

User manual

Fastbit IoT Connect Shield for STM32 Nucleo & Arduino UNO

Introduction

The **Fastbit IoT Connect Shield** is an all-in-one development platform for building and prototyping IoT applications. It integrates wireless connectivity, sensor inputs, display output, data storage, and user interaction into a single Arduino-compatible shield - ideal for STM32 Nucleo-64 boards and Arduino UNO.

With a built-in **ESP32-C6** module (preloaded with AT firmware) and essential IoT components, this shield enables rapid development of cloud-connected, sensor-driven, and user-interactive systems.

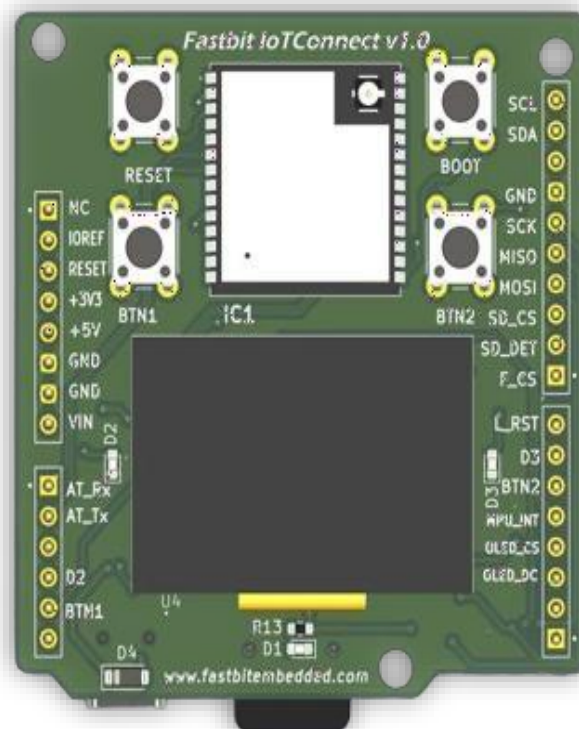
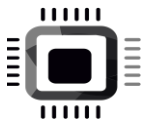
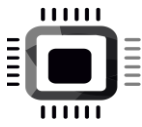


Figure 1. Fastbit IoT Connect Shield



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Features:

Wireless Module

- ESP32-C6 with:
 - Wi-Fi 6 (802.11ax)
 - Bluetooth 5 (BLE)
 - Zigbee and Thread protocol support
- Preloaded with AT firmware for UART communication
- Can be re-flashed with custom firmware via USB

Compatibility

- STM32 Nucleo-64 boards (via Morpho connectors)
- Arduino UNO boards (standard shield footprint)

Sensors

- HDC1080 (I2C): Temperature and humidity sensor
- MPU6050 (I2C): 3-axis accelerometer and 3-axis gyroscope

Display

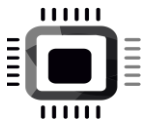
- SH1106 OLED, 128×64 resolution, SPI interface

Storage

- microSD card slot (SPI interface)
- 16 MB SPI NOR Flash memory (W25Q128JVSIG)

User Interface

- 2 Push buttons
- 2 Status LEDs



Hardware and layout

The Fastbit IoT Connect Shield integrates key components like the ESP32-C6, MPU6050, HDC1080, OLED display, and microSD slot in a compact Arduino-compatible layout. User interaction is supported through push buttons and LEDs, while USB and SPI/I2C interfaces enable flexible connectivity. The figures below show the top and bottom views of the shield with all major components clearly labeled.

