

Physical Computing Application Equipment

Covers the entire process of
Wiring, Coding, Feedback, and Expansion

TICLE Lite



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Homepage

- Physical computing application equipment that contains the entire process of wiring-coding-feedback-expansion in cubic (hexahedral) form factor
- Support real-time and non-real-time job separation by adopting Dual-Core ARM Cortex-M33 main processor
- Front: PixelLED matrix, Top: Core, Rear: Power stacking, Left: Speaker, Right: Peripheral separated layout to minimize wiring/module location confusion during practice
- Provide core sensors and actuators such as 6-axis IMU, 4 buttons, illuminance (CdS)/variable resistance, 16x2 text LED, piezo buzzer
- Pixel LED matrix, 3" speaker, MEMS microphone, bearing turntable combined with servomotor support simultaneous visual, auditory, motion feedback
- Establish high-end PBL project without soldering/breadboard by freely wiring signal and power through lever connector
- Pop Plus library makes it possible to pipeline Sensor data collection → Control logic → Actuator operation with a few lines in MicroPython, extending to physical AI creation
- Provide open-source MQTT broker supporting SSL/TLS encryption/authentication, QoS/subject-specific ACL
- Provide integrated Python/MicroPython development environment including real-time log, serial console, firmware transfer, package management
- Configure No-Code Remote Control GUI for Android/iOS with Blynk Example
- Provide examples of Physical Artificial Intelligence applications based on PySide6, Vision Perception, AI STT

Software

Specifications

Embedded Runtime Environment for MCU

- MicroPython Version 1.26 or higher
- Supports PIO 0 - 3 (12 state machines)

Pop plus Library for MCU

- upaho, ublynk, ufilter, utools, Din, Dout, Adc, Pwm, I²C, ReplSerial
- Multiple control components (Button, Relay, Servo, Ultrasonic etc)

Integrated Development Environment for PC

- replx with VSCode
- Real-time log/serial console, firmware transfer, package management workflow

Hardware

Specifications

T Box

Size : 185 x 140 x 165mm

Speaker : 3" Max 10W 1ea

Servo Motor

- Torque : 9.4Kg.cm
- Speed : 0.20sec/60°
- Bearing-based turntable

RGB LEDs

- One wire digital control Interface
- RGB LED 256ea

T Core

Size : 65 x 65 mm

Dual Core ARM Cortex-M33

- Equipped with DSP, single-precision FPU
- providing a simplified double-precision (F64) calculation coprocessor

Connectivity

- Wi-Fi, Bluetooth, UART, USB

Interface

- 26 GPIOs based on lever connector.
- +5V Tolerant

LITE Power

Size : 100 x 50 mm

Interface

- +5V Lever Connector 16 ea
- +3.3V Lever Connector 4 ea
- GND Lever Connector 20 ea

T Basic

Size : 100 x 100 mm

Push Switch 4ea

IMU Sensor

- I²C Interface
- Gyro Range : ±250, ±500, ±1000, ±2000 °/s
- Acceleration range : ±2 ±4 ±8 ±16g

MEMS MIC.

- I²S Interface
- SNR : 54dB
- Frequency Response : 60Hz - 20 KHz

Audio AMP

- I²S Interface
- PSRR : 74dB @ 1kHz
- Sample rate : 8kHz - 96 KHz

Light Sensor

- ADC Interface
- A reference resistor with constant resistance : 10kΩ

Resistance Sensor

- ADC Interface
- Maximum Resistance : 10kΩ

Text LCD

- I²C Interface
- 16 characters x 2 Lines

Buzzer

- PWM Interface
- Approximate resonant frequencies of 2 to 6 kHz

Layout



Training Contents

- Digital I/O & Event Loop
- Analog Input & Filtering
- Real-time Control (Servo/Turtable)
- Reading IMU & Pose Estimation
- Audio Feedback & Sound Trigger
- Text LCD & Local UI
- MQTT Networking & Security
 - GUI & Web Programming
- Mobile No-Code GUI
- Pixel LED Matrix Graphics & Animation
- Multimodal Interaction (Vision·STT Integration)
- PBL Mini-Project
 - Sound Reactive Cube:
 - Equalizer distinguishing MEMS Micro Frequency
 - Digital HourGlass that detects rotation direction :
 - Recognize direction via IMU→ Display PixelLed animation
 - Minigame: Snake game with button and pixel LED matrix
 - Multimodal integration: Emotional TICLE that detects facial expression using PC camera and understands it

Components



TICLE-Lite



Micro B Type Magnetic
USB Cable



Male to Male Jumper
Cable 1set