

# Project Overview



## Background

An overloaded electrical circuit has resulted in a fire inside a warehouse! The warehouse stores badly protected explosive hydrogen fuel cells. If we don't put out the fire quickly, the resulting heat from the fires will cause the hydrogen fuel cells to explode! The overloaded circuit and resulting fire have fried most of the factories wiring, so the power is out. Without lights, we have limited visibility. Sending human firefighters into the warehouse would be extremely dangerous with the risk that an explosion could occur at any time. Luckily, this warehouse utilises line-following robots to move its items around.

## Synopsis

In this Project, learners will create an algorithm to guide a line-following robot to a series of fires within a warehouse, putting them out safely before they spread to the nearby hydrogen fuel cells! Learners will not only create their own control algorithm, but they will also learn about some of the basics of fire safety, warehouse automation, and the advantage that robots have over humans when operating in hazardous situations.

## This Project is divided into nine lesson plans

- 01.** **Define** the situation by playing and discussing a video with your class. You will then help them to accurately **Define** the problem that they will be solving in the Project.
- 02.** Learners will **Imagine** their own solutions to the problem before being introduced to the solution that they will be implementing. You will also describe the approach to implementing this solution that students will be taking in this Project (solving five separate sub-problems).
- 03.** Learners will now use the platform to start to **Create** their solutions. They will begin by researching and then planning their solution to the first sub-problem.
- 04.** Learners will continue to **Create**, coding their solution to the first sub-problem before researching the second.
- 05.** Learners will continue to **Create**, planning and then coding their solution to the second sub-problem.
- 06.** Learners will continue to **Create**, planning and then coding their solution to the third sub-problem.
- 07.** Learners will continue to **Create**, researching, planning and then coding their solution to the fourth sub-problem.
- 08.** Learners will **Create** their solution to the complete problem. They will plan how they will combine their solutions to each of the sub-problems together before writing and testing their code.
- 09.** Learners will be given an opportunity to **Improve** their solution, before concluding the Project by spending time to **Review** their journey.

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## Subject Areas



Technology



Engineering



Computer Science



Line Following



Fire Safety



## Learning Outcomes

By the end of this Project, **learners** will be able to:

- Explain how and why line-following is used for navigation.
- Understand why we decompose problems.
- Understand the fundamentals of flow-based coding and write code using the Flow editor.
- Describe DC motors and outline how they work (optional).
- Describe IR sensors and outline how they work.
- Define comparators and conditionals.
- Write programs that use sensor data to control an output.
- Use logical reasoning to derive simple and more complex algorithms.
- Write programs that use conditional statements to control an output.
- Differentiate between different types of fires and how to deal with them.
- Define while loops and use them to solve problems.
- Combine the solutions to different sub-problems to solve a larger problem.
- Explore ways a solution can be optimised.



## Equipment List

**Learners** require:



Access to our online platform through a Chromebook, laptop or PC



Access to our learning journal through either Google docs or Microsoft Word

**Educators** require:



The situation video  
(link included in lesson plan)



Access to this lesson plan, either printed or digitally



Easy access to the answer documents, printed or digitally  
(file included in lesson plan)