

Climate Action Kit

Quickstart Guide

Welcome to the Climate Action Kit



Help us inspire the next generation of creative thinkers to build a better future for us all.

The Climate Action Kit is a STEAM learning platform that presents real-world challenges as opportunities to take climate action by building and coding functioning prototypes of real-life technology. Connected to the United Nations Sustainable Development Goals, the goal of the Climate Action Kit is to create meaningful learning and teaching experiences that inspire generations of creative thinkers to build a better future for us all.

The Climate Action Kit includes 3 main components:



Hardware



Learning Platform



Coding Tutorials

In this quick start guide, you will learn how to assemble the Wind Turbine project, code the project to simulate real-life technology, and create your account on the Forward Education Learning Platform.

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Smart Components

- The Breakout Board
Smart Sensors

Building Blocks

Motors & Additional Parts

SMART COMPONENTS

The Breakout Board

The Breakout Board is the main hub of the Climate Action Kit. All of the Sensors and Motors are connected to the Breakout Board and the onboard battery powers the projects. The micro:bit is inserted into the slot and the Breakout Board transmits all of the data from the micro:bit out to the various components.

Understanding Breakout Board ports:


Sensor Ports


The Breakout Board has four Sensor ports. This is where you can connect Sensor Components. Make sure to match the symbol when connecting components.


Motor Ports

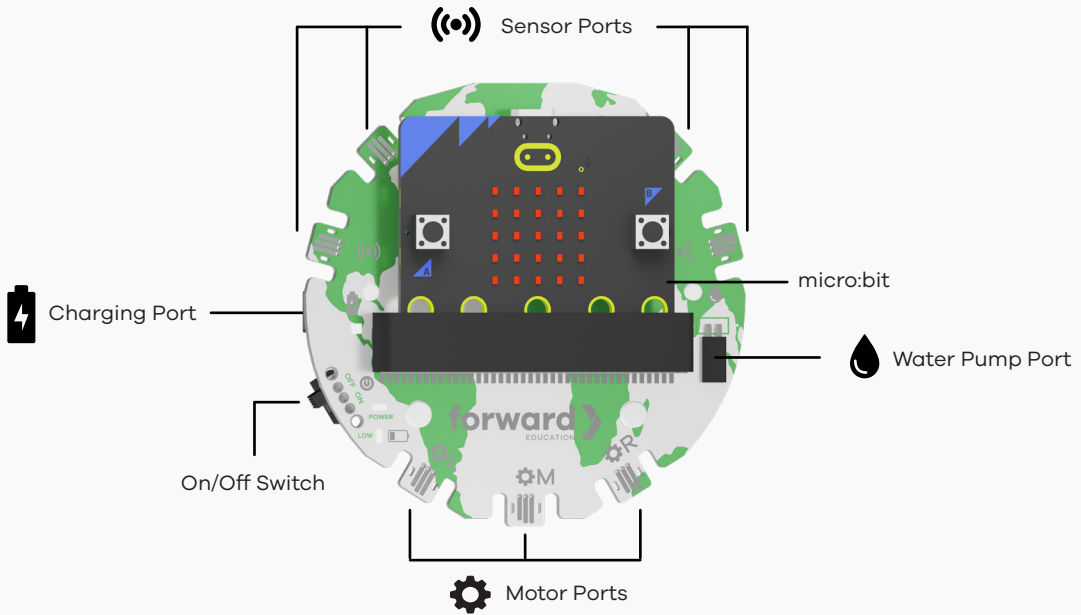
The Breakout Board has three Motor Ports. This is where you can connect Servo Motors. Make sure to match the symbol when connecting components.

Motor Ports are also labelled Left, Middle, and Right. This will help you program the correct motor during the coding process.

 **L** Left Motor Port

 **M** Middle Motor Port

 **R** Right Motor Port



micro:bit

To connect the micro:bit to the Breakout Board, insert it into the slot in the orientation shown here. Please note, a V2 micro:bit is required with the Climate Action Kit.

Water Pump Port

The Water Pump in the Climate Action Kit has a dedicated port on the Breakout Board. Insert the pins into the port, following the positive and negative symbols (red = positive, black = negative).

Charging Port

A micro USB cable is used to charge the onboard battery of the Breakout Board.

