THE SYMBOLIC ELEMENT

Your group's symbolic element is **EARTH**, which represents **stability, nourishment, and interconnectedness**. In the context of the **United Nations Sustainable Development Goals (UN SDGs)**, earth can symbolise technological advancements and innovations aimed at addressing health and well-being challenges. We cannot hope for sustainable development without healthy, effective communication and collaboration.

This worksheet addresses the following UN SDGs within the Healthcare industry:

- **Goals 3** Ensure healthy lives and promote well-being for all at all ages.
- **Goals 9** Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation.
- **Goals 15** Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.
- **Goals 17** Revitalize the global partnership for sustainable development.

THE HEALTHCARE INDUSTRY

In the healthcare industry, technologies such as Artificial Intelligence (AI), Robotics, Internet of Things (IoT) can be used to provide efficiency, communication, and sustainability in the healthcare sector.

AI	Robotics	Internet of Things

EXTENDED READING:
Artificial Intelligence (AI): AI aids in medical diagnosis through image analysis. Example: IBM's Health analyses medical images to detect anomalies like cancer.

Robotics: Robotics assists in surgery for precision and minimally invasive procedures. Example: Da Vinci surgical System performs complex surgeries with enhanced precision.

Internet of Things (IoT): IoT monitors patient health remotely. Example: wearable devices like Fitbit track vital signs and send alerts to healthcare providers.

THE ROBOTICS TECHNOLOGY

- Robotics technology can be used in the healthcare industry in the form of service robots.
- Robots designed to interact with humans and to deliver items.
- These robots can carry medicine trays and deliver them directly to patients or healthcare professionals.

THE MISSION: CREATE A SIMPLE AUTONOMOUS CAR

Question: What helps the robot move?
Please write down you answer below:

Answer:

Question: How does a robot turn right?
Please write down you answer below:

Answer:

Question: How does a robot turn left?
Please write down you answer below:

Answer:

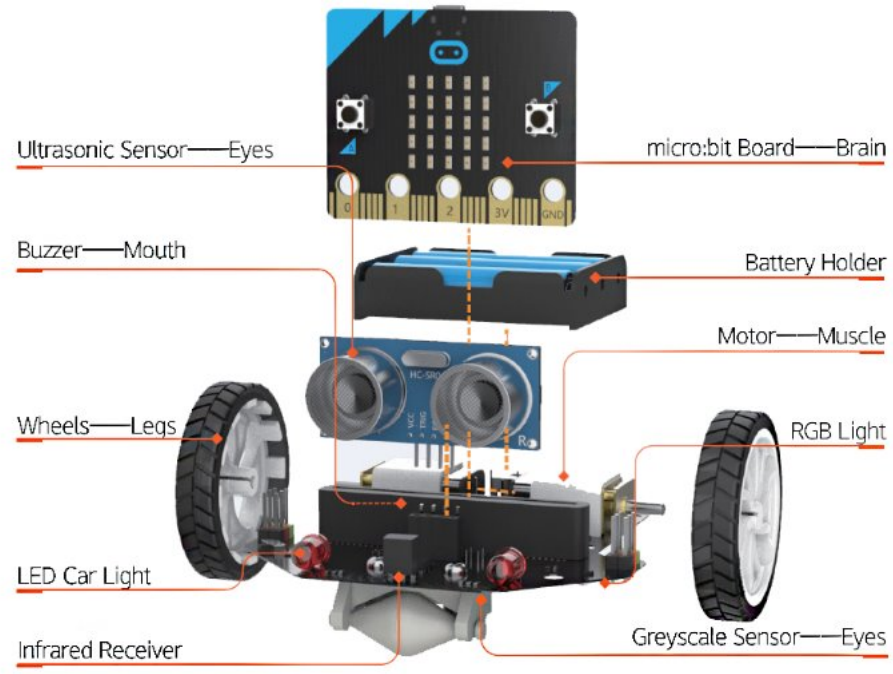
THE MISSION: USE A ROBOT TO DELIVER MEDICATION FROM PHARMACY TO PATIENT ROOMS IN VARIOUS DEPARTMENTS

The use of robots for medicine delivery can improve efficiency, reduce human error, and ensure timely and secure medication delivery. These robots follow a predetermined path within a facility. Reduce the workload on healthcare staff and minimise human contact, which is crucial for infection control.

