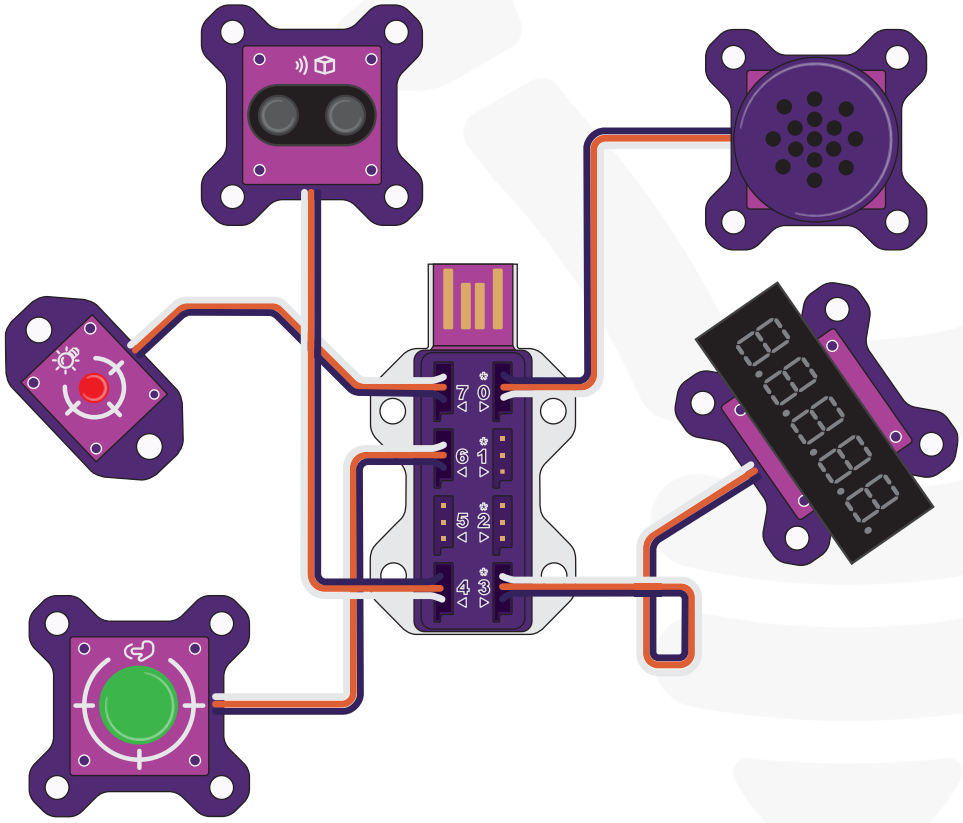
Invention Engine Lessons - Unit 3

Looking for trouble



Invention Engine

The fun of inventing is the journey

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Invention Engine Lessons - Unit 3 by

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Introduction

Imagine a world where the challenges you see around you are not just problems, but opportunities waiting for your creativity and innovation.

You have the potential to be an inventor, an engineer, a designer, a coder, etc and shape the future in ways you can't yet imagine. Look around – from the devices you use to the buildings you enter; everything has been created by someone with a vision.

For this journey you need to embrace your curiosity, ask questions, and wonder: "What if?" You have the power to make those "what ifs" a reality – whether it is designing a more efficient way to solve everyday tasks, crafting solutions for global challenges, or even inventing something entirely new that changes the game.

So, let us embark on this adventure!

1. Looking for trouble.

Pain points are the specific problems or challenges that people encounter in their daily lives, and these problems can cause frustration or make things difficult. When you identify pain points, you can come up with creative solutions to make things better and more convenient for yourself and others.

How to find pain points?

- **Talk to People:** When you chat with friends, family, or classmates, listen to what they complain about. Do you notice any problems that could have creative solutions?
- **Think About Your Interests:** Do you have hobbies or activities you really enjoy? Are there things that bother you while doing them?
- **Spot Patterns:** If you hear lots of people griping about the same thing, like a crowded school bus or confusing homework, that is a pattern, and it is a problem waiting to be solved.
- **Explore Your World:** Read the news and pay attention to what is going on around you—in school, your neighbourhood, or your community. Are there things that could be made better? Problems related to the environment, safety, convenience, or accessibility?
- **Tech Talk:** Think about the technology you use every day. Can you come up with ways to make those devices even better?
- **Everyday Items:** Look at the things you use regularly, like your phone or backpack. Do you think they could be made more user-friendly or functional?
- **Inspired by Others:** Have you seen cool inventions or ideas on the news, TV, or online? Check out reviews for these inventions. How can they be improved, or can you build upon those ideas?