Smart Components

The Breakout Board

- Smart Sensors

Building Blocks

Motors & Additional Parts

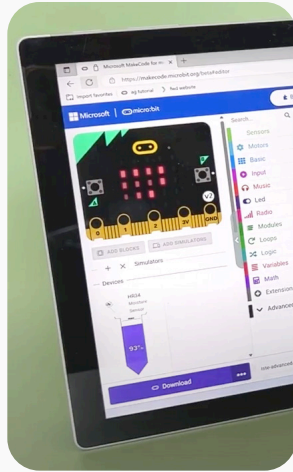
IMPORTANT

To program these Smart Components, you will need to add the “Forward Education” extension in the MakeCode coding environment or follow one of the coding tutorials in the Learning Platform.

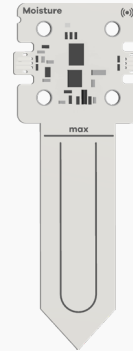
SMART COMPONENTS

Smart Sensors

Each of the Smart Sensors in the Climate Action Kit are designed to provide various input/output data in the projects. These Sensors are considered ‘smart’ because they will provide real-time feedback in the form of ‘virtual simulators’ in the MakeCode coding environment.

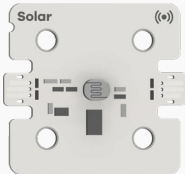


Simulator example



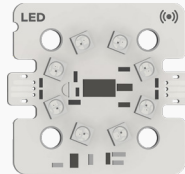
Moisture Sensor

Measures the percentage of moisture present in a medium such as soil.



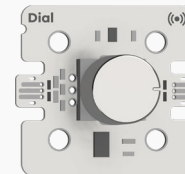
Solar Sensor

Measures the percentage of light present.



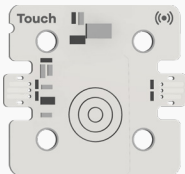
LED Light

Contains eight independent multi-colour LEDs.



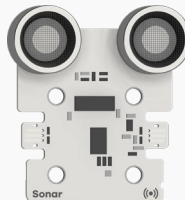
Rotary Dial

Detects the input of a dial turn or button push.



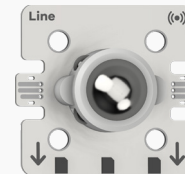
Touch Sensor

Detects the action of a touch or hold.



Sonar Sensor

Uses ultrasonic frequency to measure the proximity of an object.



Line Sensor

Contains 3 x infrared sensors that can be used to follow a line. Also contains a ball and caster to act as a third wheel in mobile projects.

Smart Components

The Breakout Board

Smart Sensors

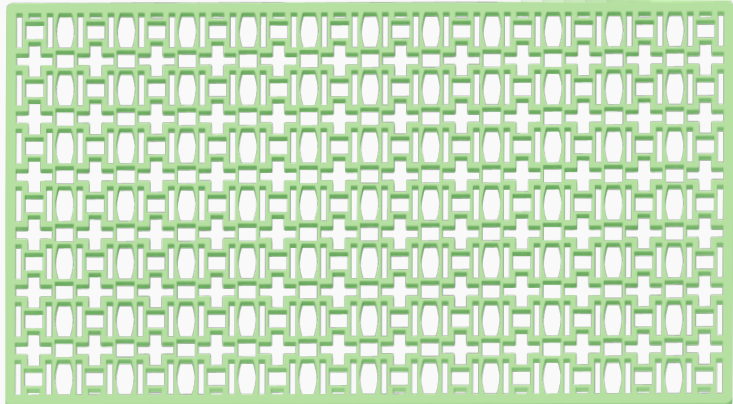
Building Blocks

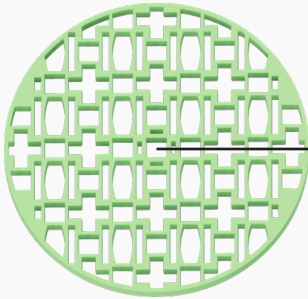
Motors & Additional Parts

Building Blocks

The Climate Action Kit Building Blocks are designed to assist in the construction of projects. The blocks are LEGO® compatible and can be used in multiple different configurations. The Component Backing Building Blocks, which are attached to the back of the Smart Sensors, allow you to securely attach the various sensors to your projects.

Base Plate





Circle

The center hole can be connected to the Servo Motor gear.



