

# Zenitant CFF 2025 Workshop and Kit Overview

CODE FOR FUN ENRICHMENT PROGRAMME

*Strictly Private  
and Confidential*



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## ***Why Zenitant CFF***

- **Experienced Team** - Since 2013, we have been conducting CFF, with our trainers boasting an average of over 8 years of experience in coaching micro:bit and computational thinking programs.
- **Thorough Training Program for Trainers** - All trainers are required to complete 70 hours of training focused on student engagement, classroom management, and hardware usage prior to their deployment in schools.
- **Comprehensive Kit with Essential and Thematic Sensors and Actuators** - Our kit includes the latest micro:bit v2.2, a cutting-edge Elecfreaks IoT breakout board with WiFi/ IoT capabilities, and over 18 components, including the Elecfreak AI Smart Lens Kit.
- **Interactive and Engaging Program with Various Activity Levels** – Our program employs the See, Think & Act framework and incorporates digital resources and games on Padlet to enhance student engagement. To accommodate different student abilities, we offer three tiers of activities aligned with Bloom's Taxonomy. Additionally, students will have access to informative videos and tutorials on Padlet related to the components they have learned and exciting projects they can explore. At the conclusion of each lesson, students will participate in a brief formative assessment, including practical projects, to reinforce their understanding.
- **Hardware Management** - Our skilled team of engineers is available to assist with hardware management, ensuring that all kits are operational and prepared for the program's commencement, as well as properly packed at its conclusion.

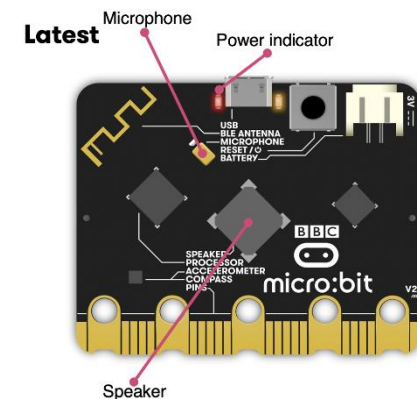
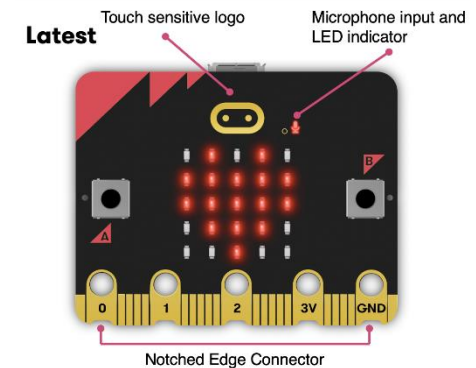
## ***Our CFF Kit Overview***

- Our CFF Kit includes the IoT:Bit breakout board featuring a built-in Wi-Fi chip, along with a variety of external sensors and actuators. This kit is ideal for IoT projects requiring Wi-Fi connectivity, real-time clock capabilities, and the integration of multiple external sensors or actuators.
- Each kit will come with core accessories, making materials (e.g. cardboard templates, Blokies, plastic bricks and connectors) and a project kit with thematic sensors/actuators that will be very useful for creating prototypes in line with your school's ALP/Project themes.
- The AI Husky Lens kit uses the DF Robot Huskylens Camera and is an advanced AI machine vision sensor designed to simplify the integration of AI capabilities into various projects. It features a Kendryte K210 AI chip, enabling high-speed performance for tasks like face recognition, object tracking, object recognition, line tracking, color recognition, tag recognition, and object classification. The sensor includes a 2.0-inch IPS screen for real-time feedback and supports UART and I2C interfaces, making it compatible with both the M5 Core S3 and micro:bit platforms. With its one-click learning function, users can easily teach the sensor to recognize new objects and faces without complex programming.
- The AI EF Lens kit uses the ElecFreaks Smart AI Lens and is an AI module designed to enhance micro:bit projects with advanced vision capabilities. It features the K210 AI chip, enabling robust performance for tasks such as face tracking, ball tracking, card identification, line tracking, color identification, and one-button query. The lens uses an I2C interface, making it easy to integrate with any microcontroller. Designed for graphical programming with the micro:bit, it is an accessible platform to introduce computer vision for beginners.

