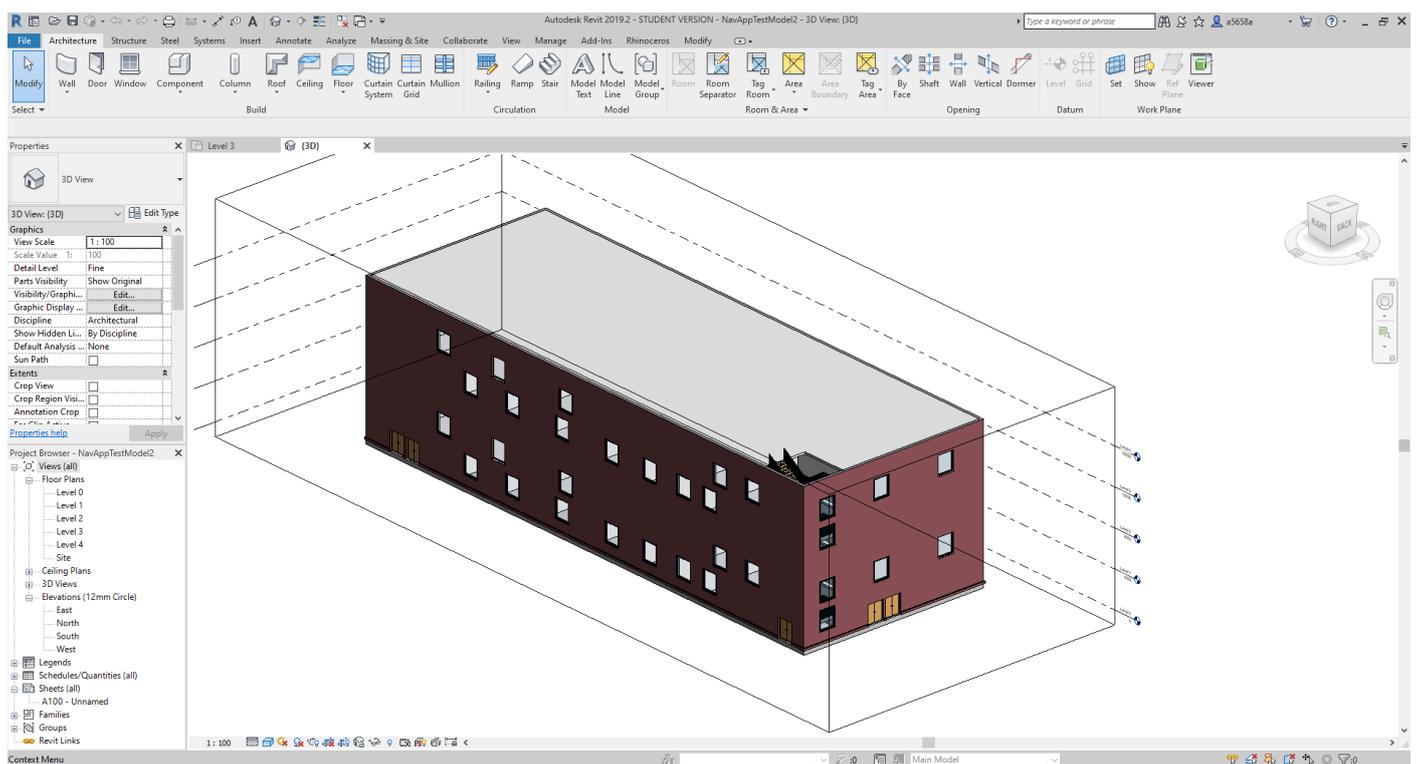
While this is only version 1, there is one file type can be brought in, but it is one which can be created by most 3D programs; .OBJ file type. **FBX file types to come in future updates.** This is an easy mesh file type which can be brought in with out to much processing time. Also, due to the mesh and the early development, textures and images are not brought in, they are replaced with the simulation's white materiality. This is a simulation program and not one for rendering, but you can screen record or screen shot to extract the simulation for your use and presentations.

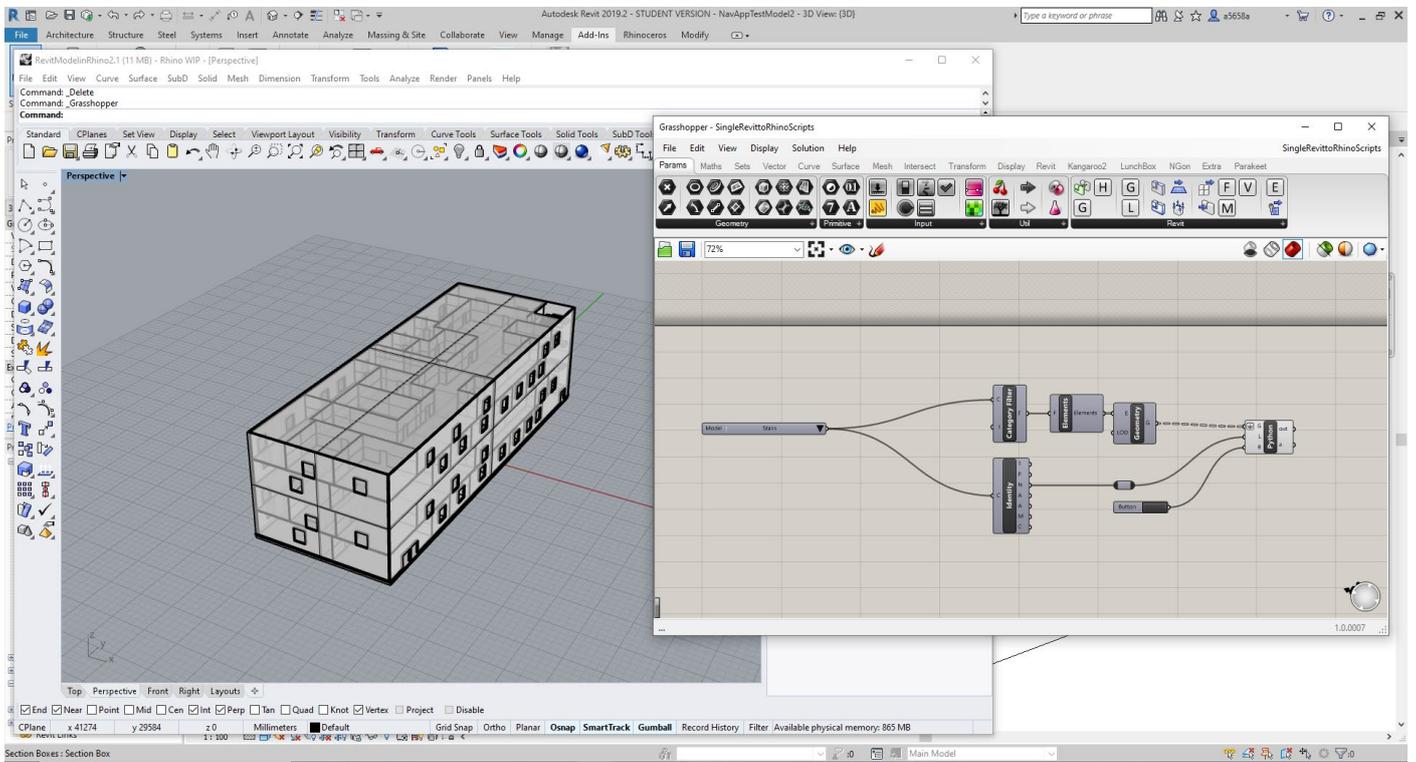
A requirement for this program to work, is you will need access to Rhino. The program is free trial for 30 days, or a one time purchase. Also you can download Rhino.Inside a new plug-In for Revit.