Thin Frame

Medium Frame with Servo



Use this space to insert a Servo Motor into the Building Block.

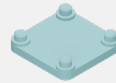
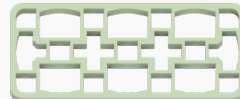
Long Frame



Medium Frame

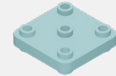


Small Frame



Component Backing Connector

This piece is attached to the back of the Smart Sensors and allows you to connect them to the other Building Blocks.



Back-to-Back Connector

Use this piece to attach two Building Blocks together.



Corner Connector



Cube Connector

Smart Components

The Breakout Board
Smart Sensors

Building Blocks

Motors & Additional Parts

IMPORTANT

After you're finished using the Water Pump, run the pump out of water for a few seconds to flush any excess water. Air dry the Water Pump for 24 hours before storing it to prevent damage.

Motors & Additional Parts

The Climate Action Kit includes these additional parts and motors for project building.



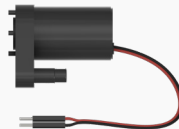
Servo Motor (Continuous)

The Continuous Servo Motor allows for continuous movement, such as driving or spinning. This movement is measured in percentage (%) of power.



Servo Motor (Positional)

The Positional Servo Motor allows for positional movements, such as turning to a specific direction. This movement is measured in degrees (°), up to 270°.



Water Pump

This is a submersible Water Pump that will displace water from one vessel to another. After you've connected the water tubing, insert the black Water Pump into the water, and place the end of the tubing into an empty vessel.



Screwdriver



Water Tubing



Butterfly Clips

Butterfly Clips can be used to attach paper, cardboard, or other craft supplies to Climate Action Kit projects.



Wheels

Wheels can be attached onto the Servo Motors. You can use the provided screws and screwdriver to attach the wheels securely to the Servo Motors.



Cable Extender

The Cable Extender is used to connect two cable connectors together to increase the length.



USB Cable

The USB cable is used to charge the Breakout Board. The USB cable is also used to download MakeCode programs to the micro:bit.

Cable Connectors

Cable Connectors are used to connect various Smart Components and Servo Motors to the Breakout Board. Cable Connectors are reversible, so you can't wire them wrong!



Short Cable Connector



Long Cable Connector

The Learning Process

Each Climate Action Kit lesson and project is based off of a real-world challenge, technology, or climate action opportunity.



Discover

Discover the world around you and be inspired by real-life technologies and organizations making a difference!



Build

Use the various Smart Components, Building Blocks, and Motors in the Climate Action Kit to build a prototype version of real-life technology.



Code

Using a micro:bit and Microsoft MakeCode, code your project to perform all sorts of actions.

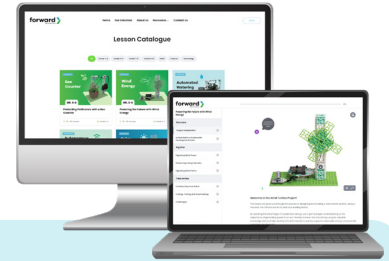


Explore

Ready to explore more possibilities? Build on your project with a coding challenge, customize the build, or create something entirely new!

The Learning Platform

The Forward Education Learning Platform contains all of the lessons, projects, tutorials, and support material for using the Climate Action Kit.



Lessons

Lesson content is curriculum-aligned and consists of a variety of lessons offering different coding entry points depending on your experience level.

Each Lesson includes curriculum-aligned learning content, step-by-step building and coding tutorials, inquiry and reflection questions, as well as Educator support materials for classroom delivery.

Projects

The Project library contains a variety of ideas and inspiration for projects that you can build with the Climate Action Kit.