## Our CFF Kit – Micro:bit v2.2

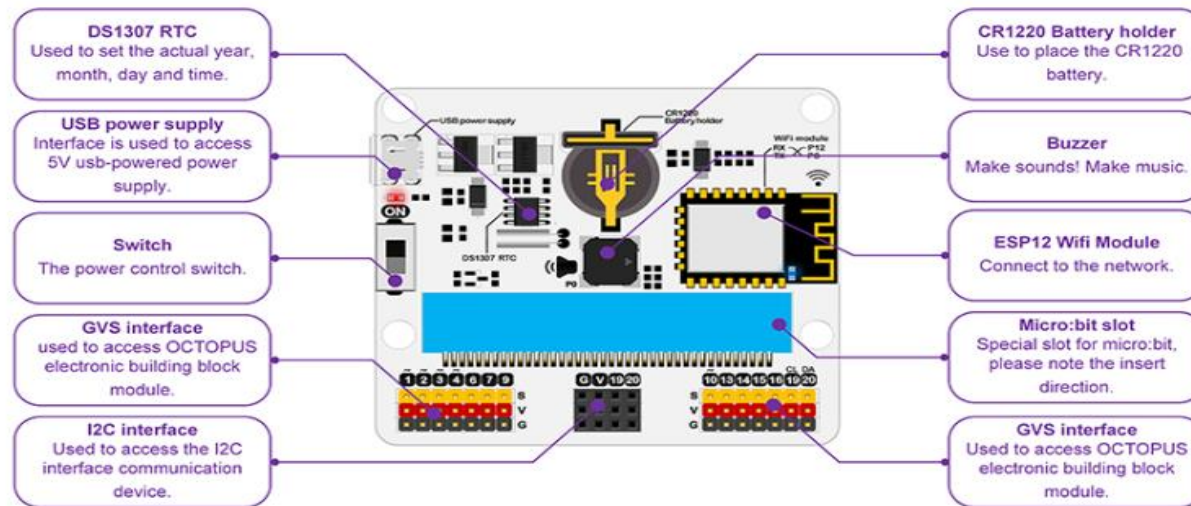
- The Micro:bit v2.2 is powered by an ARM Cortex-M0 processor and comes with accelerometer and magnetometer sensors, Bluetooth and USB connectivity, a display consisting of 25 LEDs, two programmable buttons, and can be powered by either USB or an external battery pack. It has a built-in microphone and speaker to allow sound-sensing and sound-making without the need to attach another device. It also introduces capacitive touch sensing, a power-saving mode and more computing power for the classroom.

Feature	Latest (v2)
Processor	Nordic Semiconductor nRF52833
Memory	512kB Flash, 128kB RAM
Interface	NXP KL27Z, 32kB RAM
Microphone	MEMs microphone and LED indicator
Speaker	On board speaker
Logo touch	Touch sensitive logo pin
Edge Connector	25 pins. 4 dedicated GPIO, PWM, i2c, SPI and ext. power. 3 ring pins for connecting crocodile clips/banana plugs. <b>Notched for easier connection</b>
I2C	Dedicated I2C bus for peripherals
Wireless	2.4Ghz Micro:bit Radio/BLE <b>Bluetooth 5.0</b>
Power	5V via Micro USB port, 3V via edge connector or battery pack, <b>LED power indicator, Power off (push and hold power button)</b>
Available current	<b>200mA available for accessories</b>
Motion sensor	ST LSM 303
Software	C++, MakeCode, Python, Scratch
Size	5cm(w) x 4cm(h)



## ***Our CFF Kit - Core accessories kit***



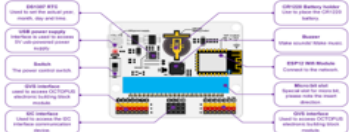



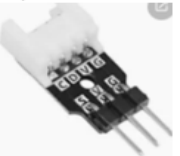






- The MB IoT Accessories Kit (“CA2”) uses the ElecFreaks IoT:Bit breakout board as the extension board. The IoT:Bit has an in-built Wi-Fi chip, array of external standard sensors and actuators. **This kit is best for IoT projects with Wi-Fi**, real time clock needs and connecting various external sensors/actuators.