- **Your Own Challenges:** Think about the challenges you have faced in your life. Can you come up with creative solutions for them?
- **Global Concerns:** Are there big world problems, like climate change or pollution, that you are passionate about helping to solve?
- **Imagine the Impossible:** If you had a magic wand and could change anything in the world, what would it be? How could you make that imaginative idea into a real solution?

Finding problems to solve is like being a detective for everyday issues. It is all about making things better for people and creating cool solutions.

Once you have a problem in mind, it is time to find a solution! Inventing a solution is super exciting! Specially, when we have someone in mind!

2. Empathy

A powerful tool for inventors is empathy.

Empathy helps us to understand what someone is experiencing by reaching into our own experience so we can try to understand and connect into what person is feeling. Have you ever had a similar problem?

Empathy helps us create inventions that really work for the people who will use them. To empathise we need to carefully listen and observe users, so that we can understand what they are going through.

In **user-centered** design, the user is the most important person. It means that when designing our inventions, we need to ensure that what we create fits the needs, and solves the user's problem.

Once we "get" what someone is going through, we can tackle the problem our way. Each solution depends on how we understand the issue and our unique perspective.

Inventors who empathize with their users are better equipped to create solutions that are user-centered and meet user's needs.

A great tool to help you understand what your user is experiencing is an **empathy map**. The empathy map below includes four categories; Hear, Think and Feel, See, and Say and do. Under each category there are a few questions to keep in mind when talking to, or observing users.

Draw and complete your empathy map in the back of one of the pages of your Invention Journal.

3. Define

We can understand the user's feelings, needs, and problems from the empathy map. With that information in mind, describe who your user is, what they need, and what your goal is in your Invention journal.

Before we move to the next step, it is helpful to do a little research to get inspired, generate ideas and to learn more about the problem.

When doing research think about:

- Why it happens: What's causing the problem you are trying to solve?
- What's been done: Have people tried to fix it before? What worked and what didn't?
- How people feel: How do the people facing this issue see it? What do they need or want, and what is bothering them?
- Big picture impact: What does this problem mean for everyone? Are there ethical, environmental, or social concerns to think about when solving it?

4. Design and Concept development.

This is where we turn our research and what we have learned from the empathy map into real ideas and solutions.

In the 'Design' part of your Invention Journal start by brainstorming. Try to focus on ideas that can help solve your user's problem. When you are finished:

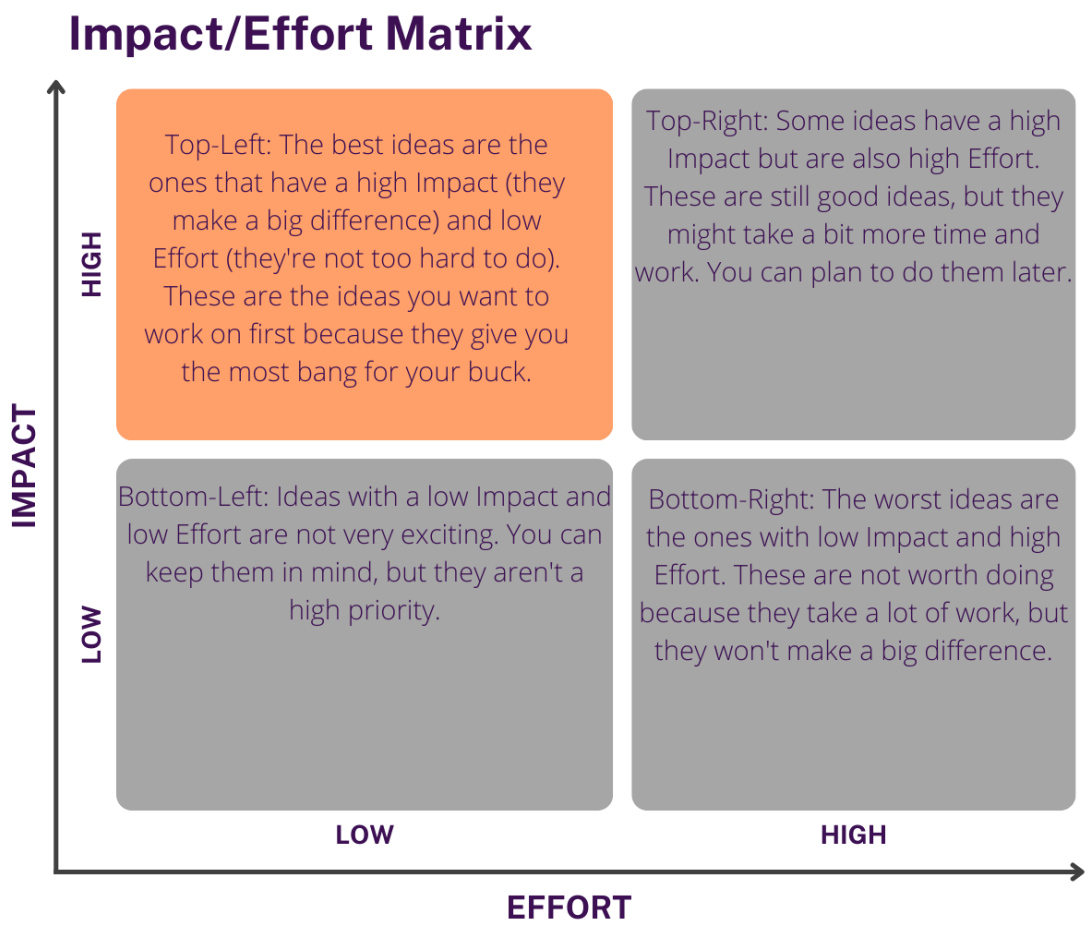
1. Get rid of anything that is not okay to do, ideas that are against the rules or impossible (unethical or impossible)
2. If the idea does not actually solve the problem, scratch it off.
3. If you do not want to do it or cannot commit to it, cross it out.
4. If it is too big or does not fit the project's rules, it is a no-go.
5. If it does not match what the project needs, take it off your list.
6. If your idea already exists, can you make it even better? If not, drop it.