## Exporting a File From Revit & Rhino 3D

A requirement for Revit in using this program is Exporting your geometry to .OBJ file type. A few ways to do this from Revit are explained here, but if you have your own way, such as converting an FBX to OBJ, then use yours. For this example we will be using Rhino.Inside to streamline the process, and work faster. But the process is similar for Exporting a FBX from Revit then Import to Rhino, then export from Rhino.

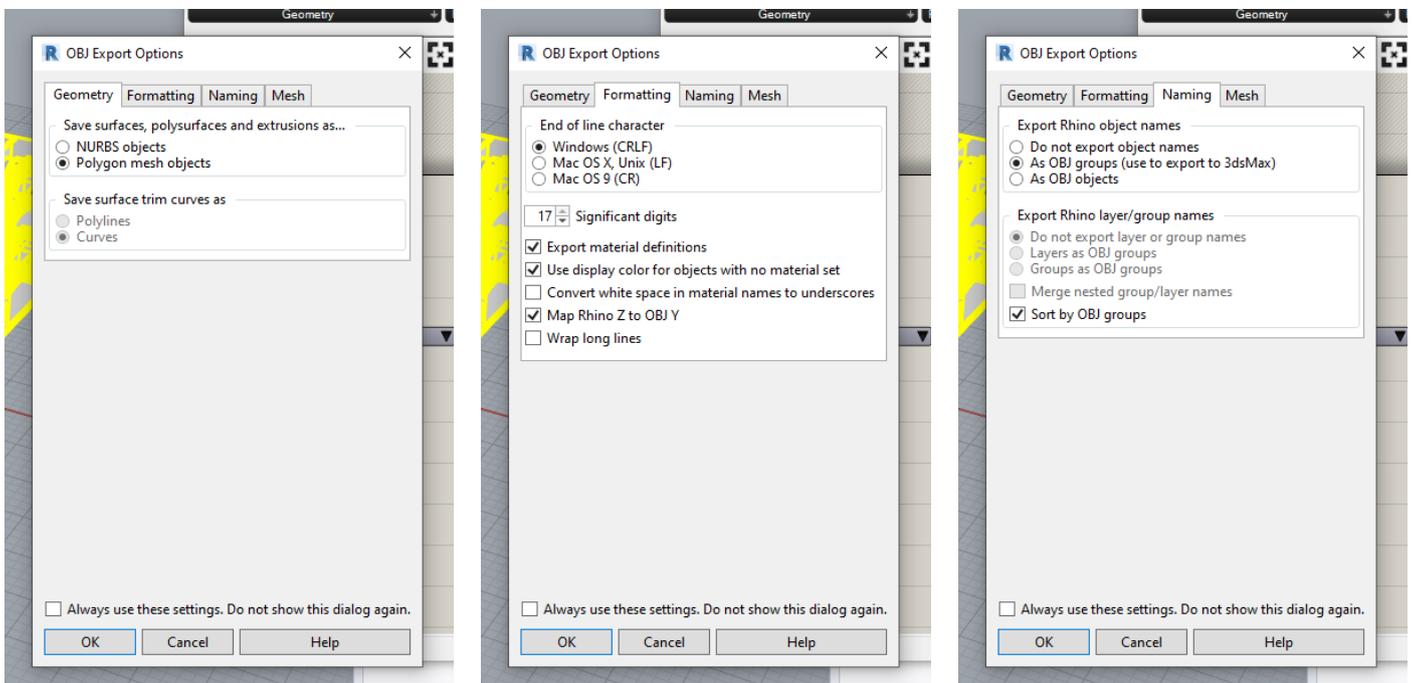
This is the example model we will be using in this example. Its a standard building; with basic Floor, Wall, Door and Window Families. From here we will be opening Rhino.Inside Add-on for Revit.