- We will provide a plastic compartmentalised toolbox with adjustable dividers that is clearly labelled for students, to keep their sensors and actuators in the kit. This will allow students to identify components easily, access and keep the components quickly.
- The kit also comes with external components including 3-pin cables, groove to 3 pin adapters, OLED, rotating Potentiometer, Light sensor, Environment sensor Ultrasonic distance sensor, PIR motion sensor, single LED Module, RGB LED strip with 16 RGB LEDs, DC motor and Servo motor.

## Our CFF Kit - Core accessories kit

- Our CFF Core Accessory Kit include the following components:

Item	
(a) Compartmentalised toolbox 	
(b) Breakout board or expansion board for interfacing with other external components. 	(h) <a href="#">Light sensor</a> . 
(c) Cables to connect the other components in the core accessories kit to the breakout board or expansion board or directly to the microcontroller kit. 	(i) Temperature or <a href="#">environment sensor</a> such as the DHT11 sensor. 
(d) Adapters to connect components in the core accessories kit to any of the Schools' existing microcontroller kits. 	(j) <a href="#">Ultrasonic distance sensor</a> . 
(e) LCD or <a href="#">OLED</a> display (any colour). 	(k) <a href="#">PIR motion sensor</a> . 
(f) At least 2 buttons or touch sensors.	(l) <a href="#">Single LED bulb</a> (any colour). 
(g) <a href="#">Potentiometer</a> (sliding or rotation sensor).	(m) One or more RGB LED strip(s) with a total of at least 16 RGB LEDs. 
	(n) <a href="#">DC motor</a> . 
	(o) <a href="#">Servo motor</a> , 180 degrees, with blades or arm attachment.



## ***Our CFF Kit - AI Smart Camera***

- The AI EF Kit uses the Elecfreaks AI camera module and is designed for educational use. We are pairing the EF Lens with both the micro:bit CA 2 and CA4 platforms.
- The AI EF Kit has on-board face recognition and colour recognition, able to learn and recognize at least 2 different objects, on-board colour screen to show what camera is seeing, able to be powered by a portable power source and is compatible with schools' existing microcontrollers kits.
- This kit also include mounting tools to mount the camera on to a robotic car frame. Mounting or dismounting takes no more than 10 minutes to complete for the first time with instructions. Angle of the camera lens is adjustable either on its own or with the help of the mounting tools to allow the camera to detect objects at an appropriate angle.



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## ***Our CFF Kit - Project Theme Accessories Kit for Sustainable Living***

- Sustainable living prototypes or projects aim to reduce environmental impact, promote resource efficiency, enhance quality of life and allow us to live in an environmentally sustainable manner. Sustainable Living project ideas include Smart Air Quality Monitoring Automation, Automated Irrigation and Smart Farming Systems, Smart Recycling/ Compost Bins and Energy Saving Smart Home Devices.
- The project theme accessories kits for sustainable living for micro:bit includes 3-pin GVS components that are compatible with the microcontroller kit. Sensors and actuators include:
  - i) Dust Sensor
  - ii) Soil Moisture Sensor
  - iii) Water Pump with Relay
  - iv) Solar Panel with Solar Manager
- The project theme accessories kits also contain \$15 worth of consumables such as:
  - i) Modular Blokies Cardboard pieces
  - ii) Bricks and Connectors
  - iii) Cardboard Templates
  - iv) Cardboard Connectors



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## ***Our CFF Kit - Project Theme Accessories Kit for for Emerging Technologies***