When we have a few remaining ideas, we can use the **Impact- Effort Matrix** tool for picking the best idea.

The Impact-Effort Matrix is a way to figure out which ideas will make a big difference and which ones are easy to do. You want to choose the ideas that are both easy and make a big impact while putting aside the ones that are either hard to do or won't help much.

This is how you use the Impact-Effort Matrix.

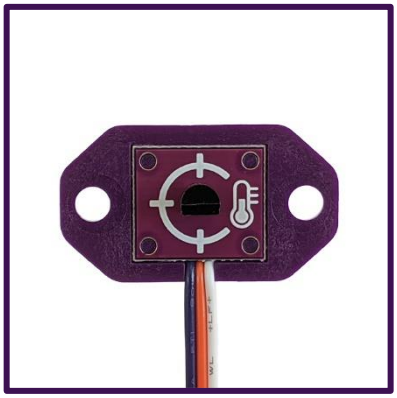
1. **Rate Impact:** Think about how awesome they would be if you added them to your project. Use a score from 1 (not so cool) to 5 (super cool).
2. **Rate Effort:** Then, consider how hard or easy it would be to do each idea. Again, score from 1 (very easy) to 5 (really tough).
3. **Plot on the Chart:** Make a chart like the one below, you can use the back of a sheet on your Invention Journal. Take each idea and put it on the chart. Look at the scores you gave each idea for how awesome it is and how hard it is.
4. **Pick!** Choose an idea from the too-left of the chart. Continue to develop your idea in your Invention Journal.



5. New bits in this unit

When coding, remember you have new bits in this unit to add to your invention! For more information on the following bits look at the datasheets.

The temperature sensor bit



The temperature sensor is an input bit that reads the temperature of the air surrounding the sensor. Generally, the temperature sensor is used in a conditional statement. For example, if the temperature is higher than 25°C then turn the light on.

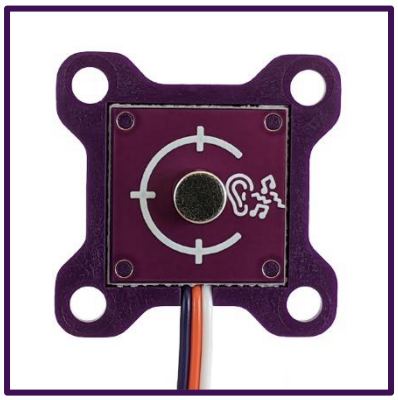
The IR transmitter bit

The IR transmitter bit is an output bit that sends data via an infrared (IR) light signal. The IR receiver bit is required to receive the data.

The IR transmitter bit almost looks identical to the LED bits however, the IR LED has a blue tint

When programming the infrared transmitter bit, it can send a constant (or fixed number) or a variable.

The noise sensor bit



The noise sensor is an input bit that detects loud sounds.

When a loud sound is detected the red LED on the noise sensor bit briefly turns on. During this brief time the noise sensor bit also sends the hub a signal that a loud sound has been detected.

The noise sensor is a sensing block so it must be used with control blocks.

The motor bit

The motor bit is an output bit that rotates an output shaft continuously.
For precise angular movements refer to the servo bit.

The motor bit can rotate the output shaft within a range of speeds (1 to 10) in either a clockwise or anticlockwise direction.