



TYPA

# Skyrock Tech Summer Camp

In this camp, students will discover a world of coding, invention and robotics that goes beyond the usual battles, destruction and droids. This program is about using design and engineering skills to invent and build projects that solve problems, look great or make parents go 'Wow!' when they see what their kid has made.

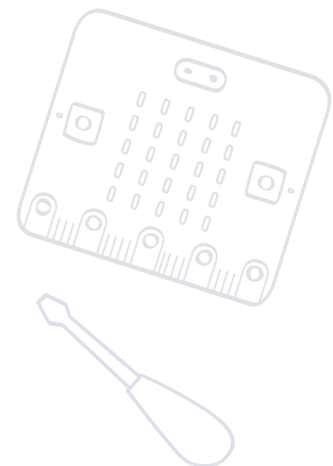
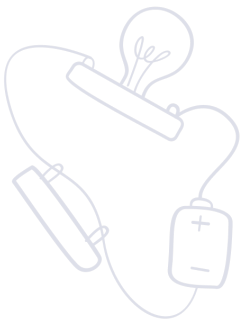
This year we are building the camp around three central themes, with a different theme taking place each week. The three themes are Weather and Climate, Transportation and Navigation, and Health and Wearable Technology.



**Weather  
and  
Climate**

**Transportation  
and  
Navigation**

**Health  
and  
Wearables**



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# Weather and Climate

Weather and Climate will enable students to explore sensors and hardware that affect changes in the environment around us. We will use a microcontroller and open-source electronics to build systems that alter conditions for organisms to live in, whether this may be a house or greenhouse.

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**Below you can find the sample projects for each age group**

## **Grades 1 -2**

- Introduction to computer programming with Scratch. Students will build a weather simulation of an average week in Taipei, including animations, timing and variables.
- Students will learn how to read data from input sensors using computer code and the microbit.
- Students will learn about the science behind light and rainbows. They also play with color mixing and color contrast.
- Students will build about the following projects: Spectroscope, Rainbow Animation, Flashlight Fun, Mixing Colors.

## **Grades 3 - 4**

- Students will build a farm simulation game on Makecode arcade. This is a brand-new project that enables students to understand weather patterns to help grow their crops!
- Students will construct a smart plant pot. They will program a micro controller to monitor soil and automate the watering process.
- Students will make a windmill generator to demonstrate how the wind can be harnessed to make power. This project will involve understanding how gears and cams work.

**Grades 5+**

- Students will learn the basics of python and program a microbit to build a smart greenhouse with automated lighting and climate control.
- Students will design and build their own weather app for iOS so that they can track the weather at home and school. They will understand how APIs work to gather data from the cloud to display in their own app

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# Transportation and Navigation

Transportation and Navigation will introduce students to autonomous driving devices and other cutting edge robotic tools. Vehicles are just the beginning, following on from this we will discover how we will build cities of the future with connected roads and environments. In this course we also introduce students to computer vision, looking at how we use AI to enable cameras to detect specific actions.

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**Below you will find the sample projects for each age group.**

## **Grades 1 – 2**

- Students will learn about friction and forces by engineering and building their own balloon powered and wind up car.
- They will build their own car racing game on scratch which involves understanding speed and coordinates as they design their game. Newcomers to coding will be introduced to the basic concepts through the Skyrock curriculum of coding.
- Students will build their own traffic light system using paper circuits and move on to an RGB lantern which teaches them how to make different colors by varying the inputs to an RGB light.

## **Grades 3 – 4**

- Students will learn about friction and forces by engineering and building their motor driven car with working lights.
- Students will learn how to program the microbit so that it can control a car and use logic to give it intelligent movement to avoid obstacles.
- Students will build a smart landing pad to guide a drone in for landing. This will use a mixture of sensors and the microbit to build out this really engaging project.

**Grades 5+**

- Students will be introduced to the Sphero RVR, where they will understand how to give it autonomous functions using computer code.
- Students will build, wire and code their own intelligent railway crossing system.
- Students will make their own car racing game using Makecode. This game teaches them the importance of conditionals, variables and functions.