Tutorials

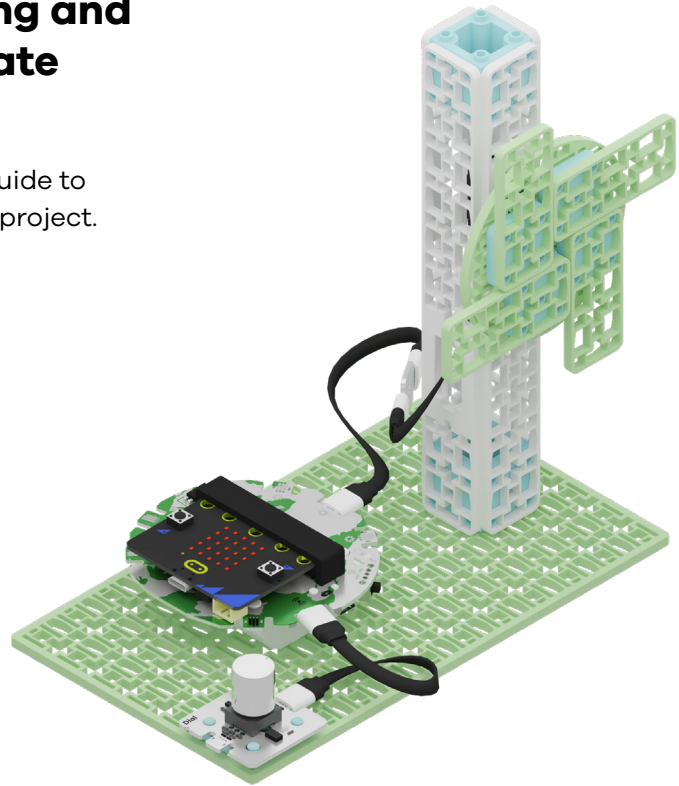
The Tutorial library contains a variety of bite-sized tutorials on the various Climate Action Kit Smart Components and Motors.

Platform Access

Educators can access the Learning Platform by registering for an account using the voucher code on the back of this booklet. Student accounts are not required - educators simply generate a unique student link to give students access to Lesson content.

Ready to start building and coding with the Climate Action Kit?

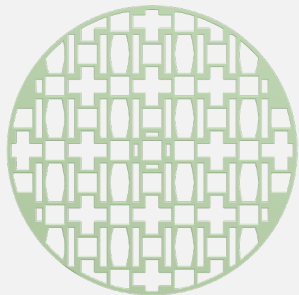
Follow this quick build and code guide to get started with the Wind Turbine project.



1



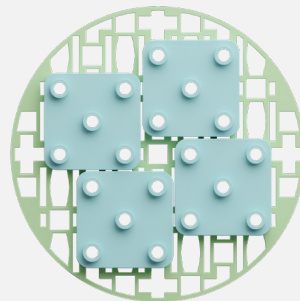
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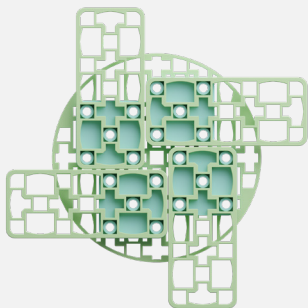
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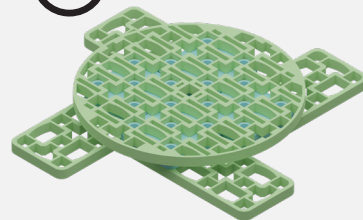
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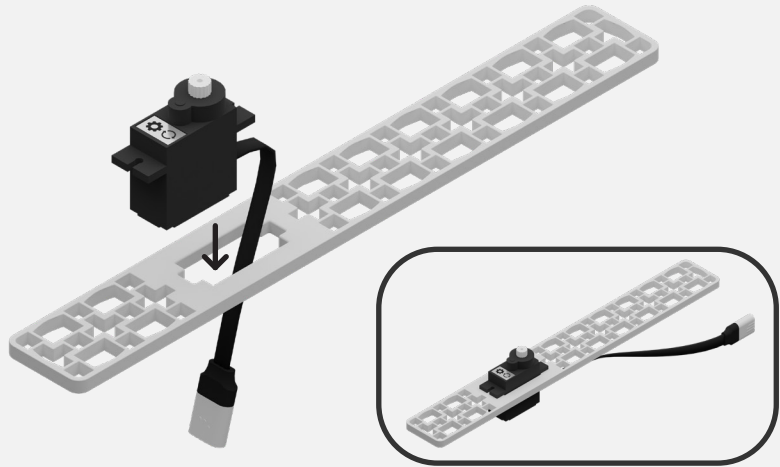
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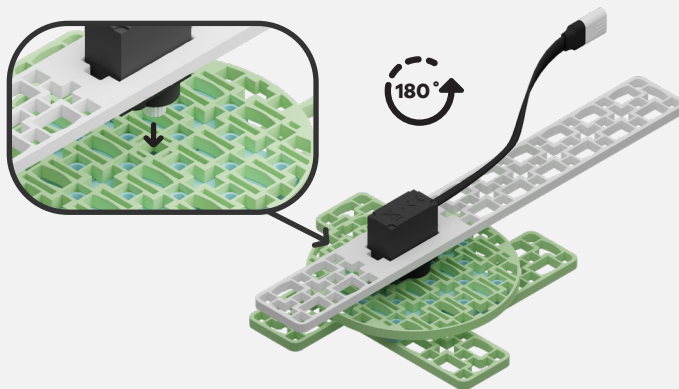
IMPORTANT