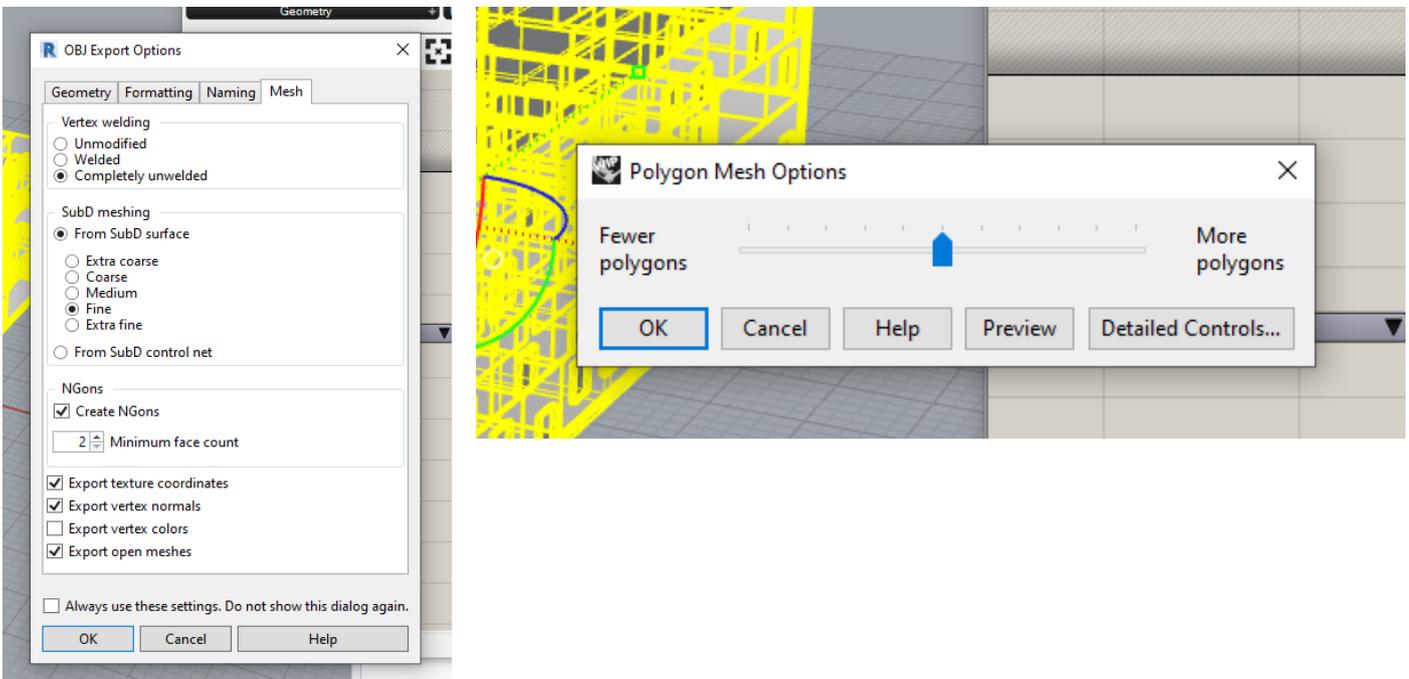


From here open Grasshopper, and using a script (on the Right) provided when you downloaded the Add-on; we will transfer our objects from Revit to Rhino. Since this app is focused on Navigation, only Walls, Floors, Stairs, Ramps, or any navigation related Generic Models you would like to have walkable.

From Rhino, Select your object and export to .OBJ. Below are my OBJ Settings which I have found to work best.



In the naming Section, it is important you leave it as export OBJ Groups (3DS Max) option and do not export names. This is because the App wants to read every Mesh Group, so your one wall, or one floor plate. By exporting the names, you would group everything and the program would treat it as a single object.



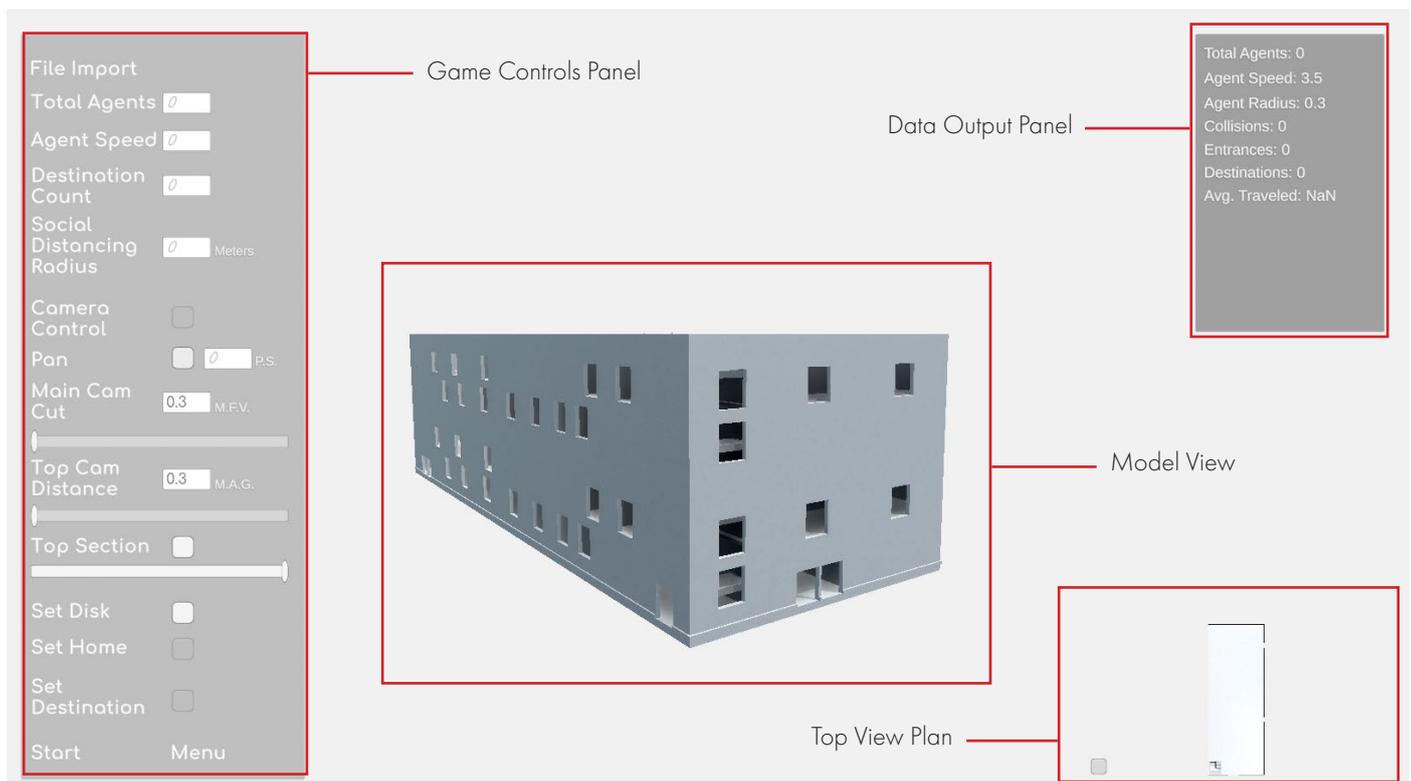
If you import your model and you find the door or window openings are cut off by a triangle, the mesh didn't leave the opening properly. Then adjust the number of Polygons to Fewer Polygons. The middle is optimized, but this setting will affect how the geometry will mesh overall. You can also preview before exporting to verify this is what you want.

