BambuTagger-Touch

An ESP32-based tool for reading, cloning, and writing Bambu Lab lament spool RFID tags.

Designed for the **Guition JC8048W550** 5.0" 800×480 capacitive-touch display with a dedicated RC522 RFID module on the HSPI bus.

Features

Category	Details
RFID	Read, clone, and write Bambu Lab MIFARE Classic 1K spool tags
Magic card support	Gen1A (0x40/0x43 backdoor), Gen2 (CUID/FUID implicit), Gen3 (APDU), Gen4 (GTU/GDM CF-command)
Key derivation	HKDF-SHA256 with Bambu Lab salt — no hardcoded keys
Touch UI	Full 800×480 TFT with header (logo, title, WiFi icon), subheader (contextual title), footer, and touch-friendly buttons
Web UI	Files / Dumps / Status / WiFi / BambuMan tabs
GitHub browser	Browse & download dump les on-device via touch
OTA updates	Check & ash latest release from GitHub with live progress bar
BambuMan catalog	On-device browser + web search; sync downloads full ZIP and extracts data.bin les to FAT
File management	Upload `.bin` dumps, browse FAT directory tree, delete les
Category	**Details**
WiFi	Auto-STA on boot; AP fallback `BambuTagger` / `bambu1234` ; signal-strength icon in header

Serial debug	Timestamped output; disable with `#define DEBUG_SERIAL 0`

Hardware

Bill of Materials

Component	Notes	Buy
Guition JC8048W550	ESP32-S3-N16R8, 5" 800×480 ST7262 RGB + GT911 touch	https://de.aliexpress.com/item/1005006715794302.html
RC522 RFID module	SPI interface	https://de.aliexpress.com/item/1005006907801802.html

Pin Assignments

Display (parallel RGB565 via ST7262)

Signal	GPIO	Signal	GPIO	Signal	GPIO	Signal	GPIO
R0	8	G0	5	B0	45	HSYNC	39
R1	3	G1	6	B1	48	VSYNC	41
R2	46	G2	7	B2	47	DE	40
R3	9	G3	15	B3	21	PCLK	42
R4	1	G4	16	B4	14	Backlight	2
		G5	4				

Touch (GT911 via I2C)

Signal	GPIO
SDA	19
SCL	20
RST	38
Signal	**GPIO**
INT	18 (unused in code; shared with RC522 CS)

RC522 (SPI on HSPI bus)

Signal	GPIO
CS / SDA	18

RST	17
SCK	12
MOSI	11
MISO	13
3.3V	3.3V
GND	GND

Software

Required Libraries (Arduino Library Manager)

Library	Version
`LovyanGFX`	≥ 1.x
`makerspaceleiden/rfid` (MFRC522)	latest
`ArduinoJson`	≥ 7.x
`miniz`	Built into ESP32 Arduino core
`mbedTLS`	Built into ESP32 Arduino core

Board Settings (Arduino IDE)

Setting	Value
Board	**ESP32S3 Dev Module**
Partition Scheme	**Custom** (select `partitions.csv`)
Flash Size	**16 MB** (OPI)
Setting	**Value**
PSRAM	**OPI PSRAM**
Upload Speed	921600
Monitor Speed	**115200**

> The sketch calls `FFat.begin(true)` — formats the FAT partition on rst boot.

Custom partition table

Copy `partitions.csv` into the Arduino ESP32 core's partitions directory:

```
copy partitions.csv ^
   %LOCALAPPDATA%\Arduino15\packages\esp32\hardware\esp32\
<version>\tools\partitions\
```

Then select **Tools → Partition Scheme → partitions**.