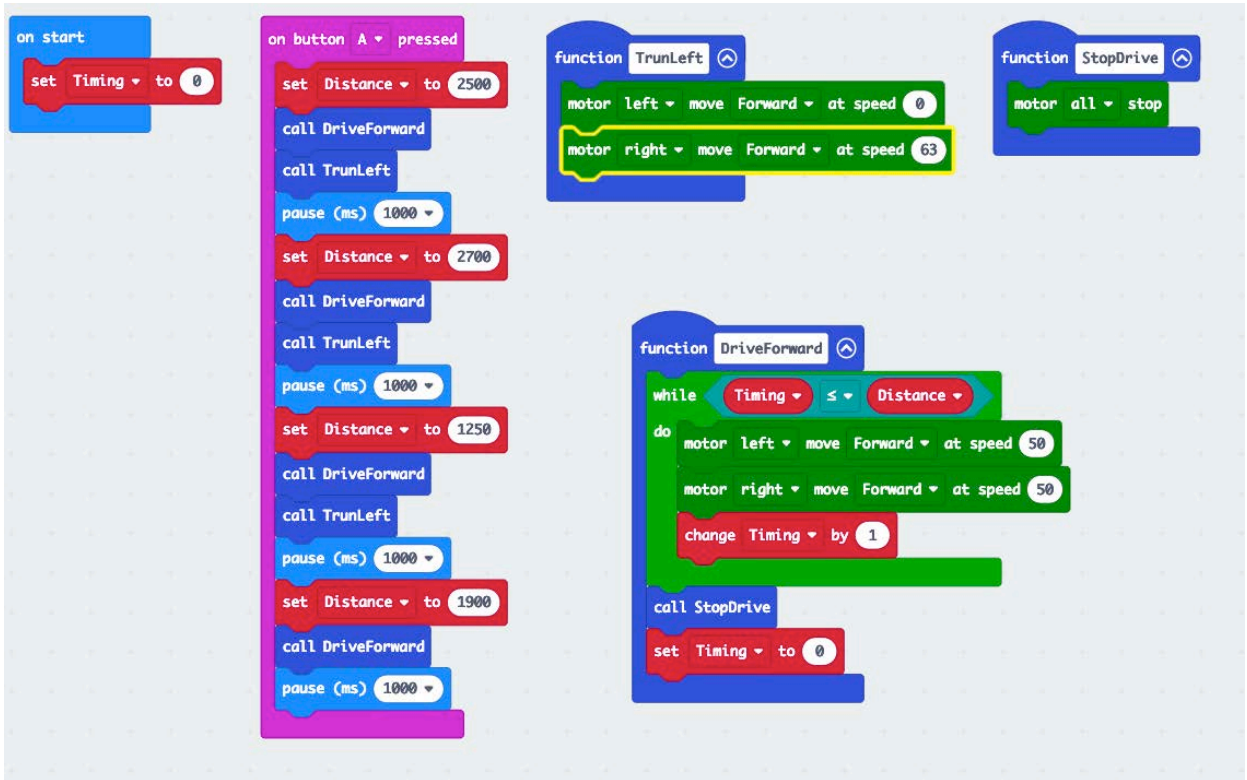
STAGE ONE: PROGRAM A ROBOT TO FOLLOW A PREDETERMINED PATH

1. We will use a mini two-wheeled robot called a Maqueen, and a Maqueen can be controlled using the micro:bit board. The Maqueen has the following specifications:

- Two motors (left and right) which allows you to control the Maqueen's speed and movement.
- An ultrasonic sensor, which allows you to read the distance of the sensor and the obstacle ahead.
- A line-tracking sensor, where you can read the value of this sensor on the button of Maqueen robot.



2. Below we have the coding building blocks that can program the movement of the robot in certain directions. The code uses *functions*, where functions are "self-contained" pieces of code that accomplish a specific task. Read the code below and answer the following questions.