Now your file should be exported and saved in the folder you chose. Now we can use this model for the simulation.

# Simulation Controls

While this is only version 1, there is one file type can be brought in, but it is one which can be created by most 3D programs; .OBJ file type. **FBX file types to come in future updates.** This is an easy mesh file type which can be brought in with out to much processing time. Also, due to the mesh and the early development, textures and images are not brought in, they are replaced with the simulation's white materiality. This is a simulation program and not one for rendering, but you can screen record or screen shot to extract the simulation for your use and presentations.

A requirement for this program to work, is you will need access to Rhino. The program is free trial for 30 days, or a one time purchase. Also you can download Rhino. Inside a new plug-In for Revit.



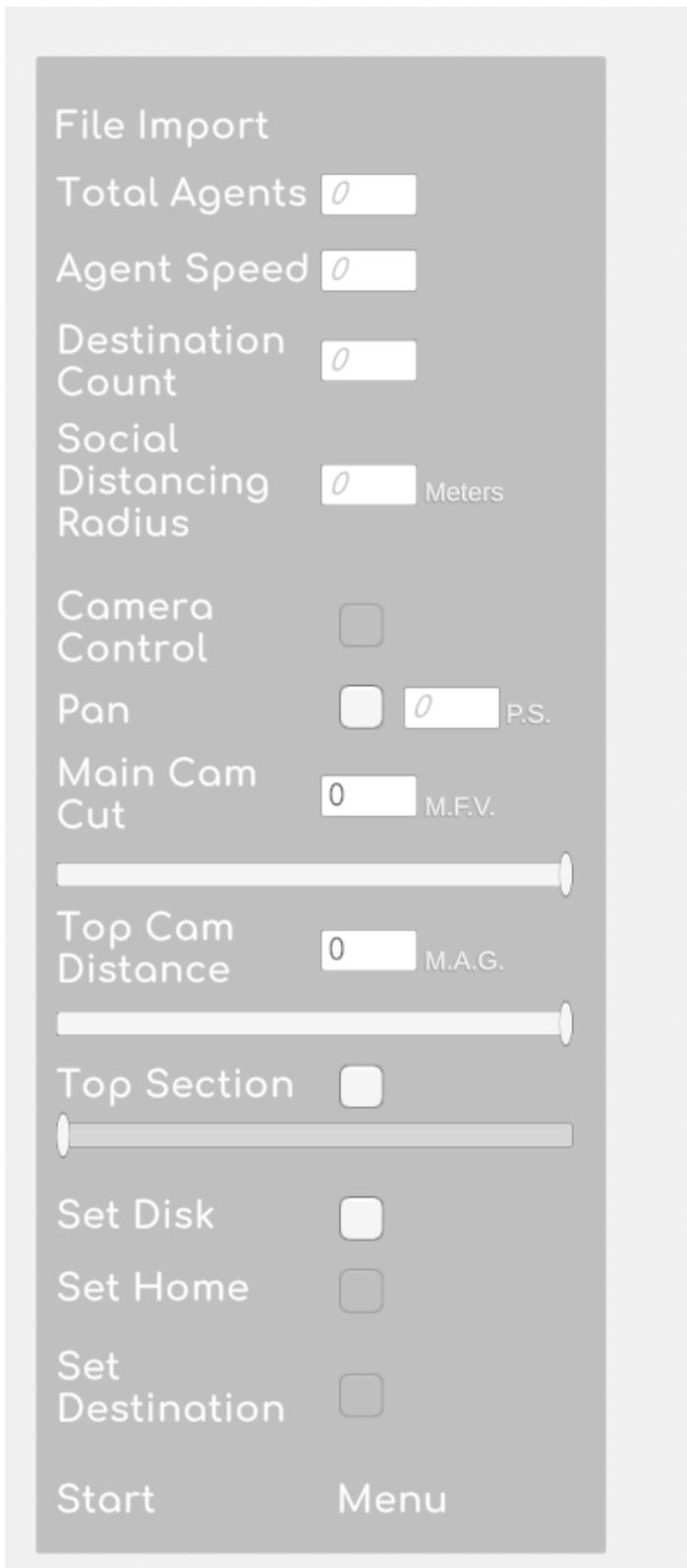
**Game Controls Panel:** This is where you will input your parameters for the simulation as well as control the views.

**Model View:** This is the main View where you will be able to see the model.

\*For altering Model Materiality: Press *T* key for Transparency, or the *Y* key for Standard.\*

**Data Output Panel:** Here you will see the Data the Simulation is working with and live computing.

**Top View Plan:** This gives a top view of the model, allowing you to see the model as a floor plan. The button on the bottom right of map, expands the top view.



**File Import:** This Button brings a menu where you will be importing your .OBJ File. You are only allowed to input one .OBJ file for one simulation. Return to Main Menu to start a new simulation.

**Total Agents:** The number of people who will occupy the model. Default is 10.

**Agent Speed:** The Meters/Second in which they move. Default is 3.5.

**Destination Count:** Is the number of destinations you want the agents to visit before leaving. Default is 10.

**Social Distance Radius:** This is the Radius the agents will maintain from each other while moving. If you see agents being trapped or two agents trying to move past each other. This is because of the radius that is preventing this. Default is 0.3.

**Camera Control:** a check box for telling you when you have control of the camera. This is controlled by the SHIFT key on your Keyboard.

**Pan:** If you wish to Pan around the simulation, check this box and use WASD keys for movement.

**Multi Cam Cut:** This slider is for cutting through your model to see multiple levels, this can only be done when you are looking down on your model.

**Top Cam Distance:** This slider is for looking at different floors on the Top View located at the bottom Right of the screen.

**Set Disk:** This is to allow you to set Destination/Home Disk. It must be clicked to set a disk.

**Set Home:** This checkbox informs you are setting a Home Disk. For Home press the X key. Remove last disk with Backspace key.

**Set Destination:** This checkbox informs you are setting a Destination Disk. For Destination press the Z key. Remove last disk with Backspace key.