Partition	Offset	Size	Notes
nvs	0x9000	20 KB	WiFi creds, GitHub token
otadata	0xE000	8 KB	OTA slot bookkeeping
app0	0x10000	**1408 KB**	+128 KB vs default_ffat
app1	0x170000	**1408 KB**	+128 KB vs default_ffat
ffat	0x2D0000	**1152 KB**	Dump le storage

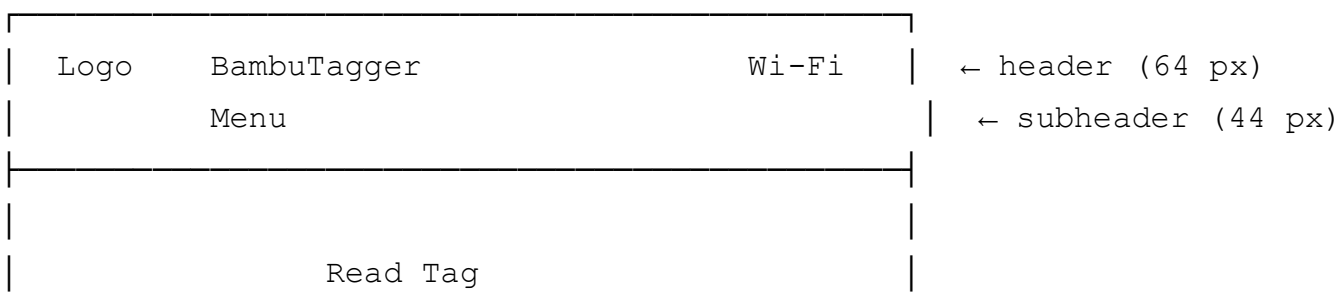
Touch UI

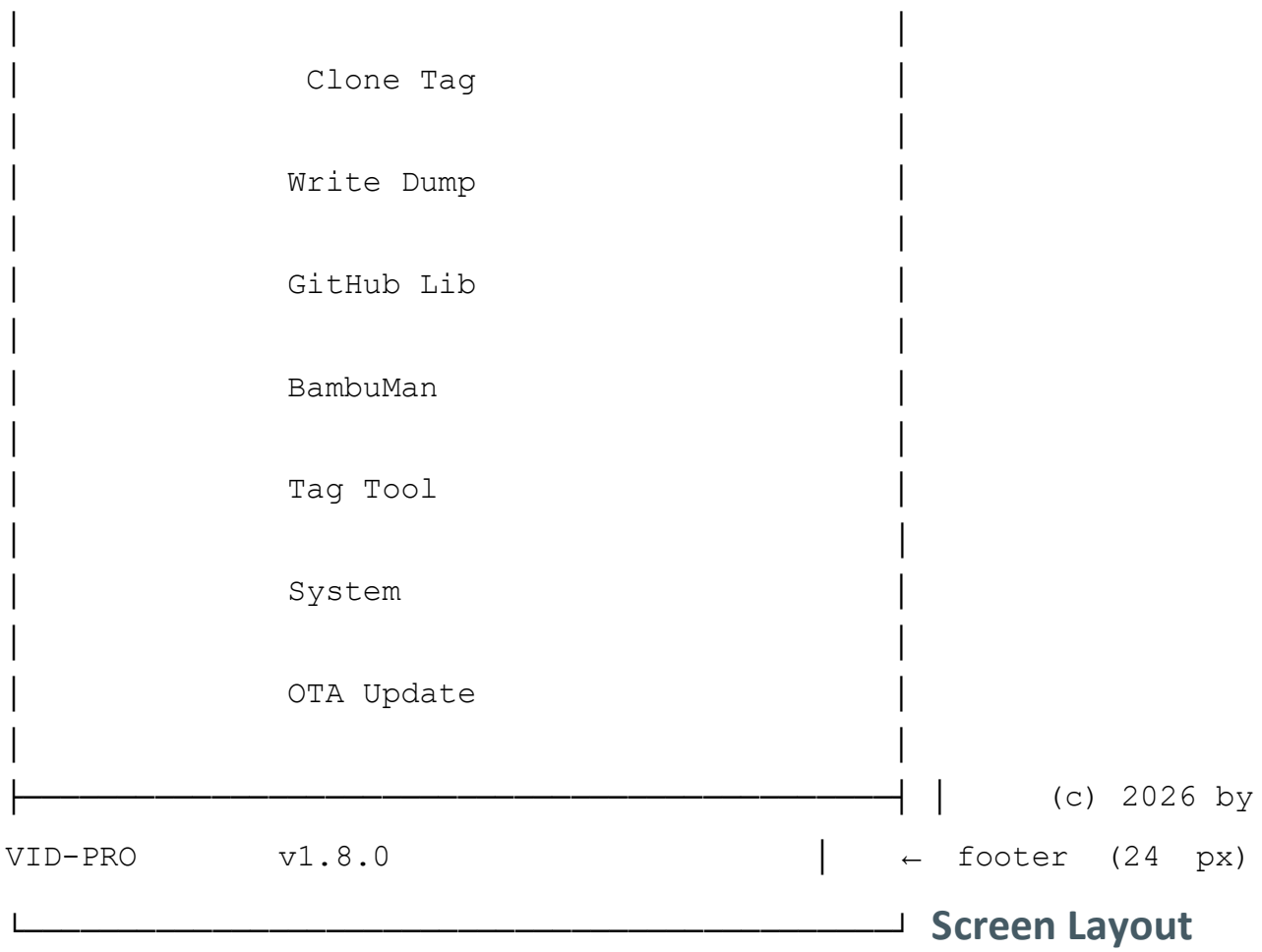
Navigation

All interaction is via tap:

- **Tap a button** to select an action
- **Tap a list entry** in any browser (GitHub, BambuMan, FAT) to navigate into a folder or select a le
- **Tap the header** (top 64 px, navy bar) on any screen to return instantly to the main menu
- **Tap** `< BACK` (list row) in GitHub, BambuMan, or Write Dump sub-directories to go up one level
- **Swipe vertically** or **tap the scrollbar** to scroll lists; tap above/below the thumb to jump

Main Menu





Screen Layout

Every screen has:

- **Header** – 64 px navy bar with 65×64 logo, centred "BambuTagger" title, and WiFi signal-strength icon (green arcs) or "AP" text
- **Subheader** – 44 px dark-grey bar with contextual title (e.g. "Tag Info", "Write Tag", "BambuMan Library")
- **Breadcrumb** – Light-grey path text below the subheader in browser screens when navigating subdirectories
- **Footer** – 24 px navy bar with "(c) 2026 by VID-PRO" centred and version number at the right edge

All buttons use centred text (`MC_DATUM`), and inactive list entries are `TFT_DARKGREY` . Scrollbars (30 px wide, proportional white thumb) appear in browsers when content over ows. Tap or swipe the scrollbar to navigate long lists.
The BambuMan Library shows two side-by-side buttons at the top level: **Sync Catalog** (quick, centraldirectory only) and **Full Download** (extracts all data.bin les to FAT).

Menu sections

Read Tag

Hold a spool near the RC522. The sketch derives MIFARE keys from the tag UID using HKDF-SHA256, authenticates all 16 sectors, and displays lament type, colour, and weight.

Clone Tag

Reads the source tag sector-by-sector into RAM, then prompts for the destination tag. Writes every block using automatic magic-card detection (Gen1A → Gen4 → Gen3 → Gen2 → normal auth).

Write Dump

Browse the dump les stored on FAT using the on-device directory browser. Navigate sub-directories with the `< BACK` row; a breadcrumb path is shown below the subheader. Select a `.bin` le, present a target tag, and every block is written with the same detection strategy.

GitHub Lib

Browse the Bambu Lab RFID Library directly on-device. Requires WiFi. Navigate with `< BACK` row; a breadcrumb path is shown below the subheader. Files are saved to FAT mirroring the repository structure.