Question: "Timing" in the code above is a variable. A variable stores information in a computer program. In the code above, what does the "Timing" variable do for us?
Please write down you answer below:

Answer:

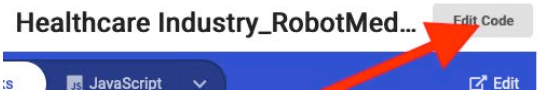
Question: What do the functions "DriveForward", "TurnLeft" and "StopDrive" in the code in the above picture do?
Please write down you answer below:

Answer:

3. Let's program the with the code above. To do that, please follow these five steps:

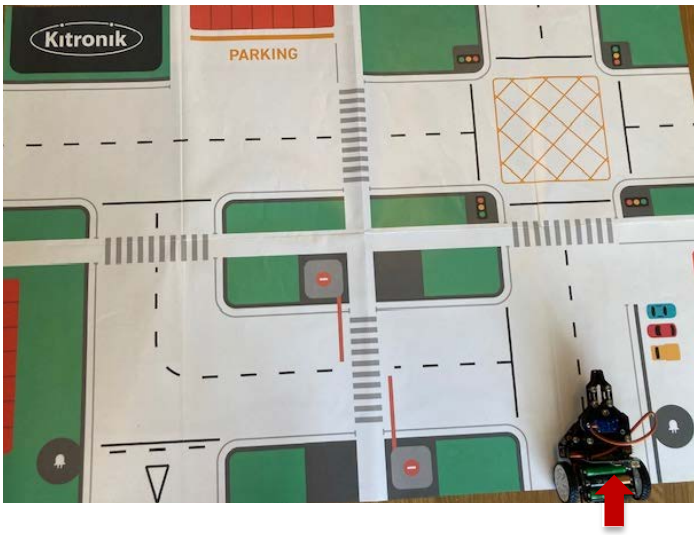
   Step 1: Go to https://makecode.microbit.org/S48746-71959-89475-03262 .

   Step 2: Click on the Edit button.

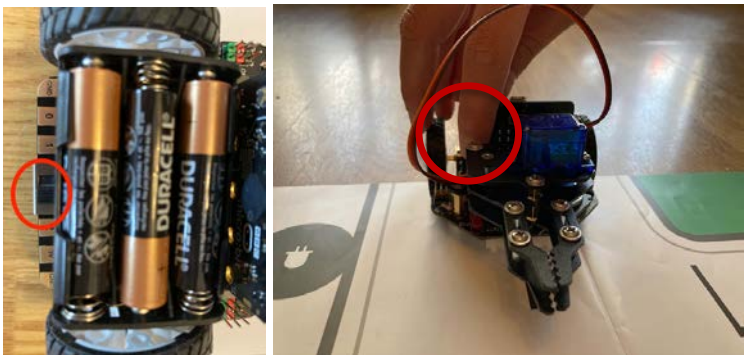


   Step 3: Download your project and copy/install it into the BBC micro:bit attached to the Maqueen robot.

   Step 4: Now, place the Maqueen robot on the map given to you. Place it on the specific location shown in the picture below.



   Step 5: Turn on the power button on the back of the Maqueen, robot and then press the **A button** on the BBC micro:bit board.

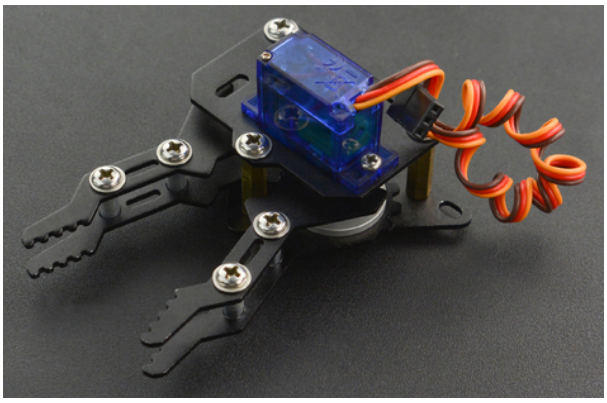


Task: Draw the path that the Maqueen traverses after pressing the button.
(*Caution: sometimes, hairs and dust get stuck in the Maqueen car's wheels; please ask for the student ambassador's help if you notice the Maqueen car behaves strangely.*)
Please draw down you answer below (please turn the Maqueen robot off after drawing your answer):