**Start:** Once your parameters have been entered and disk set, press the Start Button to begin the simulation.

**Menu:** This Button returns you to the Main Menu.

**Total Agents:** The total number of current people walking in the scene.

**Agent Speed:** The current speed they are moving at.

**Agent Radius:** The current Radius they are operating at.

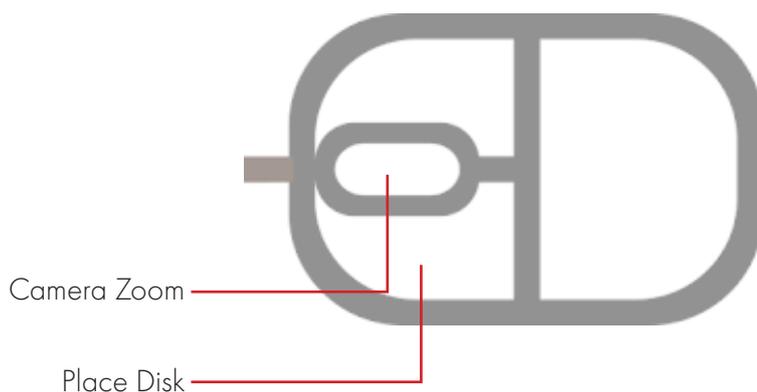
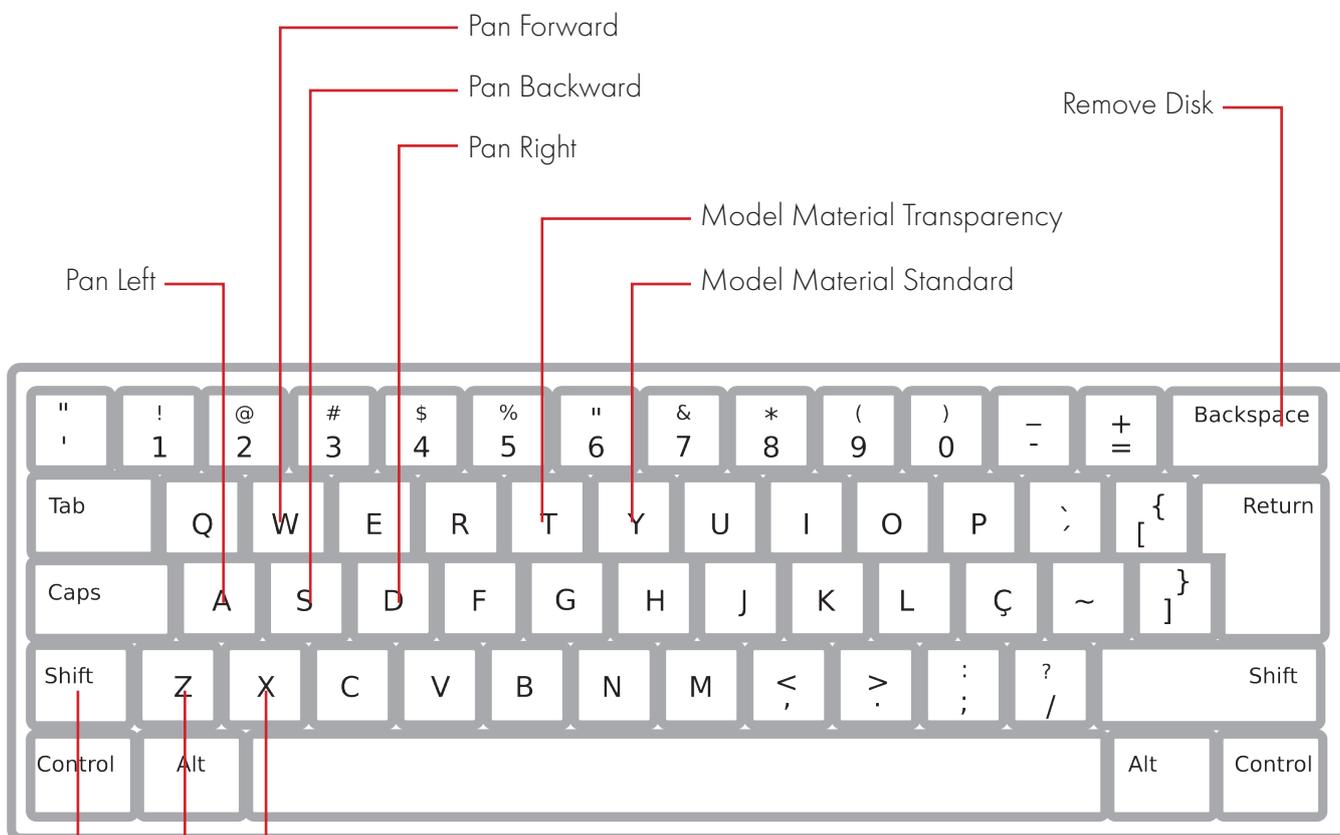
**Collisions:** The number of collisions in the Scene. Collisions happen when an agent cannot maintain social distancing rules.

**Entrances:** Total Number of Set Home Disks in the Scene.

**Destinations:** Total Number of Destinations in the Scene.

**Avg. Travelled:** The average distance the agents have walked in Meters.

Total Agents: 0  
Agent Speed: 3.5  
Agent Radius: 0.3  
Collisions: 0  
Entrances: 0  
Destinations: 0  
Avg. Traveled: NaN



# File Import



**File Path:** The file location where your OBJ File is located.

When imputing your file location follow this format: "C:\Folder\Folder\Model.obj"