- Emerging technology prototypes using microcontrollers often leverage the latest advancements in hardware and software such as AI or IoT to create innovative solutions and change how we think, communicate and live. Project examples include Smart AI Personal Assistant/ Companion with Health Monitoring functions, AIoT-Based Smart Agriculture System, Autonomous Delivery Robots and Smart AI Retail/Object Classification Systems.
- The project theme accessories kits for emerging technologies for micro:bit includes 3-pin GVS components that are compatible with the microcontroller kit. Sensors and actuators include:
  - i) Heart Rate and Pulse Oximetry Sensor
  - ii) Gesture Recognition Sensor
  - iii) Soil Moisture Sensor
  - iv) Water Pump with Relay
  - v) 360 Servos with 2 wheels and wheel connectors
- The project theme accessories kits also contain \$15 worth of consumables such as:
  - i) Modular Blokies Cardboard pieces
  - ii) Bricks and Connectors
  - iii) Cardboard Templates
  - iv) Cardboard Connectors

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## ***Our CFF Kit - Project Theme Accessories Kit for Future of Transport***

- Future transport prototypes are innovative concepts/ early models that aim to revolutionize how we travel and how we use technology to change how we move parcels in the future. Project examples include Smart Traffic Light/Management Systems, Smart Robotic/ Electric Cars, Smart Public Transport Tracker and Bike Safety Systems.
- The project theme accessories kits for emerging technologies for micro:bit includes 3-pin GVS components that are compatible with the microcontroller kit. Sensors and actuators include:
  - i) GPS Unit
  - ii) 2 x 360 Servos with Wheels and Connectors
  - iii) Catch Unit
- The project theme accessories kits also contain \$15 worth of consumables such as:
  - i) Modular Blokies Cardboard pieces
  - ii) Bricks and Connectors
  - iii) Cardboard Templates
  - iv) Cardboard Connectors

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## ***Our CFF Kit - Project Theme Accessories Kit for Cities and Urban Landscapes***

- Cities and Urban Landscapes focus on creating sustainable and resilient urban environments and how we may use technology to improve the design of a city to keep it a nice place to live. Project examples include Smart Urban Farming System, Smart Traffic Light/Management Systems, Flood Prediction and Management System, Smart Environment/ Air Quality Monitoring Systems.
- The project theme accessories kits for emerging technologies for micro:bit includes 3-pin GVS components that are compatible with the microcontroller kit. Sensors and actuators include:
  - i) Water Level Sensor
  - ii) Soil Moisture Sensor
  - iii) Water Pump with Relay
  - iv) Dust Sensor
  - v) GPS Unit
- The project theme accessories kits also contain \$15 worth of consumables such as:
  - i) Modular Blokies Cardboard pieces
  - ii) Bricks and Connectors
  - iii) Cardboard Templates
  - iv) Cardboard Connectors
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## ***Our CFF Kit - Project Theme Accessories Kit for Health and Food Science***

- Health and Food Science focus on creating practical projects to promote mental wellness, healthy living and improve food security. Project examples include Wearable Health Monitoring Devices, AI/Smart Companions, Food Waste Reduction and Recycling Systems, Automated Smart Farming Systems and Smart Food Spoilage Detection Systems.
- The project theme accessories kits for emerging technologies for micro:bit includes 3-pin GVS components that are compatible with the microcontroller kit. Sensors and actuators include:
  - i) Soil Moisture Sensor
  - ii) Water Pump with Relay
  - iii) TVOC/CO<sub>2</sub> Gas Sensor Unit
  - iv) Digital Weight Sensor Unit
  - v) Heart Rate and Oximeter Sensor
- The project theme accessories kits also contain \$15 worth of consumables such as:
  - i) Modular Blokies Cardboard pieces
  - ii) Bricks and Connectors
  - iii) Cardboard Templates
  - iv) Cardboard Connectors

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## ***Our CFF Kit - Project Theme Accessories Kit for Entrepreneurship***