BambuMan Lib

Browse the bambuman.ee community tag database in a 4-level hierarchy (Material → Type → Color → UID). A breadcrumb (e.g. `PLA > PLA Basic > Black`) is shown below the subheader. Two sync options: **Sync Catalog** (quick, catalog only via Range request) or **Full Download** (extracts all `data.bin` les to FAT). **Tag Tool**

Manage Gen4 (GTU/GDM) and Gen2 (CUID/FUID) magic card backdoors — seal, unlock, or lock block 0. Displays current card mode details below the subheader.

System

Shows system status: WiFi mode, SSID, IP, free heap, FAT usage, and tag dump count. Includes a **Delete All Tags** button to remove all dumps and empty directories.

OTA Update

Checks GitHub releases for a newer rmware version and ashes it over-the-air.

Web Interface

Open a browser to the ESP32's IP (shown in the header).

Tab	Description
Files	Navigate FAT directory tree, upload/delete `.bin` les, trigger tag writes

Dumps	Browse GitHub repository, download les to FAT
BambuMan	Sync catalog, search by material/colour, fetch & write tags
System	WiFi mode, IP, heap, FAT usage, tag dump count, delete all tags
OTA	Check for and apply rmware updates
Con g	WiFi scan + connect, GitHub API token management

Full REST API documentation is available in the source header.

REST API

Method	Path	Description
`GET`	`/api/status`	WiFi mode, SSID, IP, selected dump path, FAT usage, `app_state`
`POST`	`/api/wifi`	`{"ssid":"…","pass":"…"}` — connect & save
`GET`	`/api/scan`	Array of nearby SSIDs
`GET`	`/api/list?path=…`	GitHub directory listing
`POST`	`/api/download`	`{"url":"…","path":"…"}` — download raw le to FAT
`GET`	`/api/files?dir=<path>`	FAT directory listing
`POST`	`/api/delete`	`{"file":"…"}` — delete a FAT le or empty directory
`POST`	`/api/deleteall`	Delete all dump les and empty directories
`POST`	`/api/writetag`	`{"path":"…"}` — load dump and start tag-write
Method	**Path**	**Description**
`POST`	`/api/upload`	`multipart/form-data` — upload a `.bin`
`GET`	`/api/token`	Return saved GitHub token (masked)
`POST`	`/api/token`	Save GitHub API token to NVS
`POST`	`/api/bm/sync`	Download full bambuman.ee ZIP, extract data.bin les to FAT, build catalog
`GET`	`/api/bm/catalog`	Stream `/BM/catalog.json`
`GET`	`/api/bm/fetch?uid=…`	Fetch `data.bin` from bambuman.ee
`GET`	`/api/ota/check`	Compare running rmware to latest GitHub release

POST	/api/ota/update	Download and ash latest app binary

FAT Directory Structure

```
/
BM/
    catalog.json            — bambuman.ee catalog index   PLA/
    PLA Basic/
      Black/
        3AD82DAD.bin         — extracted dump
  PETG/
    PETG Basic/
      Black/
        A1B2C3D4.bin        — extracted dump   ...
```

WiFi credentials and GitHub API token are stored in ESP32 NVS (not FAT).

Building & Flashing

Arduino IDE

. Install **ESP32 board package** (≥ 3.x).

. Install libraries: `LovyanGFX` , `makerspaceleiden/rfid` , `ArduinoJson` .

. Select **Board → ESP32S3 Dev Module**, Flash Size **16 MB (OPI)**, PSRAM **OPI PSRAM**.

. Copy `partitions.csv` into the ESP32 core's `tools/partitions/` directory.

. Select **Partition Scheme → partitions**.

. Upload.

GitHub Actions

Push a `v*` tag to trigger an automated release build (`GHActions/release.yml`).

Credits & References

- Dump les: queengooborg/Bambu-Lab-RFID-Library
- Community tag database: bambuman.ee
- RFID-Tag-Guide
- Display library: LovyanGFX
- RFID library: makerspaceleiden/r d

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