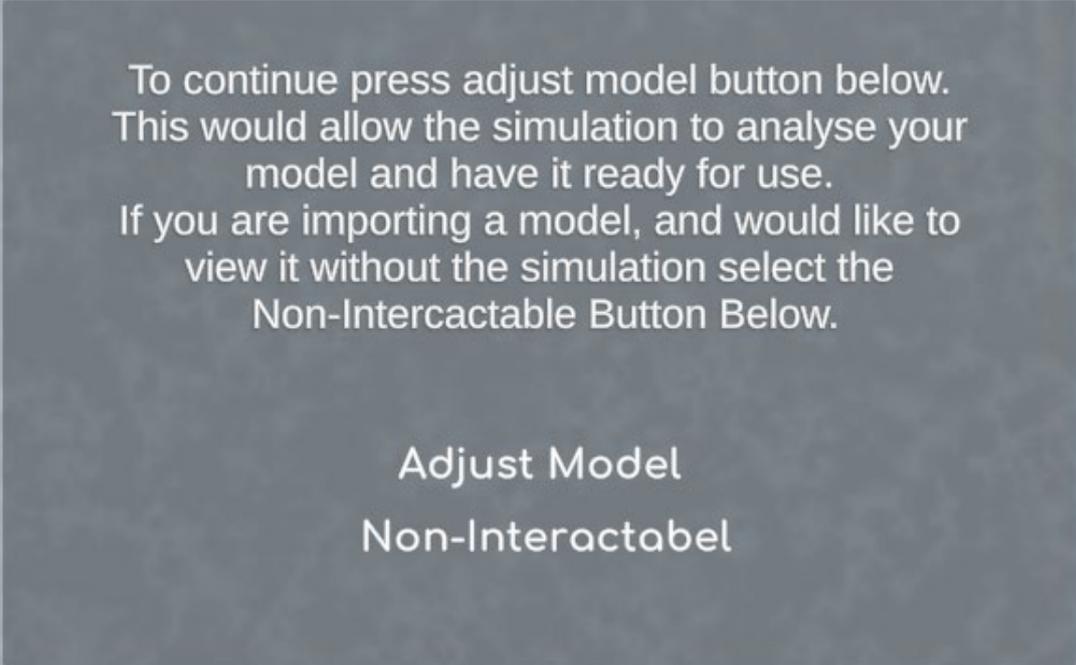
– File name and ending .obj is important to specify the file to import.

**Scale:** Scale is the scaling factor when importing, this will be how your model is scaled to meters.

OBJ file is in MM then Scale=0.001.

OBJ file is in FT then Scale=0.305.

**File Import:** The button when you are ready to import your file.



To continue press adjust model button below.  
This would allow the simulation to analyse your  
model and have it ready for use.  
If you are importing a model, and would like to  
view it without the simulation select the  
Non-Interactable Button Below.

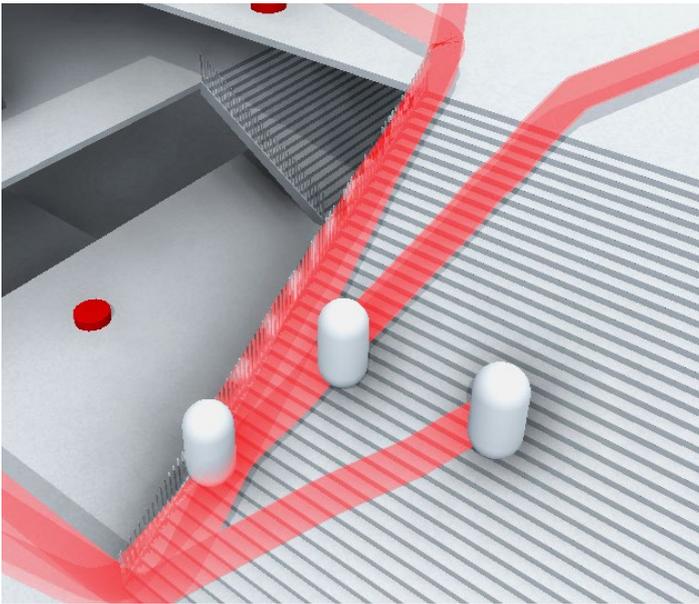
Adjust Model  
Non-Interactable

**Adjust Model:** This allows the simulation to examine the model and place the necessary inputs and your inputs and apply them to the model.

Once this is pressed, your camera will adjust to incorporate the dimensions of your model. Do not stress if the camera gets too close, or zoom use the scroll to control the distance from the model.

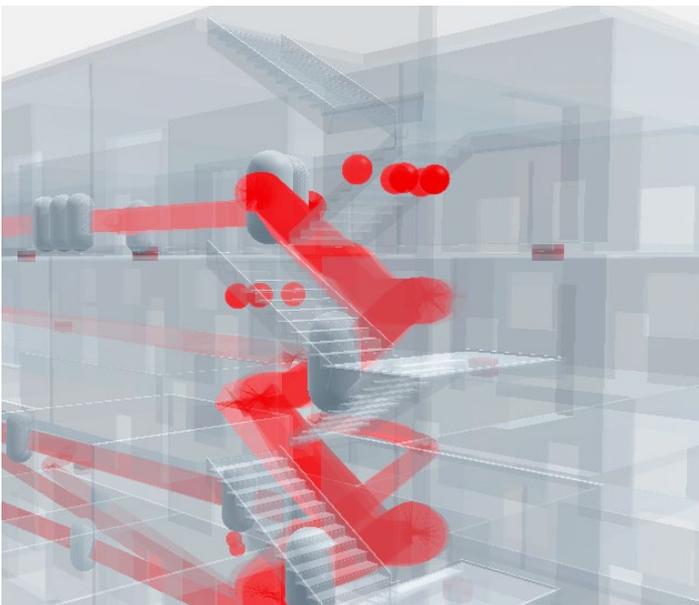
**Non-Interactable:** Means the simulation will by-pass "Adjust Model" and show you the model. The model will not be interactable and the simulation.

# Simulation Objects

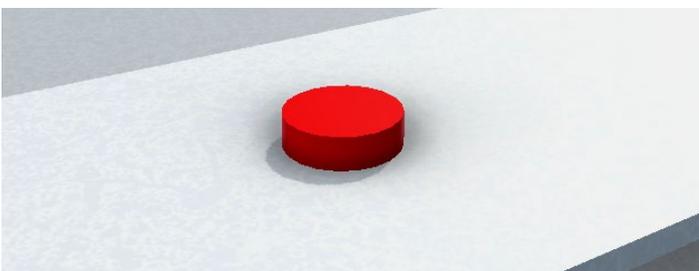


**Agent:** This is the walkable person which will be moving through the model.

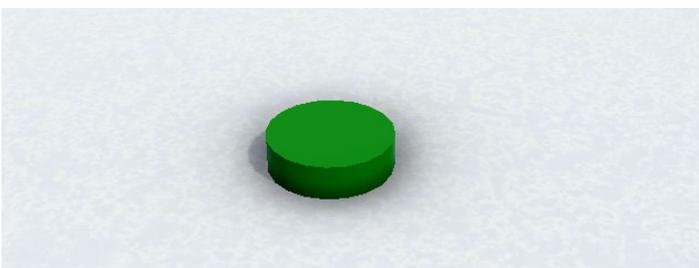
**Agent Trail:** This red line is showing where the agent has been.