There are two types of motors in your kit!

The Climate Action Kit includes a Continuous Servo Motor that spins, and a Positional Servo Motor that moves to specific positions. Check the symbol on the motor to make sure you have the correct one.



6



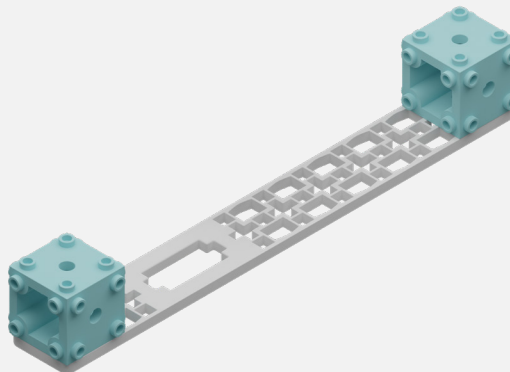
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x 2

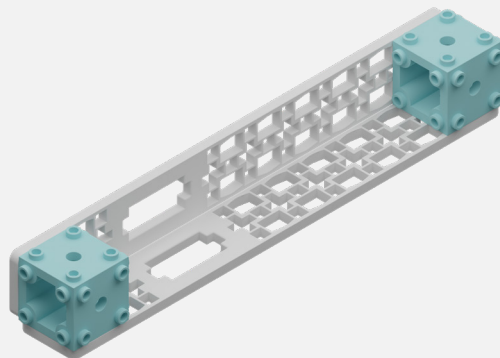


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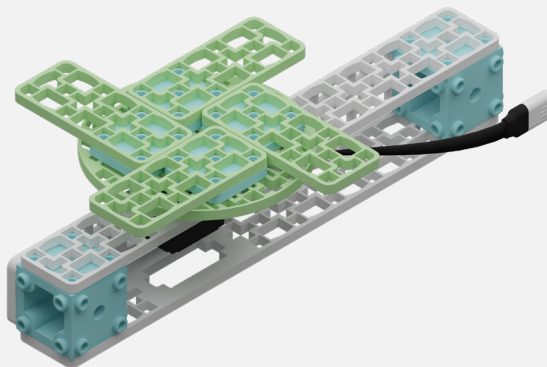
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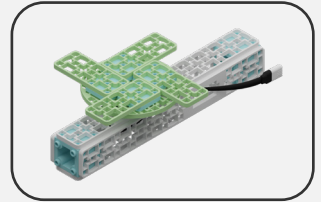
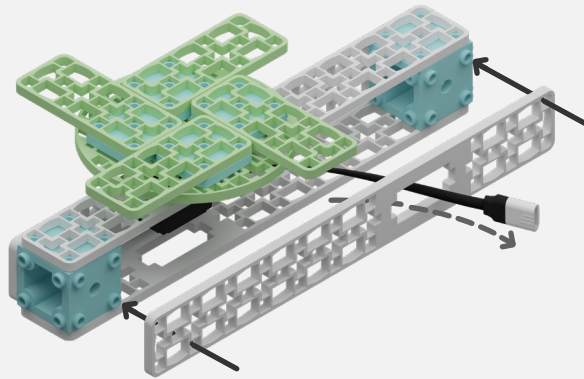


