

BambuTagger-AMS

Multi-spool NFC tag reader for Bambu Lab printers. Reads 4 tags via RC522, syncs AMS tray data over MQTT, and sends filament data to the printer/BMCU. Web interface + OLED + WS2812 LEDs + BME280.



Support me on Ko-fi

 BambuTagger AMS

StatusPrinter ConfigWiFi Config

Printer Connection

Printer IP

Port

Access Code

Serial Number

AMS Unit

Printer AMS Status

MQTT Enabled

MQTT Update Interval (ms)

Save Printer Settings

 BambuTagger-AMS v1.0.7

StatusPrinter ConfigWiFi Config

Slot Status

Slot 1

AMS: empty

Slot 2

Type: PLA
Sub: PLA
Material: GFA00
Color: 0A2389FF

Slot 3

AMS: empty

Slot 4

AMS: empty

WiFi: Connected MQTT: Connected Printer: Online 25.5C 43%

Scan All Slots Send to Printer Sync From Printer Firmware up to date (1.0.7)

Printer AMS Slots

A #22.8C 20%

AMS - FW 7 - SN 7

SLOT1: empty

SLOT2: PLA GFA00

SLOT3: empty

SLOT4: empty

B #27.2C 39%

AMS - FW 7 - SN 7

SLOT1: PETG GFG99

SLOT2: PLA GFL99

SLOT3: PETG GFG99

SLOT4: PLA GFL99

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Features

Category	Details
RFID readers	4× RC522 on shared SPI, MIFARE Classic 1K + NTAG
Tag formats	Bambu Lab, TigerTag, SpoolEase, OpenSpool, OpenTag3D – auto-detect
Key derivation	HKDF-SHA256 with Bambu Lab salt – no hardcoded keys
Web interface	3-tab SPA: Status (merged slots + swatches), Printer Config, WiFi Config
OLED	128×64 SSD1306: splash, AMS tray data, big BME280 temp/humidity, OTA progress bar
LEDs	4× WS2812: per-slot color from printer AMS tray data (live MQTT)
BME280	Temperature + humidity on I2C shared bus, displayed on OLED + web
MQTT bridge	Subscribe printer status, publish <code>ams_filament_setting</code> to BMCU
WiFi	STA with AP fallback + captive portal on <code>192.168.4.1</code>
OTA updates	One-click from GitHub Releases, OLED progress bar, web overlay
CI/CD	GitHub Actions: build on push, merged + OTA binaries on release tags

Hardware

Bill of Materials

Component	Notes	Buy
ESP32 Dev Module	Standard ESP32-WROOM	https://de.aliexpress.com/item/1005006589341221.html
4× RC522	SPI, shared bus	https://de.aliexpress.com/item/1005006233005745.html
4× WS2812	Daisy-chained, single data pin	https://de.aliexpress.com/item/32560280169.html
128×64 OLED	SSD1306, I2C	https://de.aliexpress.com/item/1005007551771400.html
BME280	Temp/humidity, I2C (shared bus with OLED)	https://de.aliexpress.com/item/1005006824236173.html
PCB	DIY PCB from JLPCB	https://oshwlab.com/bambutagger/project_hdkkdlsn

Pin Assignments

Component	ESP32 Pin
SPI MOSI	GPIO 23
SPI MISO	GPIO 19
SPI SCK	GPIO 18
RC522 #1 SS	GPIO 13
RC522 #2 SS	GPIO 12
RC522 #3 SS	GPIO 14
RC522 #4 SS	GPIO 27
RC522 #1 RST	GPIO 26
RC522 #2 RST	GPIO 25
RC522 #3 RST	GPIO 33
RC522 #4 RST	GPIO 32
WS2812 data	GPIO 15
OLED SDA	GPIO 21
OLED SCL	GPIO 22

Slot Mapping

RC522 #	SS	Slot	WS2812 Pixel
1	13	1	0
2	12	2	1
3	14	3	2
4	27	4	3

Software

Required Libraries (Arduino Library Manager)

Library	Notes
MFRC522-spi-i2c-uart-async	Multi-reader SPI sharing (not standard MFRC522)

Library	Notes
Adafruit NeoPixel	WS2812 LEDs
Adafruit GFX Library	Graphics
Adafruit SSD1306	OLED
Adafruit BME280 Library	Temp/humidity sensor
PubSubClient	MQTT
ArduinoJson	v6.x or v7.x
mbedTLS	Bundled with ESP32 core, HKDF-SHA256