- Entrepreneurship projects focus on using technology as part of a business idea or to promote a business idea that makes a positive impact on the community. Project examples include Smart Home Automation/Security System, Smart Educational and Mental Wellness Monitoring Companion, Smart GPS Item Tracking and Finding Devices and Environment/ Air Quality Monitoring Systems.
- The project theme accessories kits for emerging technologies for micro:bit includes 3-pin GVS components that are compatible with the microcontroller kit. Sensors and actuators include:
  - i) Gesture Sensor
  - ii) ii) GPS Sensor
  - iii) iii) Dust Sensor
- The project theme accessories kits also contain \$15 worth of consumables such as:
  - i) Modular Blokies Cardboard pieces
  - ii) Bricks and Connectors
  - iii) Cardboard Templates
  - iv) Cardboard Connectors

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## ***Our CFF Kit - Project Theme Accessories Kit for Aesthetics***

- Aesthetics projects focus on using technology to enhance wearables or visual arts to allow for greater self-expression and engagement with others. Project examples include Smart Cardboard Mascot Collectibles (ie. Bear Bricks), Smart Temperature Responsive Wearables, Gesture Controlled Wearable Fashion and Mood Responsive Smart AI Companions.
- The project theme accessories kits for emerging technologies for micro:bit includes 3-pin GVS components that are compatible with the microcontroller kit. Sensors and actuators include:
  - i) Gesture Sensor
  - ii) Heart Rate and Oximeter Sensor
  - iii) Vibration Sensor
- The project theme accessories kits also contain \$15 worth of consumables such as:
  - i) Modular Blokies Cardboard pieces
  - ii) Bricks and Connectors
  - iii) Cardboard Templates
  - iv) Cardboard Connectors



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## ***Our CFF Kit - Project Theme Accessories Kit for Language***

- Language projects focus on using technology to help people communicate more effectively and meaningfully or be more discerning of the information they receive. Project examples include Smart Interactive Story Telling Companion for Young Learners, Smart Language Learning Device, Communication Aid for Elderly/ Disabled and Classroom Microchat Kit.
- The project theme accessories kits for emerging technologies for micro:bit includes 3-pin GVS components that are compatible with the microcontroller kit. Sensors and actuators include:
  - i) Gesture Sensor
  - ii) ADKeypad
  - iii) Voice Recognition Module
  - iv) Mini MP3 Player
- The project theme accessories kits also contain \$15 worth of consumables such as:
  - i) Modular Blokies Cardboard pieces
  - ii) Bricks and Connectors
  - iii) Cardboard Templates
  - iv) Cardboard Connectors

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## ***Our Hardware Management Services***

- Each School may separately opt for hardware management services for all new hardware kits provided to the School, and all hardware (microcontrollers and accessories).
- Hardware management services tasks, namely hardware preparation, hardware maintenance, hardware accountability and reporting that you have set out in your ITT. The estimated number of hours for the above tasks are set out below:
  - A. Hardware preparation before the start of the first lesson (8 man-hours):
    - 1) Re-pack the hardware kits in a way that allows for easy distribution during one-hour lessons (3 man-hours).
    - 2) Assemble any components that need assembling (3 man-hours).
    - 3) Check that the software or web app that will be used to program the microcontroller and hardware kits is compatible with the students' Personal Learning Devices (PLDs) and other computing devices that the students will be using (1 man-hour).
    - 4) Check that a simple program that a lower secondary student may create can be successfully downloaded on to the microcontroller and run from the microcontroller (1 man-hour).
  - B. Hardware maintenance before the start of the first lesson (6 man-hours):
    - 1) Check for and report any defective components (3 man-hours).
    - 2) Update the firmware on the microcontrollers, AI cameras and other components that require firmware updates (3 man-hours).

## ***B26. Hardware Management***

- Hardware accountability after the end of the last lesson (9 man-hours).
  - 1) Take stock of the number of each component and report any missing components (3 man-hours).
  - 2) Check for and report any defective components (3 man-hours).
  - 3) Sort all components and pack them into the hardware kits for storage. Dismantle any components if necessary for easy storage (3 man-hours).
  