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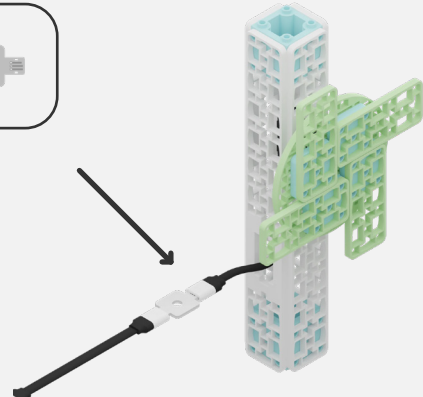
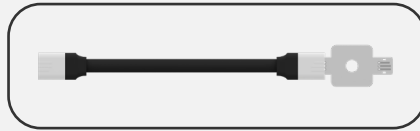
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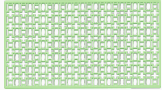
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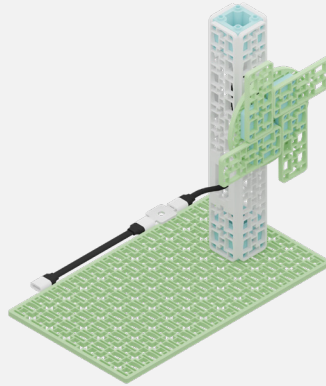
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12



x 1

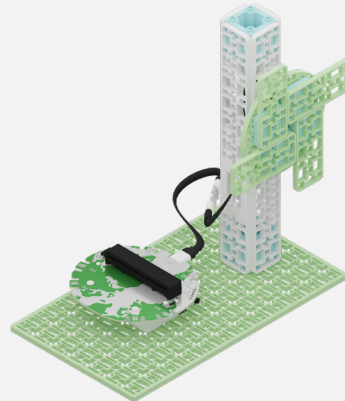


13



x 1

Connect the Continuous Servo Motor to the Motor Port labelled "M" for middle.



14



x 1



x 1



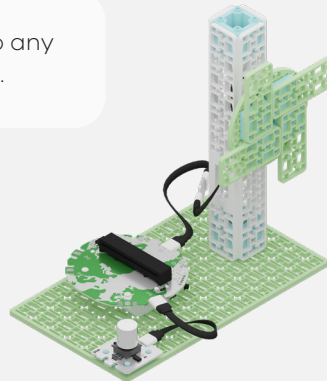
IMPORTANT



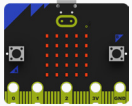
15



Connect the Dial to any of the Sensor Ports.



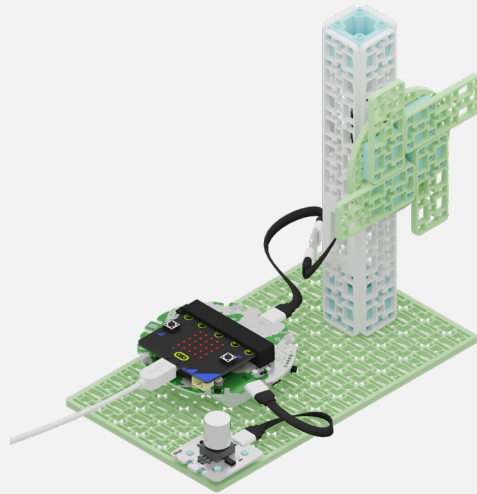
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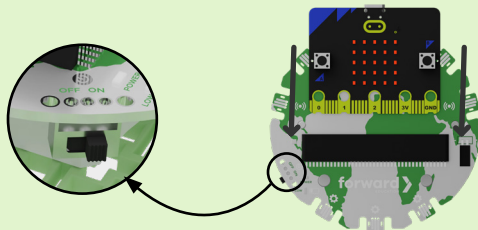


x 1



IMPORTANT

Insert the micro:bit into the slot on the Breakout Board. The micro:bit LEDs should face out as shown here, and don't forget to turn on the Breakout Board.



Project Coding

Once your project is built, you'll need to download code onto the micro:bit. The micro:bit acts as the brain of our project, so we need to tell it what to do!

To code this wind turbine project you have two options:



Download code:

fwdedu.com/download

OR



Try coding yourself:

fwdedu.com/code

Microsoft | MakeCode

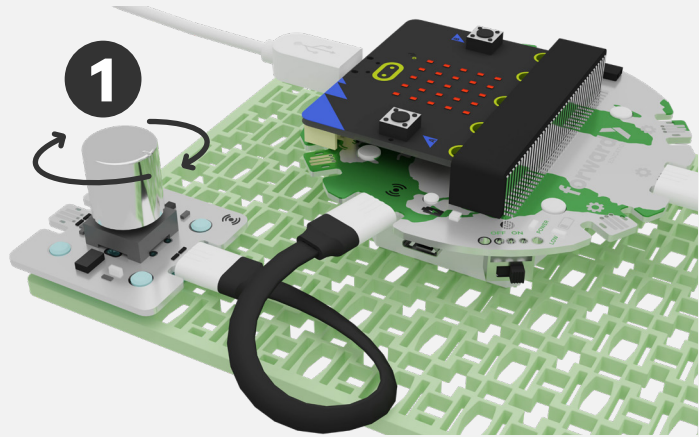
The micro:bit is coded using a program called Microsoft MakeCode. This is a coding environment where you can use simple block-based coding to program the micro:bit and more advanced coding languages when learners are ready.

If you're not using one of the Forward Education coding tutorials, be sure to add the "Forward Education" extension in MakeCode.

Once you have the code for the Wind Turbine, follow the on-screen instructions to download it to your micro:bit.

18

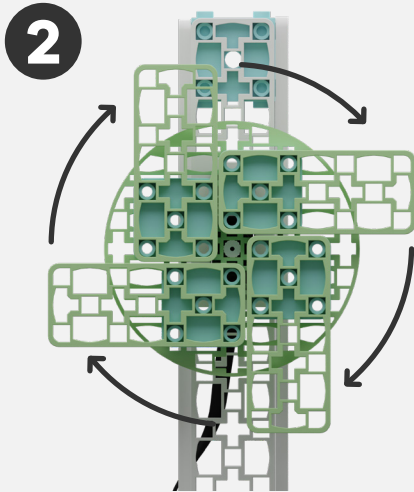
Test your project



1

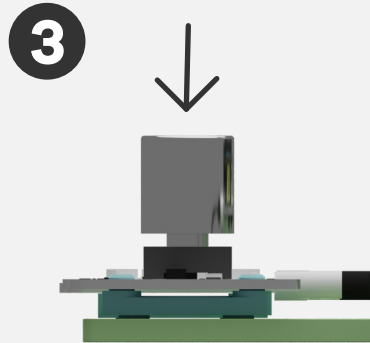
Start the Wind Turbine

Start up the Wind Turbine's Servo Motor by turning the Dial.



2 The blades are spinning

Our prototype now simulates a real-life Wind Turbine!



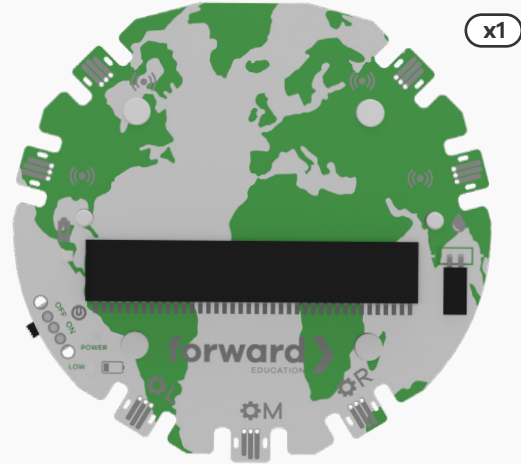
3 Press the Dial to stop spinning

Pressing the Dial down sets the Servo Motor speed to 0% and stops the Wind Turbine.

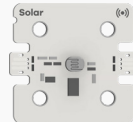
Kit Contents

IMPORTANT

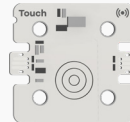
A V2 micro:bit is required to use the Climate Action Kit.



