# ATOM Lite をスマートキーとつなげた話

## The story of connecting ATOM Lite with a smart key

Tam

# ネットワーク経由でスマートキーの暗証番号を変更するのに ATOM Lite を使ってみた。

**I tried using ATOM Lite to change the password of the smart key via the network.**

# 注意(Note)

スマートキーの製造会社との秘密保持契約のため、いろんなところを曖昧なままで表現してます。

Due to the non-disclosure agreement with the smart key manufacturer, various parts are expressed in vague terms.

# 実態(Reality)

BLE と WiFi が載ったデバイスということで、 ESP32 で開発を進めていた。

Since it is a device with BLE and WiFi, I was developing it with ESP32.

ESP32 に 3D プリンターでケースを用意するのが面倒になり、調べていたところ、 ATOM Lite が ESP32-PICO-D4 チップを載せている、かつケース付きコンパクトということで、後付けで ATOM Lite を使用することにした。

It became troublesome to prepare a case for ESP32 with a 3D printer, and when I was investigating, I decided to use ATOM Lite as an aftermarket because ATOM Lite has an ESP32-PICO-D4 chip and is compact with a case.

# ATOM Lite を選んだ理由(Reasons for choosing ATOM Lite)

- 開発した ESP32 用のプログラムがそのまま流用できる。
- Programs developed for ESP32 can be used as they are.
- ケース付きでコンパクト。今回の用途に不要なデバイスが少ない。
- Compact with a case. Few devices are unnecessary for this application.
- microB ではなく、 Type-C が採用されている。（重要）
- Type-C is adopted instead of microB. (important)

# 構成(composition)

SmartKey <- BLE -> ATOM Lite <- WiFi -> Server

- BLE で暗証番号が変更できる SmartKey を利用。
- Use SmartKey that can change PIN with BLE.
- 暗証番号は、オンラインでサーバーに問い合わせる。
- Ask the server for the PIN online.
- ATOM Lite がサーバーからの指令を受けて、 BLE でスマートキーの暗証番号を変更する。
- ATOM Lite receives a command from the server and changes the PIN of the smart key with BLE.

# 問題その１(Problem 1)

**BLE と WiFi の両方のライブラリを含めようとすると、プログラムが巨大になりすぎて、 4M のサイズに収まらなくなってしまった。**

**Attempting to include both the BLE and WiFi libraries made the program too large to fit in the 4M size.**

# 解決法(Solution)

- WiFi を諦めて、有線LAN の ESP32 を使う。
- Give up WiFi and use wired LAN ESP32.
- 8M の ESP32 を使う。
- Using an 8M ESP32.
- NimBLE ライブラリを使う。（採用）
- Use the NimBLE library. (adoption)

# 問題その２(Problem 2)

**SmartKey の BLE protocol スペックが、たまにバージョンアップする。**

**SmartKey's BLE protocol specs are occasionally upgraded.**

# 解決法(Solution)

**ATOM Lite 側では最低限の BLE のやり取りしか行わず、 BLE のプロトコルの組み立てはサーバーで行うようにした。**

**On the ATOM Lite side, only the minimum BLE communication is performed, and the BLE protocol is assembled on the server.**

# 問題その３(Problem 3)

**ペアリング情報を ATOM Lite 側に書き込みたくなく、そのために複数の SmartKey がある環境で、別の SmartKey と繋がってしまうことが発生。**

**I don't want to write the pairing information on the ATOM Lite side, so in an environment with multiple SmartKeys, it may be connected to another SmartKey.**

# 解決法(Solution)

**SmartKey の BLE address を鍵としてサーバーと Digest 認証に成功したときのみ、接続を成功させるようにした。**

**Only when Digest authentication with the server succeeds using SmartKey's BLE address as a key, the connection is allowed to succeed.**

- MD5 はオープンソースのライブラリを利用して、 Digest認証は自前で実装した。
- MD5 uses an open source library and implements Digest authentication by myself.

# まとめ(summary)

- 今回の ATOM Lite 側のプログラムは必要最低限に絞っているが、 4M のサイズだとぎりぎり収まるくらい。
- The program on the ATOM Lite side this time is narrowed down to the bare minimum, but if it's 4M size, it just fits.
- OTA はまだ実験中だが、なんとかサイズに収まりそう。
- OTA is still being experimented with, but it looks like it will fit the size.
- Watch Dog とかは稼働させているものの、今のところ失敗やハングアップはまったくなし。
- Although Watch Dog is running, there are no failures or hangs at all so far.