Board Settings (Arduino IDE)

Setting	Value
Board	ESP32 Dev Module
Partition Scheme	Default 4MB with spiffs (1.2MB APP/1.5MB SPIFFS)
Upload Speed	921600
Monitor Speed	115200

Tag Formats

Format	Chip	Method	Display
Bambu Lab	MIFARE Classic 1K	HKDF keys, fixed blocks	Tag: Bambu - PLA · C12E1FFF · 1000g/1000g
TigerTag	NTAG	Binary v2.1 protocol	Tag: TigerTag - ASA-AF · F078B4FF · 1000g/1000g
SpoolEase	NTAG	NDEF URI + URL params	Tag: SpoolEase - PLA · 000000FF · 1000g/1036g
OpenSpool	NTAG	NDEF JSON	Tag: OpenSpool - ASA-AF · F078B4FF · 1000g/1000g
OpenTag3D	NTAG	MIME binary (application/opentag3d)	Tag: OpenTag3D - ASA-AF · F078B4FF · 1000g/1000g

Bambu Lab Blocks

Block	Content
0	UID (4 bytes)
1	Variant ID + Material index (e.g. GFA00)
4	Detailed type (e.g. PLA Basic)
5	RGBA color + spool weight (LE)
6	Nozzle temps (LE)

Filament Prefix → Type

Prefix	Type
GFA-GFE, GFL	PLA
GFG	PETG
GFH, GFI	ABS
GFJ	ASA
GFK	TPU

Web Interface

Tab	Features
Status	Merged slots (AMS + scanned tag), color swatches (36×36px), status bar (WiFi/MQTT/Printer/BME280), Printer AMS Cards (all units, FW, serial, temp/humidity), Sync / Scan / Send / OTA buttons
Printer Config	Printer IP, port, access code, serial, AMS Unit selector, MQTT TLS toggle, AMS detection status
WiFi Config	SSID, password, device name

Sticky Footer

OLED Display (128×64)

Device Name	WiFi	
1: PLA	#C0C0C0FF	← AMS tray data, 1px gap between rows
2: empty		
3: empty		
4: empty		
22C 45%	PTR:OK	← big BME280 (size 2) + PTR status

- Footer alternates: BME280 temp/humidity when present, MQTT status as fallback
- OTA progress: header/footer preserved, 200ms progress bar updates

MQTT Protocol

Direction	Topic	Commands
Subscribe	device/<serial>/report	push_status , get_version , pushall responses
Publish	device/<serial>/request	ams_filament_setting , get_version , pushall , ams_user_setting (BME280)

ams_filament_setting Payload

```
{
  "print": {
    "sequence_id": "0",
    "command": "ams_filament_setting",
    "ams_id": 0,
    "tray_id": 0,
    "tray_info_idx": "GFA00",
    "tray_color": "C12E1FFF",
    "nozzle_temp_min": 190,
    "nozzle_temp_max": 230,
    "tray_type": "PLA"
  }
}
```

- `tray_type` : derived from filament prefix(GFA→PLA...) or material name for non-Bambu tags

- `tray_color` : RRGGBBFF format

OTA Updates

Feature	Detail
Button	"Update Firmware" on Status page (shows version info)
Endpoints	<code>POST /api/ota</code> , <code>GET /api/ota-check</code> , <code>GET /api/version</code>
Download	Latest <code>.ino.bin</code> from GitHub Releases
Retries	3 attempts, fresh HTTP client per attempt
Progress	OLED: "Checking..." → "Downloading..." → "Flashing... 45%", web overlay with spinner + bar
Reboot	Auto after <code>Update.end(true)</code> , web UI auto-reloads

CI / CD

Workflow at [GHACTIONS/release.yml](#) :

- **On push/PR**: compiles sketch, uploads artifacts
- **On release tag**: merged flash binary + OTA binary, attached to GitHub Release
- Pinned core: `esp32:esp32@3.0.7` , Arduino cache

Configuration Defaults

Setting	Default
WiFi SSID	(empty)
WiFi Password	(empty)
Device Name	BambuTagger-AMS
Printer IP	192.168.1.100
Printer Port	8883
Access Code	(empty)
Printer Serial	(empty)

Setting	Default
AMS Unit	0 (A)
MQTT Enabled	Yes
MQTT TLS	No
MQTT Update Interval	3000 ms
RFID Poll Interval	100 ms
Firmware Version	1.0.8

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