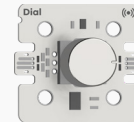
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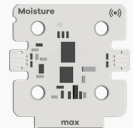
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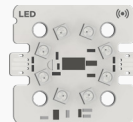
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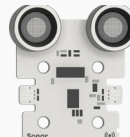
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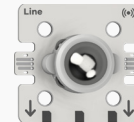
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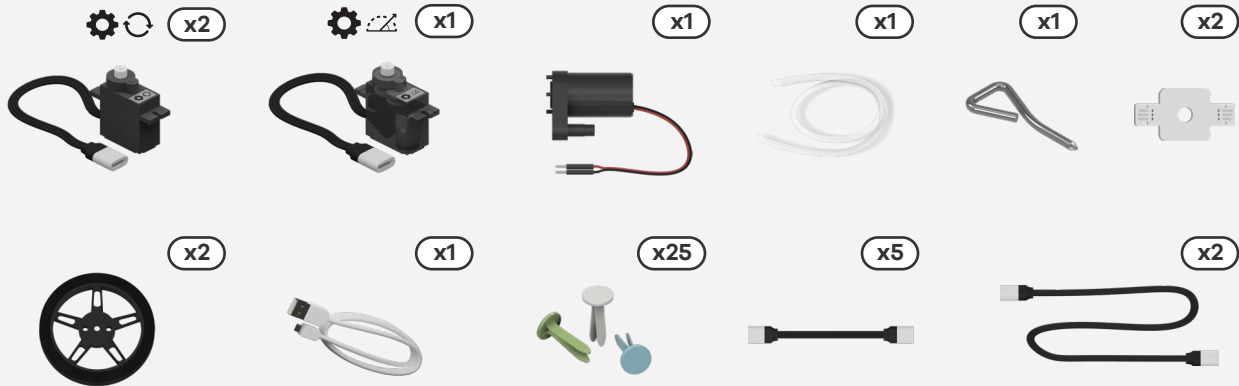
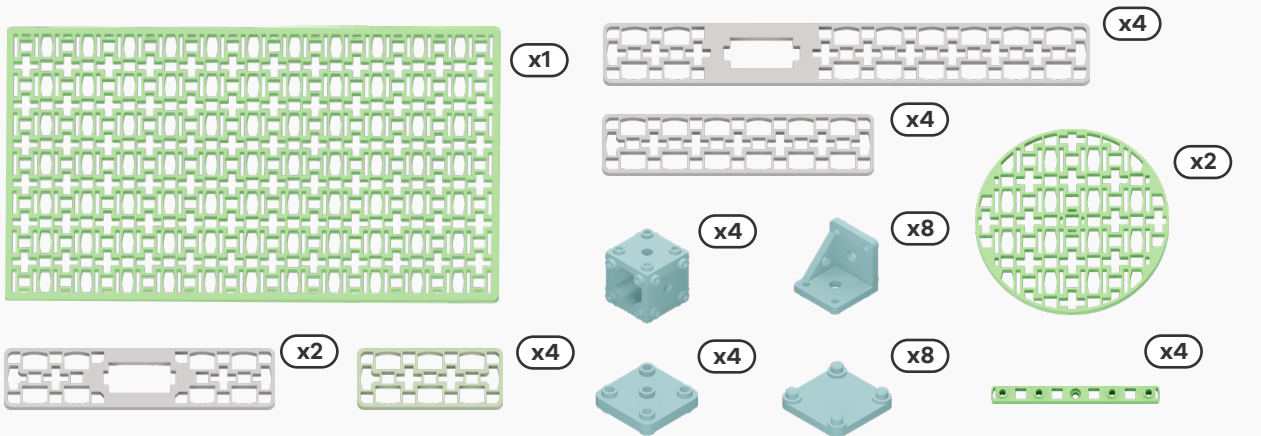


x1



x1





Get Started

To access the learning platform go to:

forwardedu.com/start



Important information: Only use a high-quality Power Adaptor, PC or Laptop for charging the rechargeable battery. Output 5V DC, 500-1500mA. Use the supplied Climate Action Kit USB cable. How to charge the battery: Charge the battery fully the first time it is used. The battery can be charged by plugging in the USB cable to the micro USB port on the Climate Action Kit Breakout Board. Connect the USB cable to a power source. The Charging Light will turn red when the power source is connected. The Charging Light will turn green when the battery is fully charged. Charging time for the battery is up to six hours. The Climate Action Kit Breakout Board can be used during charging but this will increase the charging time. Warning! Do not dispose of your battery by incineration. Dispose the battery in accordance with the current legislation in your country. Do not short-circuit the battery. Do not damage the battery. Do not dispose in fire. Do not submerge the battery in liquids. Never use a damaged battery.



472 Mill Street, Kitchener
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forwardedu.com



Parts not shown to scale.
micro:bit V2 required and
sold separately.

Rechargeable battery included.
Pile rechargeable comprise.
Bateria recargable incluida.

Warning! Choking hazard. Small parts.
Attention! Danger d'étouffement. Petites pièces.
¡Advertencia! Peligro de atragantamiento.
Partes pequeñas.

