TECH ZONE

Robotics and Arduino Track

For school students who love technology and robots. They learn C, C++ and Arduino, and finish able to design a circuit and program it themselves.

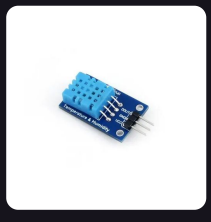
Ages
11 to 18

Languages
C, C++ and Arduino

Kit
Ten parts, reused across six projects

Goal
Design a circuit, write its code, make it work





What students learn

Four connected modules that take students from their first line of C to complete systems they designed themselves.

1. Programming fundamentals

Think and code in C and C++

- C and C++
- Logic and problem solving
- Variables and data types
- Conditions and loops
- Functions

2. How computers work

Computer engineering basics

- How a computer processes data
- What a microcontroller is
- Arduino versus a bare microcontroller
- What an embedded system is

3. Arduino

Build circuits with Arduino

- The Arduino boards and how they differ
- The Arduino IDE
- Writing, uploading and debugging code
- Digital input and output
- PWM and analog-to-digital conversion
- Servos, displays and sensors
- Bluetooth and motors

4. Robotics

Design real systems

- What a robot is made of
- Sensors and actuators
- Where robots are used for real

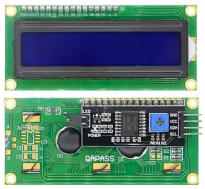
The goal: every student leaves able to design a circuit, write the code for it, and make it work.

The kit

Ten parts that students wire and program themselves, chosen to cover digital and analog input, output, sensing and motion.



Arduino Uno
The brain of every project. It runs the code and drives the other parts.



16×2 LCD with I2C
Text and live readings over only two data wires (SDA, SCL).



Traffic light module
Red, yellow and green LEDs on one ready-made board.



LEDs
Indicators for status and alerts, and brightness control with PWM.



IR sensor
Detects nearby objects, passing cars and people.



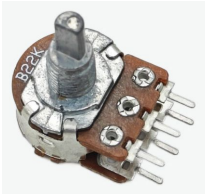
DHT11 sensor
Measures temperature and humidity.



Flame sensor
Detects a flame or strong infrared light, for fire alarms.



Servo motor
Moves to exact angles, for gates, barriers and vents.



Potentiometer
A knob to set timing, thresholds and speed.



DC fan
Driven through a transistor or driver, with its speed set by PWM.

Every project also uses a breadboard, jumper wires, resistors and a USB cable. All parts run at low voltage, under an instructor's supervision. Every part here is sold in the TECH ZONE shop.

What students build

Six projects built only from the kit, from beginner to advanced.

1 **Visitor counter and room status** — Beginner

An IR sensor counts people entering a room and the LCD shows the live number. A knob sets the maximum, and an LED turns on when the room is full.

Parts: Arduino Uno, IR sensor, 16×2 LCD with I2C, LEDs, potentiometer
Skills: digital input, counters, conditions, analog input

2 **Smart traffic light crossing** — Beginner

The lights cycle through red, yellow and green, a knob sets the green time, the LCD counts down, and an IR sensor lets a waiting car ask for green.

Parts: Arduino Uno, traffic light module, potentiometer, IR sensor, 16×2 LCD with I2C
Skills: digital output, timing, loops, state logic

3 **Smart climate fan** — Beginner

The DHT11 reads the temperature. Above a limit set with the knob, the fan turns on and speeds up as it gets hotter. The LCD shows temperature, humidity and fan speed.

Parts: Arduino Uno, DHT11 sensor, DC fan, potentiometer, 16×2 LCD with I2C, LEDs
Skills: sensors, PWM, analog-to-digital, mapping values

4 **Automatic parking gate** — Intermediate

When the IR sensor sees a car, the servo lifts the barrier and the light turns green. The LCD shows free spaces and says FULL when none are left.

Parts: Arduino Uno, IR sensor, servo motor, traffic light module, 16×2 LCD with I2C
Skills: servo control, variables, functions, several devices at once

5 **Fire detection and safety alarm** — Intermediate

Green means safe. When the flame sensor detects fire, the light turns red, the LCD shows a warning, the fan pulls the smoke out and the servo closes a model fire door.

Parts: Arduino Uno, flame sensor, traffic light module, DC fan, servo motor, 16×2 LCD with I2C
Skills: conditions, safety states, functions, debugging

6 **Smart greenhouse controller** — Advanced

A model greenhouse that runs itself: past the set temperature, the servo opens a vent and the fan runs; when it cools, both go back. The LCD shows the live status.

Parts: Arduino Uno, DHT11 sensor, servo motor, DC fan, potentiometer, 16×2 LCD with I2C, LEDs
Skills: closed-loop control, putting a system together, debugging

Which parts each project uses

Project	LCD	Traffic	LEDs	IR	DHT11	Flame	Servo	Knob	Fan
1. Visitor counter and room status	●		●	●				●	
2. Smart traffic light crossing	●	●		●				●	
3. Smart climate fan	●		●		●			●	●
4. Automatic parking gate	●	●		●			●		
5. Fire detection and safety alarm	●	●				●	●		●
6. Smart greenhouse controller	●		●		●		●	●	●

Every project also uses the Arduino Uno.

What students gain

Real engineering skills

C, C++ and hardware: the same foundations used in embedded systems work.

Build, test, debug

They learn to find and fix problems in both their code and their wiring.

Projects that work

They finish with working systems they designed and programmed themselves.

A head start

A strong base for engineering, computer science and robotics studies.

Safe, supervised learning: low-voltage kits and safe wiring habits, with an instructor guiding every step.

Join the next group

Message us on WhatsApp at **0101 098 4875** to book a place or ask about dates. Details are also at **techzoneegypt.com/learn/kids**.

- Small groups, so every child gets time
- Hands-on projects from the first session
- Regular progress feedback
- A certificate for each level completed