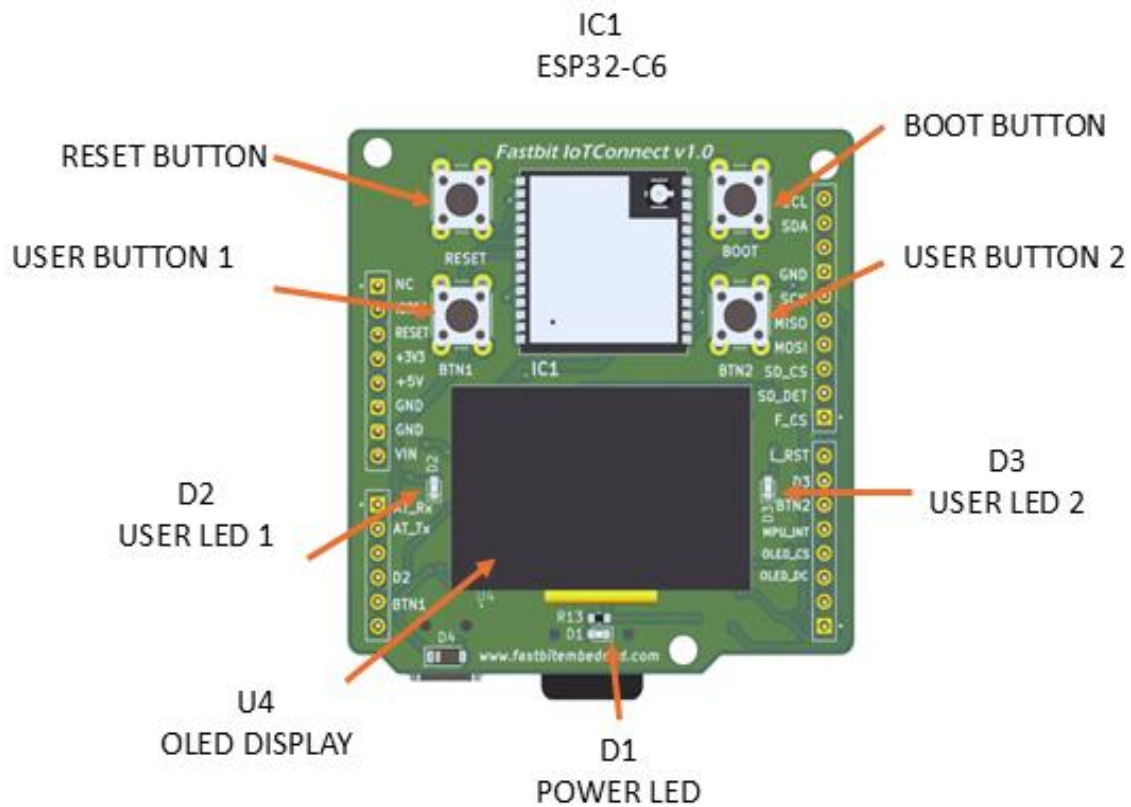


Figure 2: Fastbit IoT Connect Shield top layout

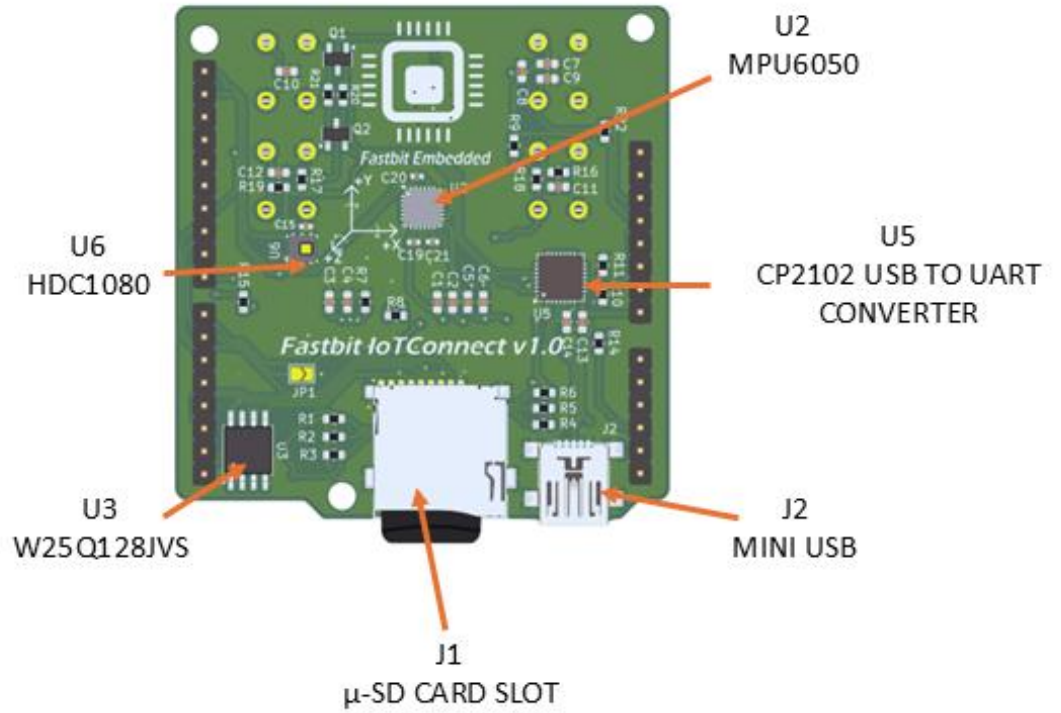
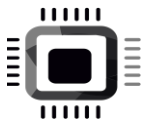
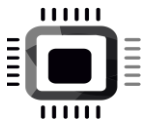