**Collider Marker:** These hovering spheres show where a collision has happened within the model.



**Destination Disk:** This is to locate an area you wish the agents to visit.

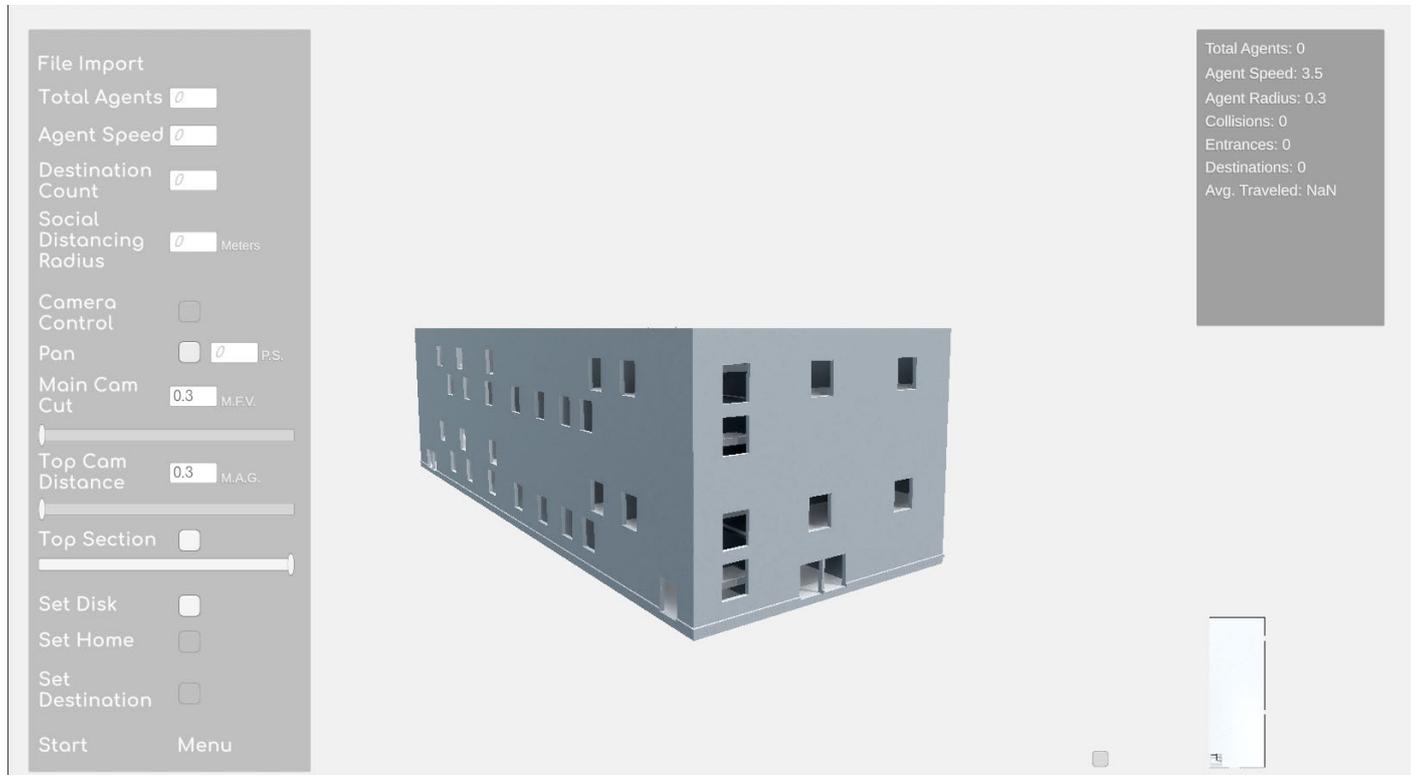


**Home Disk:** These are the points where the agents spawn in from. Locate them at entrances to the space.

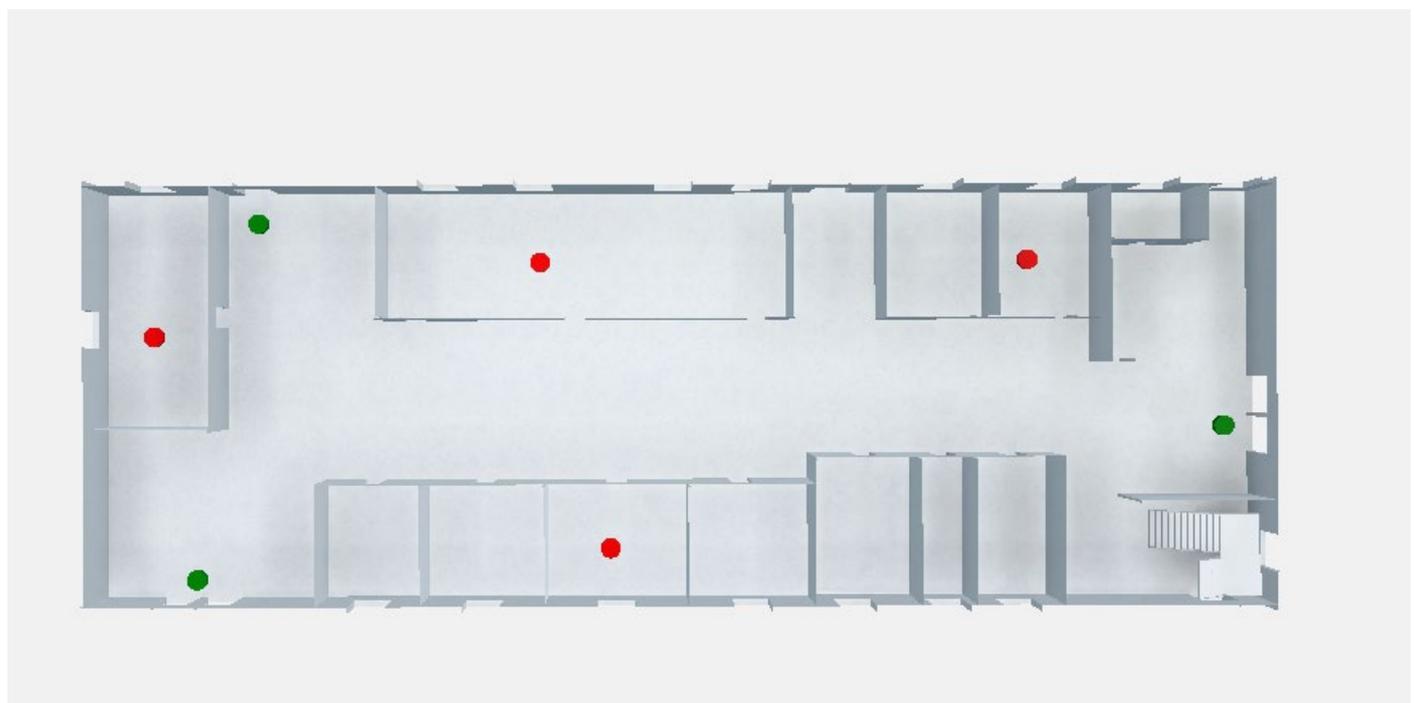
# Setting up a Simulation

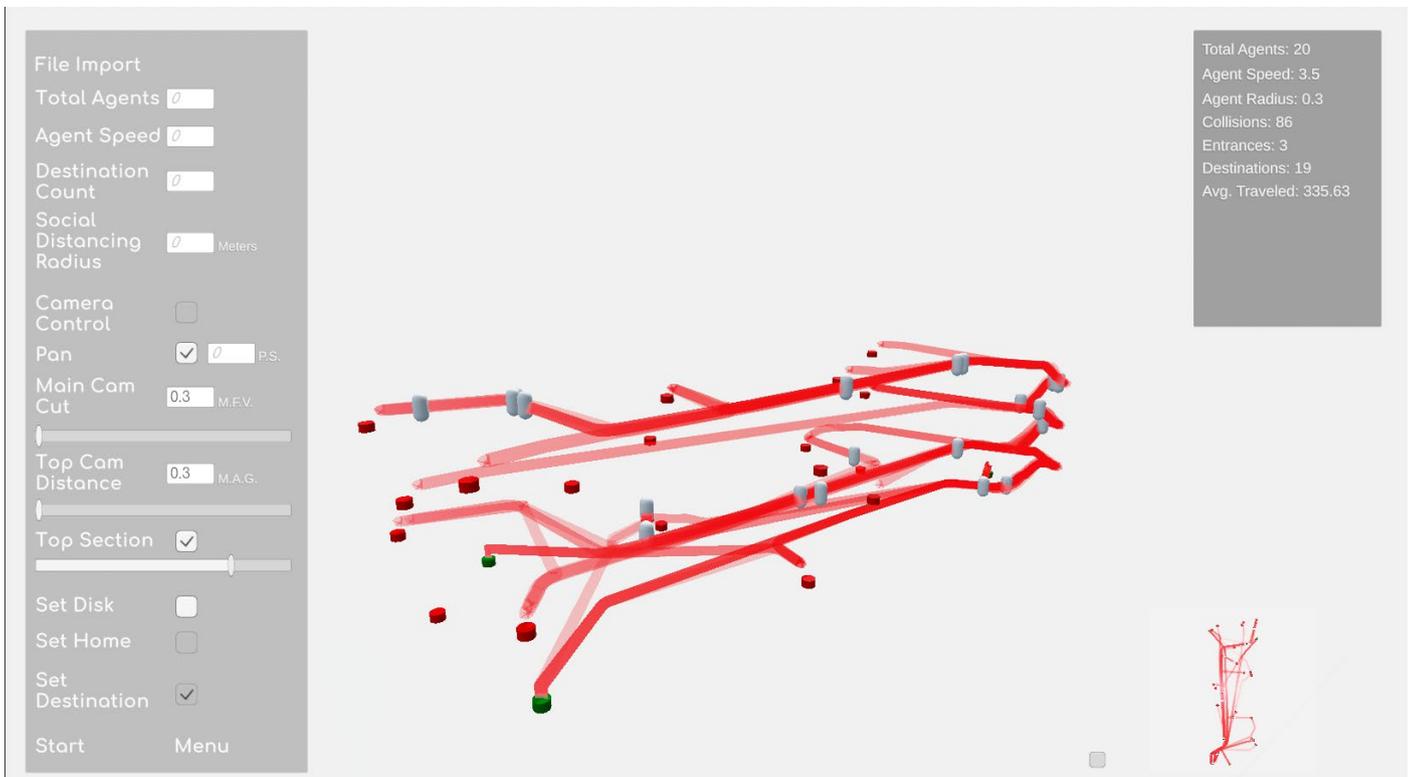
Setting up a simulation, once the geometry has been imported, is fairly easy and dependent on how you want the simulation to run. For basics, the agent needs a place to enter and a place to go to. These are going to need to be set by you.

Also, using the inputs on the controls, located on the Left side of the screen, you can change the default parameters the agents are going to use to run. These defaults are explained in the Simulation Controls section of the manual.



Placing disks in the model are needed for the agents to know where you need them to enter from and where to go. To begin setting disks, press the checkbox on the Left side, labelled Set Disk, then using the X key (Set Home) and the Z key (Set Destination) to place the necessary disk where you need it. If you place a disk and do not like its placement, or accidentally place one, press the Backspace button to remove the last disk. The backspace will remove the last disk of whatever you have checked, either home or destination.





When working on the model, you may want to see the floor plan, so you need to move the camera over the model, press shift to lock the camera, and use the slider Under Main Cam Cut to look through your model. Return the scale to the starting position when finished. If you see your model being cut, return to 90-degree position and it will reset itself. Also, on the right there is a slider for the Top Cam, this is to see the levels cut on your top view map in the bottom right corner.

Top Section Slider brings a cut plan down over your model to hide the walls and floors leaving the trails. This is to see only the trail lines. Like the image above.

Now when everything is in place, input your parameters and press the Start Button on the bottom left to begin the simulation. Your agents should be appearing from your Home Disks.