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# Health and Wearable Technology

Health and Wearables will explore how smart devices like the Apple Watch and Fitbit measure your step count and heart rate. We will explore how this technology can be used to improve our habits to improve our health. We will use different sensors, such as accelerometers, thermometers and pulse sensors to detect data about ourselves and understand how to display it to keep ourselves healthy and also safe during pandemics!

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**Below you can find the sample projects for each age group.**

## **Grades 1 – 2**

- Students will use Scratch to develop their knowledge of coding whilst making a game to help students food which forms part of a healthy diet.
- Students will build devices which help them calculate their heart rate. This uses a finger pulse sensor and various outputs to measure the data.

## **Grades 3 – 4**

- Students will build their own smart watch using a microbit. Students will understand how the different sensors work such as the accelerometer to measure the number of steps. This project teaches students how to store data inside variables.
- Using MakeCode, students will build a game whereby the goal is to Vaccinate as many patients as possible in a short amount of time. This teaches students how to use inputs such as the key board and mouse to control players to win their game.

**Grades 5+**

- Students are introduced to the basics of C++ through programming Arduino. They will investigate different sensors such as the ECG sensor to investigate heart rate.
- Students will build a machine to measure reflexes that uses sensors to measure students' reaction time.
- Students will use Python to program a simple temperature-based resistor to accurately measure body temperature.

# Invention Skill Ladder

	Micro <span>Grades 1-2</span>	Mega <span>Grades 3-4</span>	Giga <span>Grades 5-6</span>	Tera <span>Grades 7+</span>
Blocks and connectors	●	●	●	●
Origami and folding techniques	●	●	●	●
Hand-held cutting tools	●	●	●	●
Material durability and strength	●	●	●	●
2D nets and 3D shapes	●	●	●	●
Joints, fasteners, and adhesives	●	●	●	●
Fans, air flow, and vacuums	●	●	●	●
Tensions and potential/kinetic energy	●	●	●	●
Rotation, direction, and coordinates	●	●	●	●
Basic pneumatics and hydraulics	●	●	●	●
Basic circuits and conductivity		●	●	●
Isometric 2D and 3D sketching		●	●	●
3D modeling and printing, basic		●	●	●
Lasercutting & 2D vector drawing, 1		●	●	●
Lights, reflection, and animation		●	●	●
3D modeling and printing, extended			●	●
Lasercutting & 2D vector drawing, 2			●	●
Soldering and manipulating metals			●	●
Interactivity with microcontrollers			●	●
Automation with microcontrollers			●	●
Ultrasonic sensors & radio transmission				●
Breadboard circuits and LEDs				●
Python conditionals and control flow				●
Import Libraries for IoT systems				●
Design thinking process				●



# Coding Skill Ladder

	Micro <small>Grades 1-2</small>	Mega <small>Grades 3-4</small>	Giga <small>Grades 5-6</small>	Tera <small>Grades 7+</small>
Apply sequencing logic	●	●	●	●
Decomposition of programs	●	●	●	●
Keyboard and mouse controls	●	●	●	●
Computer literacy and file control	●	●	●	●
"for" loops and arithmetic operators		●	●	●
Events and triggers		●	●	●
Creating and applying functions		●	●	●
Conditionals – If/ Else / Else If		●	●	●
Booleans – True and False		●	●	●
Local and global variables		●	●	●
Tile maps and boundaries		●	●	●
Coding vectors and projectiles		●	●	●
Coding simulations with physics		●	●	●
Use arrays to create lists			●	●
Coding with coordinates			●	●
Receive data from sensors			●	●
Control output devices			●	●
Advanced functions & conditional logic			●	●
Success counters and data collection			●	●
Python coding – microcontrollers				●
Python – data types and structure				●
Python – algorithmic thinking				●
Python – efficiency and optimization				●
Python – coding autonomous vehicles				●