- Reporting (2 man-hours)
  - 1) Prepare a report showing the outcome of each task above (0.5 man-hour).
  - 2) Liaising with school on the report and getting report verified and endorsed by the School (1 man-hour).
  - 3) Submitting a copy of the report to the School and the Customers (0.5 man-hour).

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## ***Our CFF 2025 Scheme of Work***

Our programme is designed around the See, Think and Act framework. This is a structured approach used to enhance understanding, decision-making, and action whilst helping students develop critical thinking and problem-solving skills.

<b>Step</b>	<b>Description</b>
See	Students given a real-world video or scenario where they observe what the sensors/actuators and microcontrollers can do with the codes provided.
Think	Students will reflect on what they have seen. Consider the implications, context, and possible ways of using the sensors/actuators and microcontrollers.
Act	Based on their observations and reflections, students decide on an appropriate course of action to solve a problem posed. Students will start using the sensors/ actuators to create a prototype to address the situation and make a positive impact.

We believe adoption of this framework will help spark curiosity about technology and allows students to see how technology is used in the real world, providing them confidence in using technology in work and life and to solve problems for their community.

We will be using Padlet for all lessons. We believe that using Padlet in the classroom can significantly enhance student engagement, provide flexibility for different learning abilities, and support meaningful formative assessments

## ***Our CFF 2025 Scheme of Work – Baseline Module***

<b>Hour</b>	<b>Topic</b>	<b>Description</b>
<b>1</b>	Computational thinking	Introduction to computational thinking and programming with the microcontroller and programming platform on a standalone basis
<b>2</b>	Coding and controlling Outputs/Actuators in Core Accessory Kit	Learning to code Basic Outputs (eg. LEDs and Servo) in the Core Accessory Kit.
<b>3</b>	Coding and controlling Inputs/Sensors in Core Accessory Kit	Learning to code Basic Inputs/Sensors (eg, PIR and Light Sensors) with different Outputs in Core Accessory Kit.
<b>4</b>	Coding and using Actuators and Sensors in Project Kits	Learning to code sensors and actuators (eg. Moisture sensor, Solar Panel and Water) in the Project Kit to create thematic projects.
<b>5</b>	Machine Learning and AI Camera	Learning what is Machine Learning and how to use AI Camera for Pattern, Object and Facial Recognition
<b>6</b>	Integrating AI camera with Sensors and Actuators to create AI Prototypes	Learning how to integrate AI Camera with different Actuators and Sensors in Core Accessory and Project Kits to create AI prototypes.
<b>7</b>	Design thinking	Learn/ recap design thinking before empathising, defining problem statement and ideating on problem statement posed.
<b>8-10</b>	Capstone Project	Students will work in groups to create a prototype, using what they have learnt, to solve problem statement posed

## ***Our CFF 2025 Scheme of Work – AI Module***

<b>Hour</b>	<b>Topic</b>	<b>Description</b>
<b>1</b>	Understanding AI and Its Biases	Learning different AI capabilities (e.g., image recognition, natural language processing, autonomous vehicles), how AI learns and AI Bias
<b>2</b>	Societal Implications and Ethical Concerns of AI, Training Data and AI Performance	Learning how Google Teachable Machine allows users to train their own AI models using images, sounds, or poses
<b>3</b>	Introduction to Generative AI	Learning text, image and code creation with GAI
<b>4</b>	Introduction to Large Language Models and Chatbots	Learning to create a simple large language model with own inputs and documents
<b>5</b>	Understanding Training Data and Model/Chatbot Performance	Learning to code, create and train your own chatbot
<b>6</b>	Ethical Concerns of GAI	Learning to discern information generated by AI tools and recap on integrating software/hardware with AI tools
<b>7-10</b>	Hands On with GAI	Application of GAI tools to enhance the design thinking process and assist in writing code to develop either a digital or physical prototype for a real-world problem related to the chosen project theme





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