Figure 3: Fastbit IoT Connect Shield bottom layout



Power supply and power selection

- The Fastbit IoT Connect Shield is powered through the 3.3V pin on the Arduino/Nucleo header, which is supplied by the host board (STM32 Nucleo-64 or Arduino UNO).
- Alternatively, power can be supplied via the mini-USB connector on the shield.
- In this case, 5V from the mini-USB is connected to the VIN pin on the Arduino/Nucleo header, which can be used to power the host MCU.
- If using a Nucleo board and intending to power it through the shield's mini-USB, the user must change the Nucleo power selection jumper:
- Move the jumper from U5V to E5V to allow the external 5V from the shield to supply the Nucleo board.

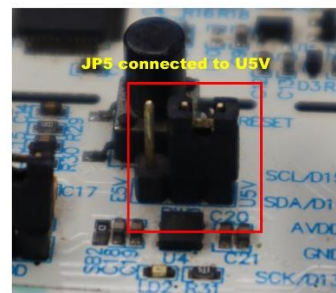
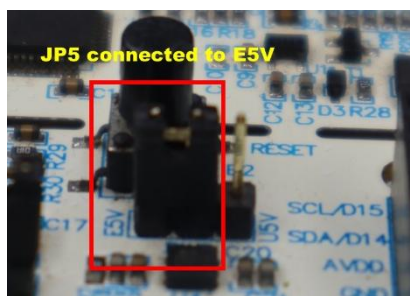


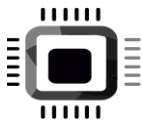
Figure 4:JP5 Jumper Positions

Note:

- Do not connect USB cables to both the host board and the shield at the same time, to avoid power conflicts.
- Do not apply external 3.3V to the shield headers unless it is precisely regulated and controlled.

LEDs

- D1 PWR: Red LED that indicates the board is powered (connected to the 3.3V supply).
 - D2 USER: User-controllable LED.
 - D3 USER: User-controllable LED.
-



Push buttons

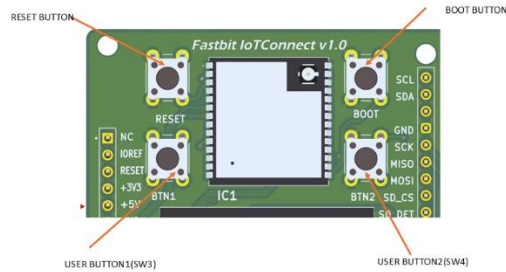


Figure 5: Push Buttons

- SW1 RESET: Push button connected to the EN pin of the ESP32-C6, used to reset the ESP32 module.
- SW2 BOOT: Push button connected to the BOOT pin of the ESP32-C6, used to enter firmware download (bootloader) mode.
- SW3 USER1: General-purpose user button 1.
- SW4 USER2: General-purpose user button 2.

6-Axis (Gyro + Accelerometer) MEMS motion tracking

- The **MPU6050** sensor is a low-power, low-cost, high-performance 6-axis motion tracking device that combines a 3-axis gyroscope and a 3-axis accelerometer on the same silicon die.
- It includes an onboard Digital Motion Processor (DMP) that processes complex 6-axis Motion Fusion algorithms.
- On the IoT Shield, the Host microcontroller communicates with the MPU6050 over the I2C interface.