Answer:

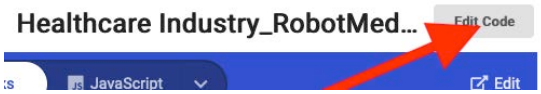
STAGE TWO: PROGRAM A ROBOT TO GRASP AND RELEASE AN OBJECT

1. We will program the beetle pincers attached to the Maqueen robot. To do that, please follow these five steps:

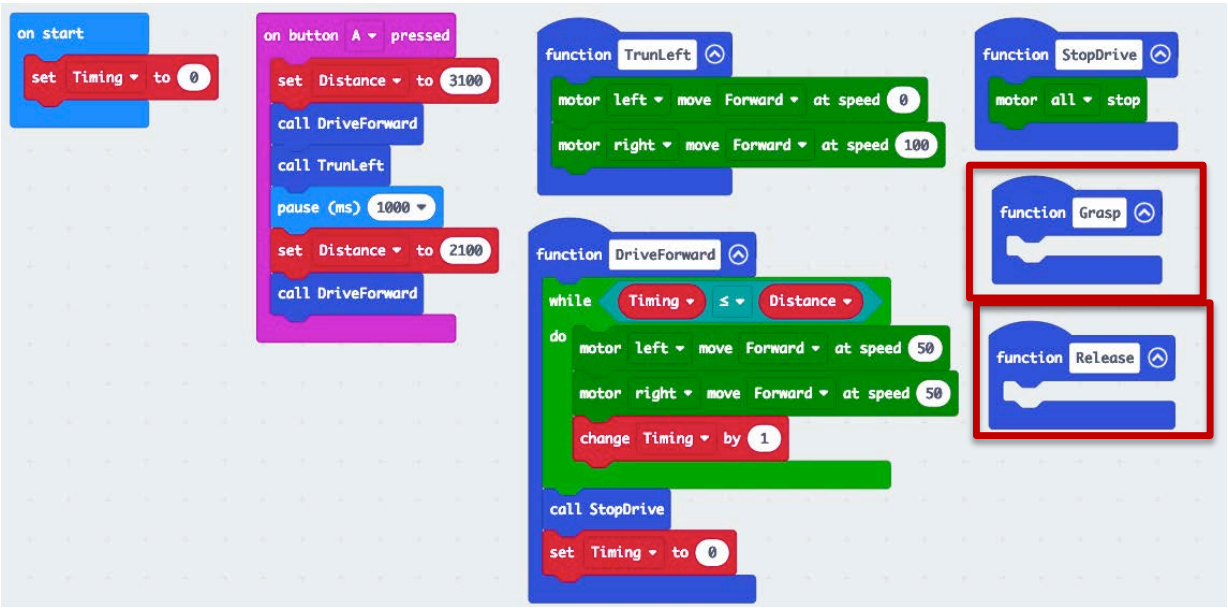


Step 1: Go to https://makecode.microbit.org/S23106-70626-42621-48256 .

