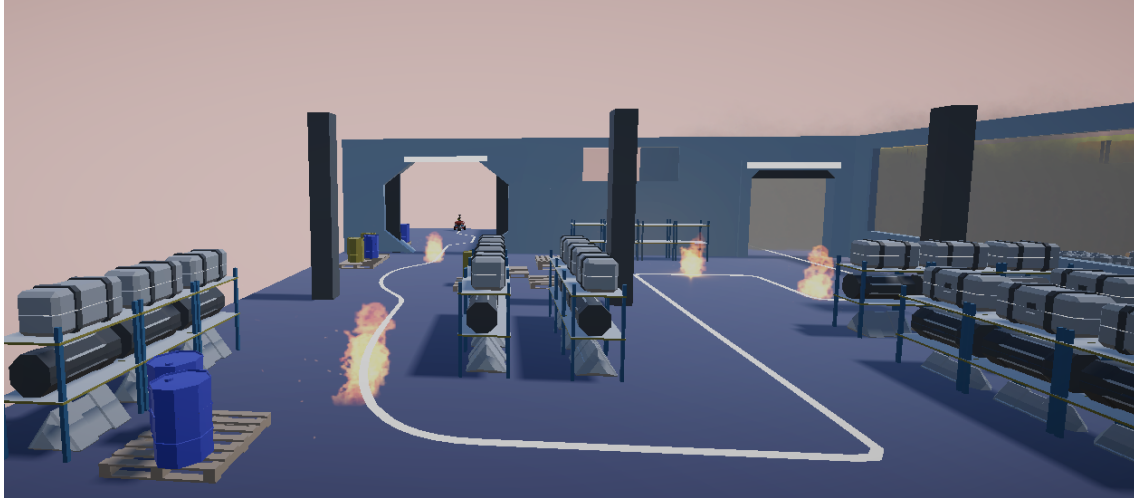


Imagine our solution

To get started with Imagine, open up your learning journals and answer the questions contained within. When you have finished, or when your teacher tells you to proceed, return to the platform and read the following contents:



Our problem: We need to quickly find and put out each fire in the warehouse without risking any human lives. If we don't put out the fire fast enough, the hydrogen fuel cells may overheat and explode!

It is important to note that this warehouse uses line following robots to move dangerous goods around. What if we re-programmed one of these line following robots to find and put out the fires for us? Luckily, each fire is located on our path so we don't need to leave the line.

Hopefully, you have already had a think about how you might solve this problem. If you have, continue to the next page where we will explain the particular solution that you will be implementing in this Project.

Our solution: We will attach a fire extinguisher to a robot and program it to follow a line, navigating between and putting out each fire.



To understand what this robotic system might look like in our situation, hit the green “Try the Game” button in the bottom left corner to control the line following robot manually. Think about the decisions that you are making and the information that you are using to make those decisions while controlling the robot, as any code that you write to automate the robot will need to use similar information to make similar decisions.

After playing the game, note how difficult it was navigating through the smoke at the end. Without clear vision, it is hard for us to control the robot manually. Manual controls also open up the opportunity for human error. Humans are more prone to unexpected or unintentional errors compared with robust programs.

To avoid these issues, we will be creating a program to control the robot automatically. After uploading our code, it will be able to navigate through the warehouse by following the line and identifying and extinguishing any fires that it encounters without any further input from a human, like us.

Continue to the next page to find out how we will be creating this solution!

Our approach: Whenever you approach a significant problem, rather than trying to implement the entire solution right away, it is often a good idea to break it down into a series of sub-systems. Sub-systems are designed to solve a portion of the overall problem. This means that we can start implementing and testing at an earlier stage, and it is easier to identify and fix any issues that occur along the way. We can then combine each of these smaller sub-systems at the end to solve our complete problem.

We can break our overall solution down into a series of sub-systems, like as follows:

1. We need to program our robot to move.
2. We need to program our robot to detect small curves in the line and adjust its movement accordingly.
3. We need to program our robot to detect significant turns in the line and adjust its movement accordingly.
4. We need to program our robot to detect the presence of a fire and automatically put it out.
5. We will then combine each of these smaller programs to solve the complete problem.

To get started with building your solution, proceed to the first iteration below. In each iteration, we will research, plan and then code one of our sub-systems. At the end of an iteration, proceed horizontally into the next iteration until you have completed them all and solved the problem!