Mini USB connector

- The shield features a mini USB connector (J2) used primarily for ESP32-C6 firmware upgrades.
- It can also serve as a power input, supplying 5V to both the shield and the connected host board via the VIN pin.
- Supports auto boot mode for flashing, eliminating the need for manual BOOT/RESET button sequences in most cases.
- When using a Nucleo board, set the power jumper to E5V to allow USB-powered operation from the shield.

Temperature and humidity sensor

- The HDC1080DMBR is a high-accuracy, low-power digital humidity and temperature sensor with a compact footprint.
- It provides 14-bit temperature and humidity measurements with factory calibration.
- The Host communicates with the HDC1080 sensor via the I2C interface on the same bus shared with the MPU6050.

MicroSD card slot

- The shield includes a microSD card slot (J1) connected via the SPI interface.
- It allows for data logging, such as saving sensor values, configuration files, or system logs.
- Ensure the card is inserted properly before powering the board to avoid read/write errors.

NOR flash memory

- The shield includes onboard SPI NOR Flash memory (W25Q128JVSIG) with 16 MB (128 Mbit) capacity for non-volatile data storage.
- Useful for storing firmware, configuration files, sensor logs, or lookup tables.
- Communicates over the SPI interface with support for high read/write speeds.
- Offers reliable long-term data retention and supports use cases where data must persist across power cycles or reboots.

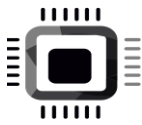
AT firmware upgrade modes

1. Auto Boot Mode

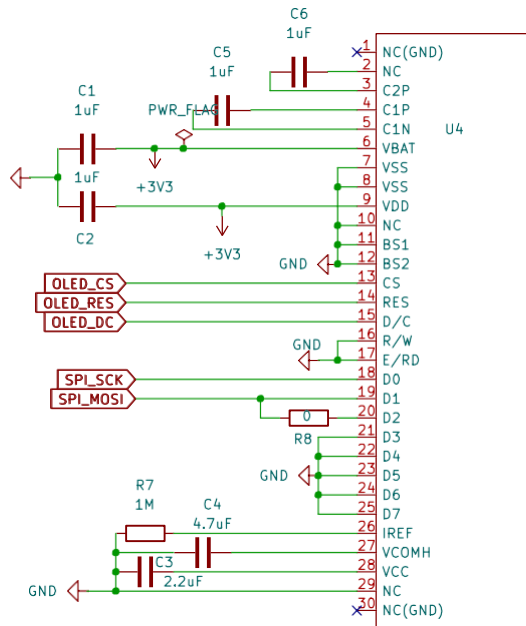
- Simply connect a USB cable to the mini USB connector (J2) on the IoT Shield.
- The onboard circuitry will automatically set the ESP32-C6 into bootloader mode.
- No manual button press is required.

2. Manual Boot Mode (Using BOOT and RESET Buttons)

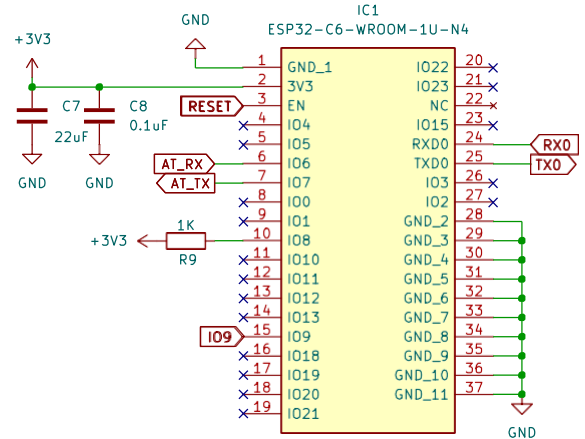
- Press and hold the BOOT button, then
 - Press and release the RESET button.
 - This sequence puts the ESP32-C6 into firmware download (bootloader) mode
- manual