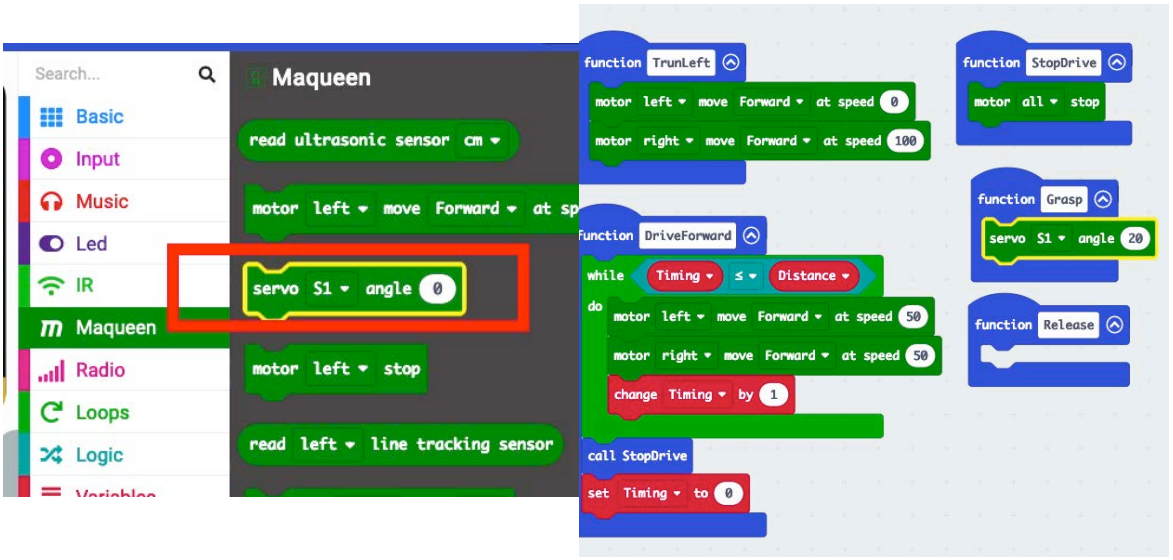
Step 2: Click on the Edit button.



Step 3: You will notice a program that allows the robot to drive forward, and then turn left towards the parking lot. Now, you need to program the *Grasp* and *Release* functions. See screenshot below.

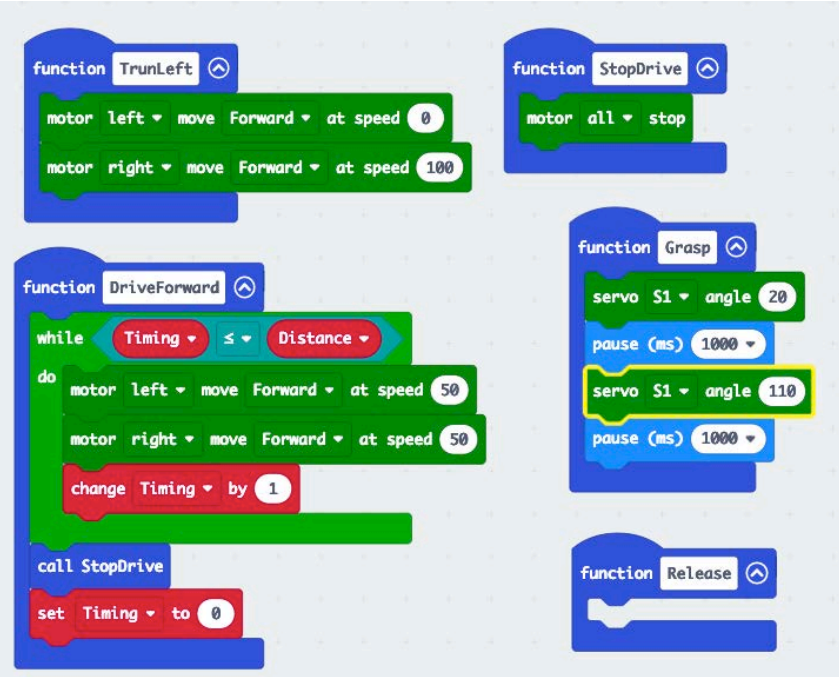


Step 4: Fist inside the *Grasp* function, drag and drop from the **Maqueen** menu, the **servo S1 angle** command. Then set the angle to 20. See screenshot below.

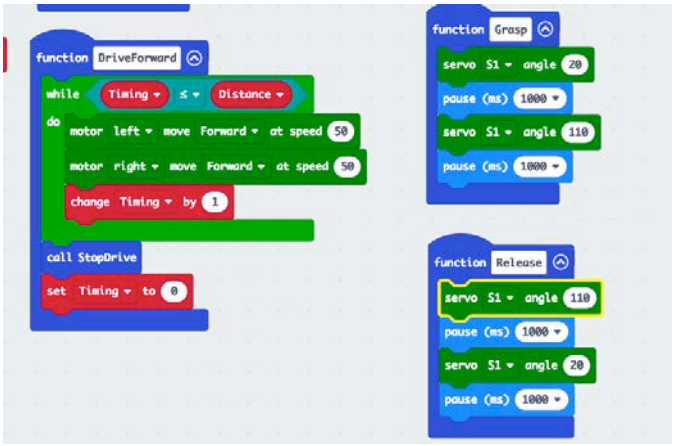


Step 5: Inside the *Grasp* function, below the **servo S1 angle 20**, drag and drop from the Basic menu, **pause (ms)** and set it to **1000**. See screenshot below.

