M5StickT2

Description

M5StickT2is an exquisite and compact infrared thermal imaging camera. It adopts the latest FLIR Lepton 3.0 long-wave infrared (LWIR) camera core with an effective resolution of 160 * 120 for a clear and stable image. As it is a large area non-contact infrared sensor, it is a good solution for temperature measurement. Its main control chip is Espressif's ESP32, which has built-in support for Wi-Fi and Bluetooth connections, and computing speeds of up to 240Mhz. This provides a favorable guarantee for image output with a FPS reaching 7 and above. The screen is 1.14 inches and has a resolution of 135 * 240. The device comes with a rich variety of hardware resources: An on-board 6-axis Inertial Measurement Unit, a digital microphone and a power management chip and a built-in 300mAh battery, all embedded into the device. In terms of interactive operation, two programmable buttons and a rotary encoder are provided. In order to facilitate users to connect more peripherals, a 4 Pin HY2.0 interface with I2C support is provided at the bottom. The body is 3D printed from high quality Black Nylon filament. In addition, an M3 screw hole and a 1/4" screw hole are provided underside for easy mounting.

Power switch operation：

◦ Power on： Long press power button for 2 seconds

◦ Power off： Short press power button for 6 seconds

Usage

Press the reset button to power on. The default display screen is RGB display mode. The left side is the temperature image, the upper right is the power display, and the lower right is the histogram and temperature range. The temperature range is automatically adjusted with the target temperature. The default bulls-eye automatically tracks the maximum temperature. Press the button on the right side of the fuselage (B button) to switch the tracking mode (minimum / center / maximum value), press the button A on the front of the fuselage to switch the image display mode (GRAY / GOLDEN / RAINBOW / IRONBLACK / RGB). Dial encoder controls the display sensitivity (adjust the display temperature and color gamut), and long press the reset button for 6 seconds to turn off.

Product Features

- ESP32-based
- Case Material: Nylon 3D print
- FLIR Lepton 3.0
- Built-in 6-Axis IMU,microphone
- Buttons and dial encoder
- IPS LCD(1.14 inch)
- built-in Lipo Battery
- GROVE/4P HY2.0 Interface

Include

- 1x M5StickT2
- 1x USB Type-C(20cm)

Applications

- Car engine failure check
- Building dehumidification insulation sealing test
- Industrial furnace inner wall refractory crack
- Outdoor observation of animals at night

Lepton 3.0 Parameter

Effective Pixels	160*120
Field of view	56°
Fast imaging time	< 500ms
Effective Frame Rate	8.7Hz

Input Clock	25MHz
Pixel Size	12μm
Low operating power	150 mW (operating), 650 mW (during shutter event), 5 mW (standby)
Scene Dynamic Range	Low Gain Mode: -10 to 400°C; High Gain Mode: -10 to 140°C
Spectral Range	8 to 14μm
Thermal Sensitivity	< 50 mK(0.050°C)
Optimum Temperature Range	-10°C to +80°C

Specification

Resources	Parameter
ESP32	240MHz dual core, 600 DMIPS, 520KB SRAM, Wi-Fi, dual mode Bluetooth
Flash Memory	4MB
Power Input	5V @ 500mA
Port	TypeC x 1, GROVE(I2C+I/0+UART) x 1
LCD screen	1.14 inch, 135*240 Colorful TFT LCD, ST7789
Button	Custom button x 2
MEMS	MPU6886
MIC	SPM1423
Power Manager	AXP192
Battery	300 mAh @ 3.7V
Antenna	2.4G 3D Antenna
Thermal	Lepton 3.0
Encoder	Dial encoder
Operating Temperature	0°C to 60°C
Net weight	26g
Gross weight	82g
Product Size	48*30*29mm
Package Size	144*44*43mm
Case Material	Plastic (PC)

EasyLoader

EasyLoader is a concise and fast program writer, which has a built-in case program related to the product. It can be burned to the main control by simple steps to perform a series of function verification.

Description:

Thermal imaging operation instructions: A button to switch tracking mode, B button to switch display mode, dial to adjust sensitivity.

PinMap

BUTTON A & BUTTON B

ESP32	GPIO37	GPIO39
BUTTON A	Button Pin	
BUTTON B		Button Pin

IPS LCD

Driver IC：ST7789

Resolution：135 * 240

ESP32	GPIO15	GPIO13	GPIO23	GPIO18	GPIO5
IPS LCD	MOSI	CLK	DC	RST	CS

HY2.0 PORT

ESP32	GPIO33	GPIO32	5V	GND
HY2.0 port	SCL	SDA	5V	GND

MIC (SPM1423)

ESP32	GPIO0	GPIO34
MICPHONE	SCL	SDA

6-Axis posture sensor (SH200Q/MPU6886) & power management IC (AXP192)

ESP32	GPIO22	GPIO21
6-Axis posture sensor	SCL	SDA
power management IC	SCL	SDA

AXP192

Microphone	RTC	TFT backlight	TFT IC	ESP32/3.3V MPU6886/SH200Q	5V GROVE

LDOI80	LDO1	LDO2	LDO3	DC-DC1	IPSOUT

Dial Encoder

ESP32	PA2	PA3	PA4
Encoder	SW	EN_B	EN_A

Related Link

- **datasheet**
  - ESP32-PICO
  - MPU6886
  - AXP192
  - SPM1423
  - Lepton datasheet
  - Lepton enigneering datasheet
  - Lepton software interface description
- **3D Printer STL File**
  - STL

Example

Arduino

- If you want the complete code, please click here

Version Change

Release Date	Product Change	Note:
2020.1	Initial public release	/
2021.5	Optimize the internal structure, reduce the volume of the pulsator, and optimize the details	/