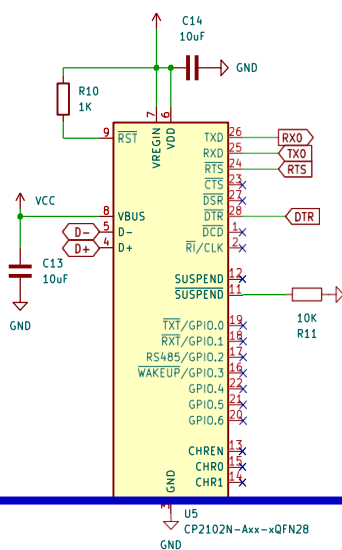
OLED DISPLAY



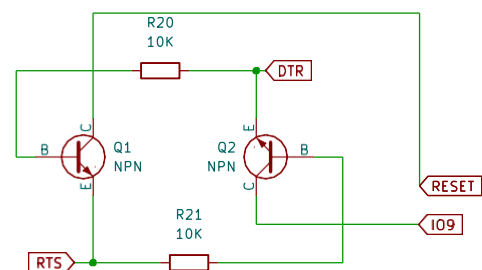
ESP32-C6

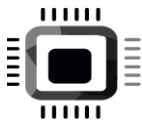


USB TO UART CONVERTER

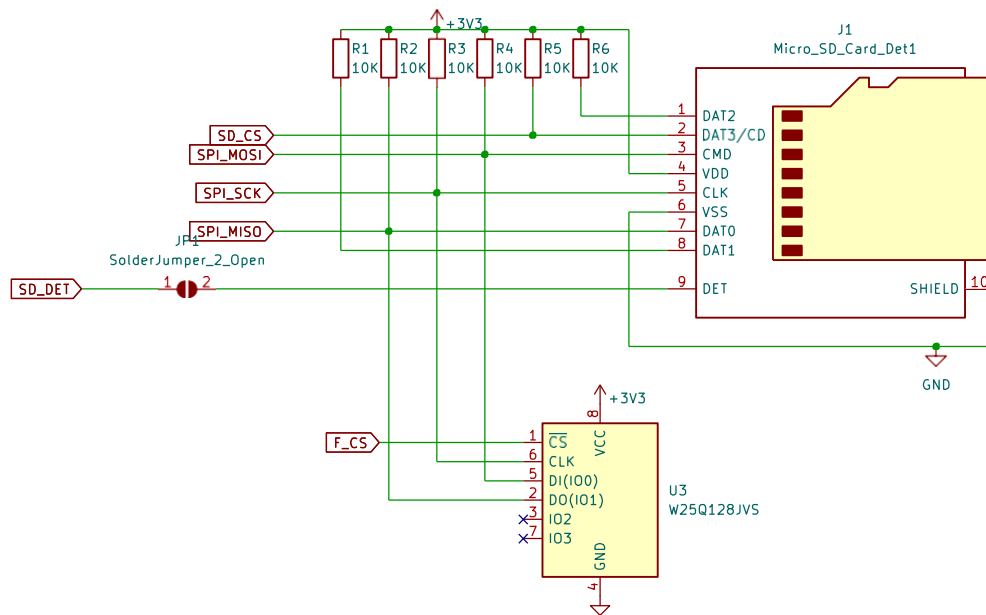


AUTOBOOT

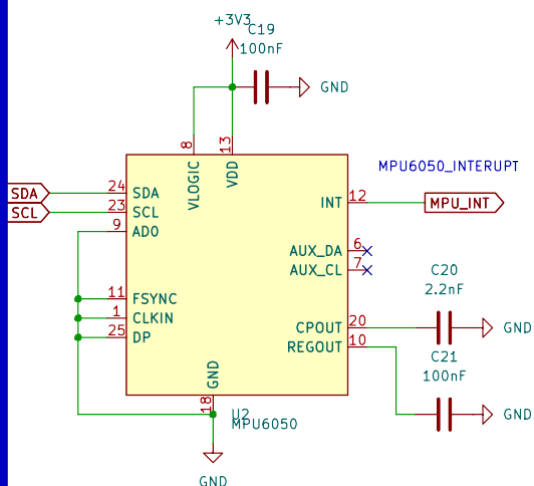




SD CARD SLOT & NOR FLASH



MPU6050



HDC1080