Step 6: After that, drag and drop from the **Maqueen** menu, the **servo S1 angle** command. Then set the angle to **110**. Then, drag and drop from the Basic menu, **pause (ms)** and set it to **1000**. See the screenshot below. This code allows the beetle pincers attached to the maqueen robot to open, and then close.



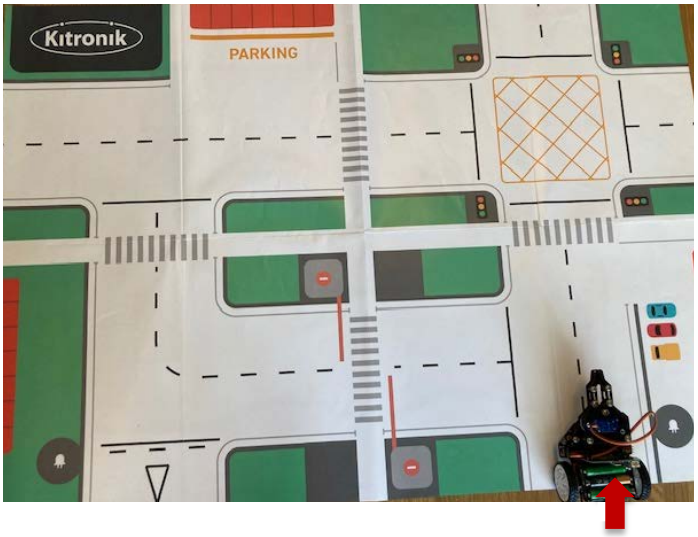
Step 7: Do the same as you did in the **Grasp** function in the **Release** function but reverse the order (see the screenshot below).



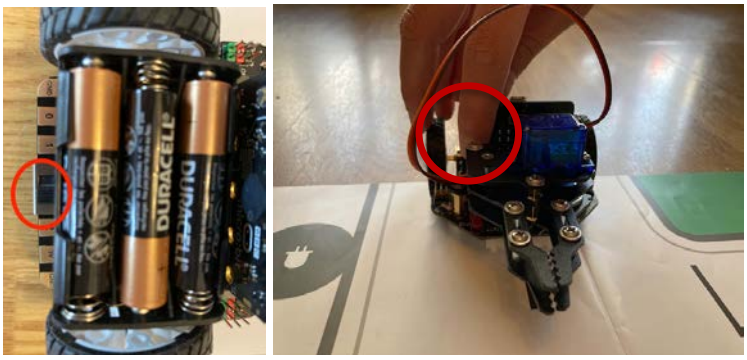
Step 8: Now, you need to modify the code such that **Grasp** function is *called* inside the **on button A pressed** code, at the beginning of this code**.** Then, you need to call the **Release** function at end of the code inside **on button A pressed.** See the screenshot below.

Step 9: Download your project and copy/install it into the BBC micro:bit attached to the **Maqueen** robot.

Step 10: Now, place the Maqueen robot on the map given to you, on the same specific location show in the picture below.



Step 11: Turn on the power button on at the back of the Maqueen robot, and then press the **A button** on the BBC micro:bit board.



Step 12: When the Maqueen's beetle pincers open, place the empty container given to you inside the pincers (see the screenshot below).

Question: When the Maqueen robot starts moving until it stops, what do you notice? (***Caution: sometimes, hairs and dust get stuck in the Maqueen car's wheels; please ask for the student ambassador's help if you notice the Maqueen car behaves strangely.***)
Please write down your answer below (**please turn the Maqueen robot off after writing your answer**).

Answer: