Introduction to IoT
LAB Exercises

2023

IoT LAB - Outline

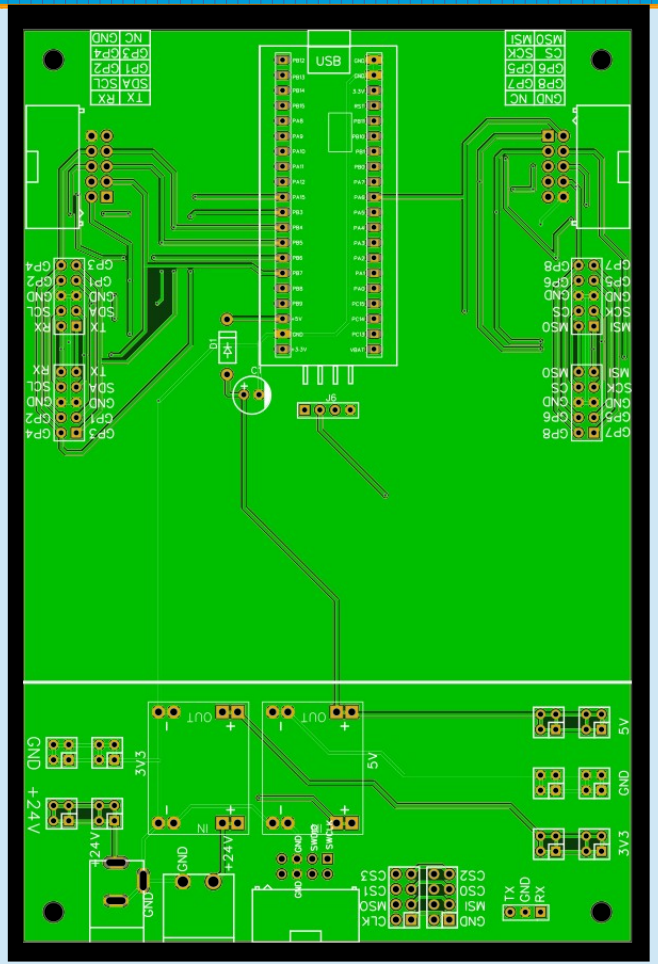
- Hardware overview
- IDE
- Environmnet setup

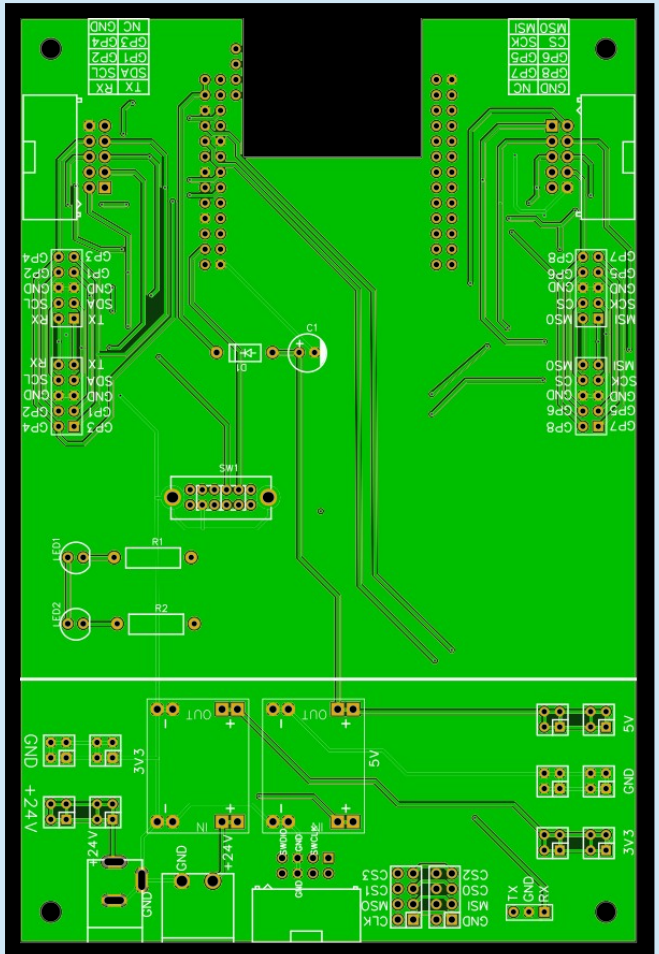
Hardware Overview

- Building blocks consisting of:
  - Base board (green)
  - Communication board (red)
  - Application board (blue)
- Interconnection – cabling
- Suplemental items – uSD
- Debugging tools – logic analyzer

Hardware – Base boards

STM32 - BluePill



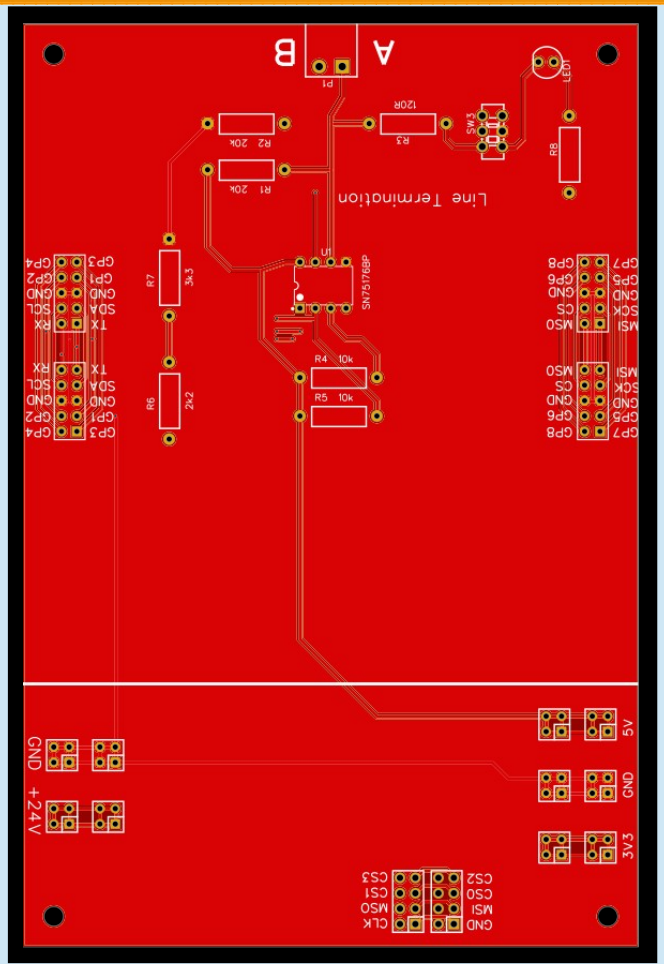


RockPi S

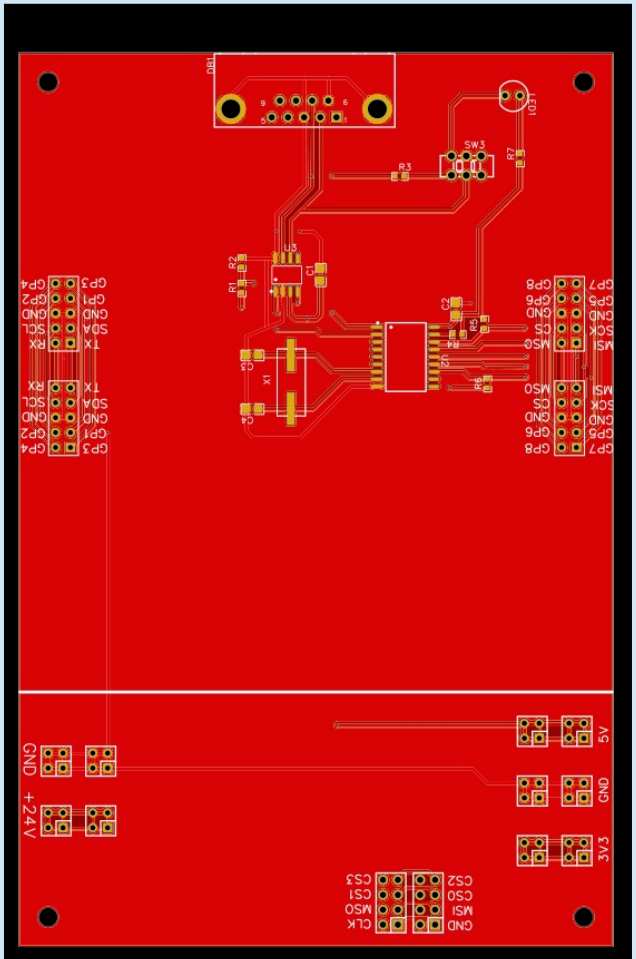
Hardware - MCUs

Hardware - Communication

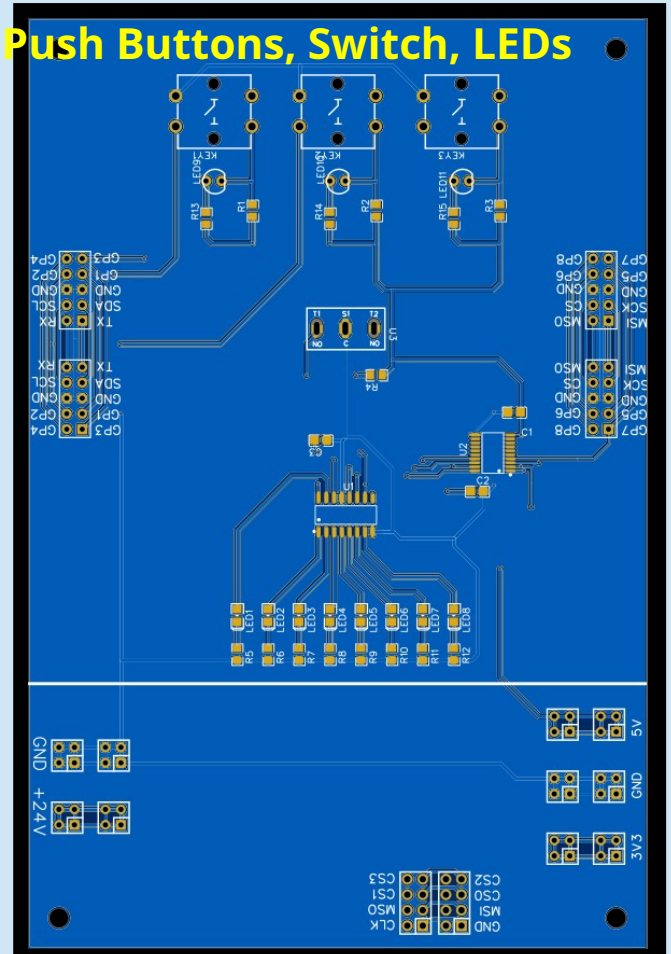
RS – 485

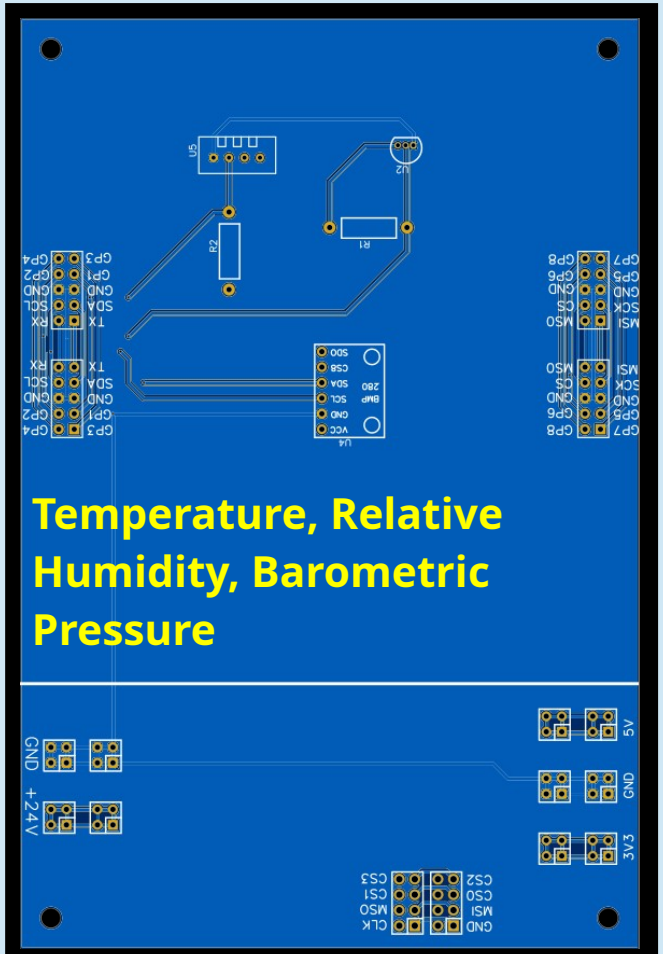


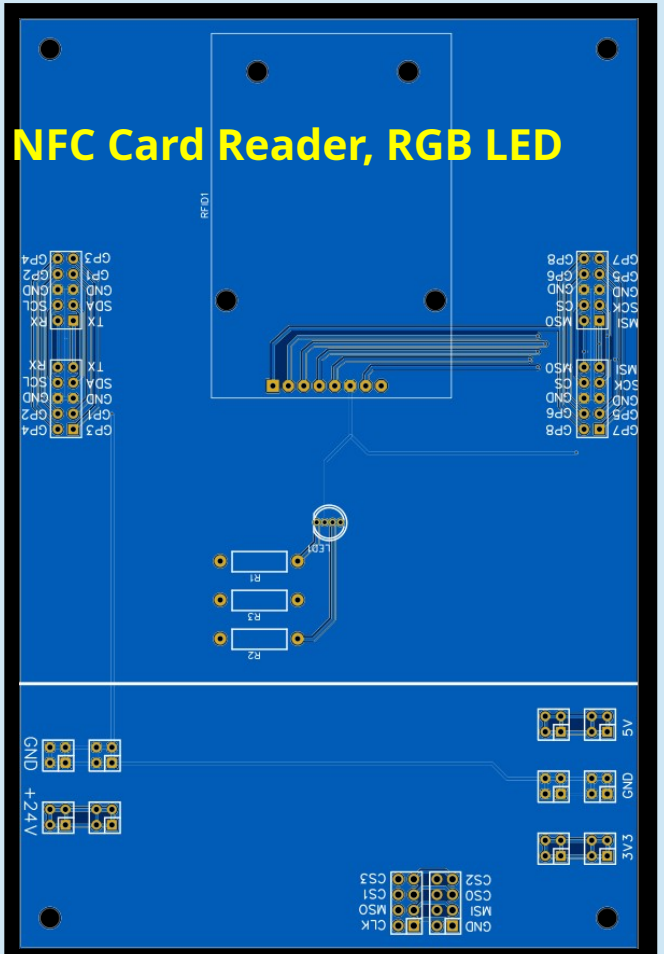
CANBus



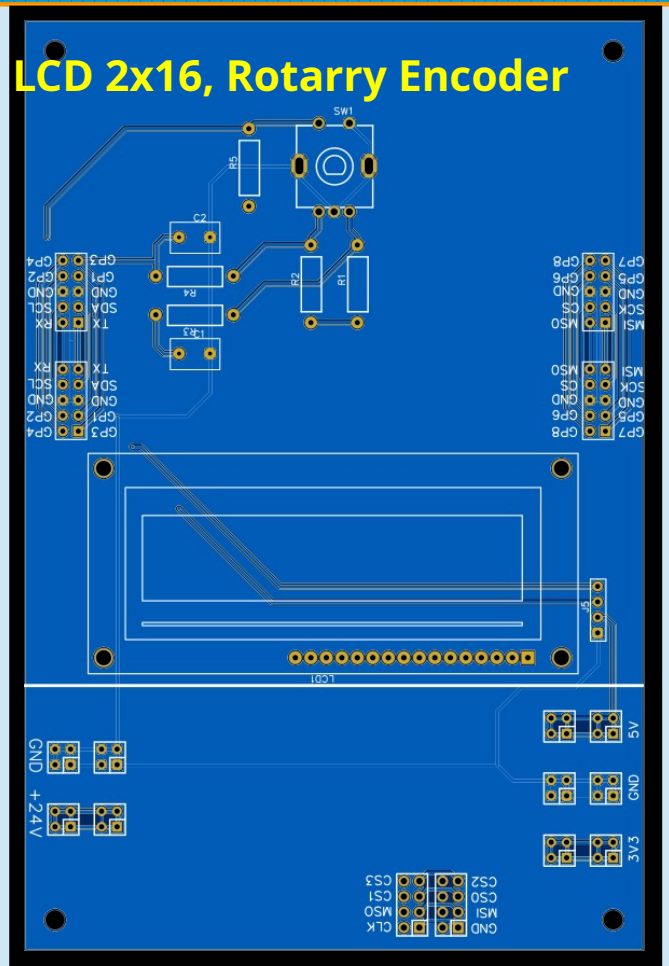
Hardware - Applications

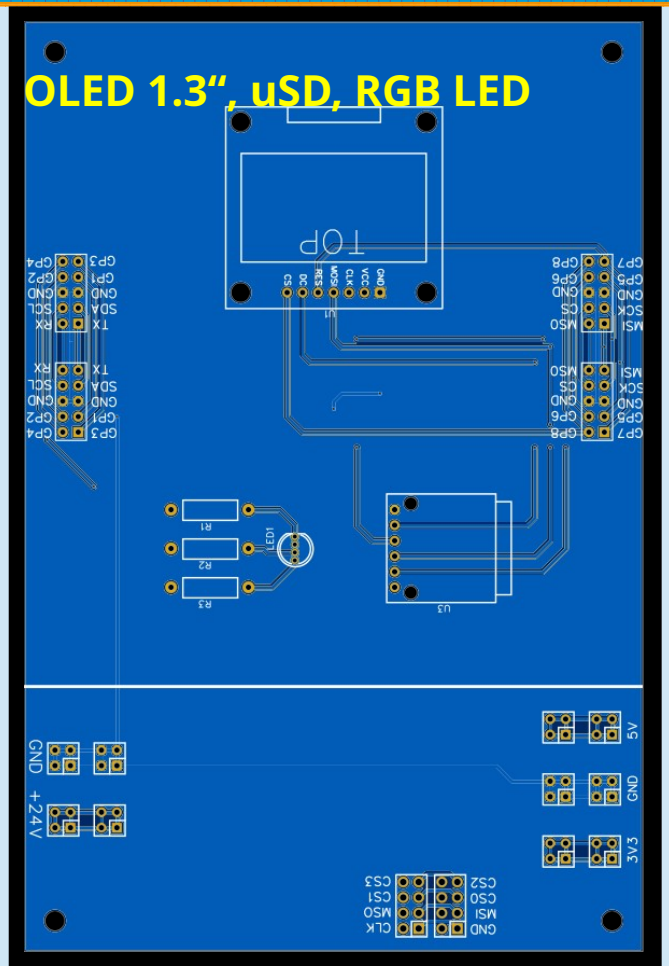






Hardware - Applications





IDE

- For bare-metal programming
- Lightweight – Arduino IDE
- Heavy duty – STM Cube

Environment setup

- Use your fi.muni account
  - https://www.fi.muni.cz/tech/account.html.cs
- Data should be stored in cloud
- Today configuration and test of the IDE
- Application: just blinking the LED

Arduino IDE

- File → Preferences
- Additiona Boards Manager URLs:
  - http://dan.drown.org/stm32duino/package_STM32duino_index.json
- Tools → Board → Boards Manager
  - STM32F1xx/GD32F1xx
- Tools → Board → STM32F1 Boards (Arduino_STM32)
  - Generic STM32F103C series

Arduino IDE

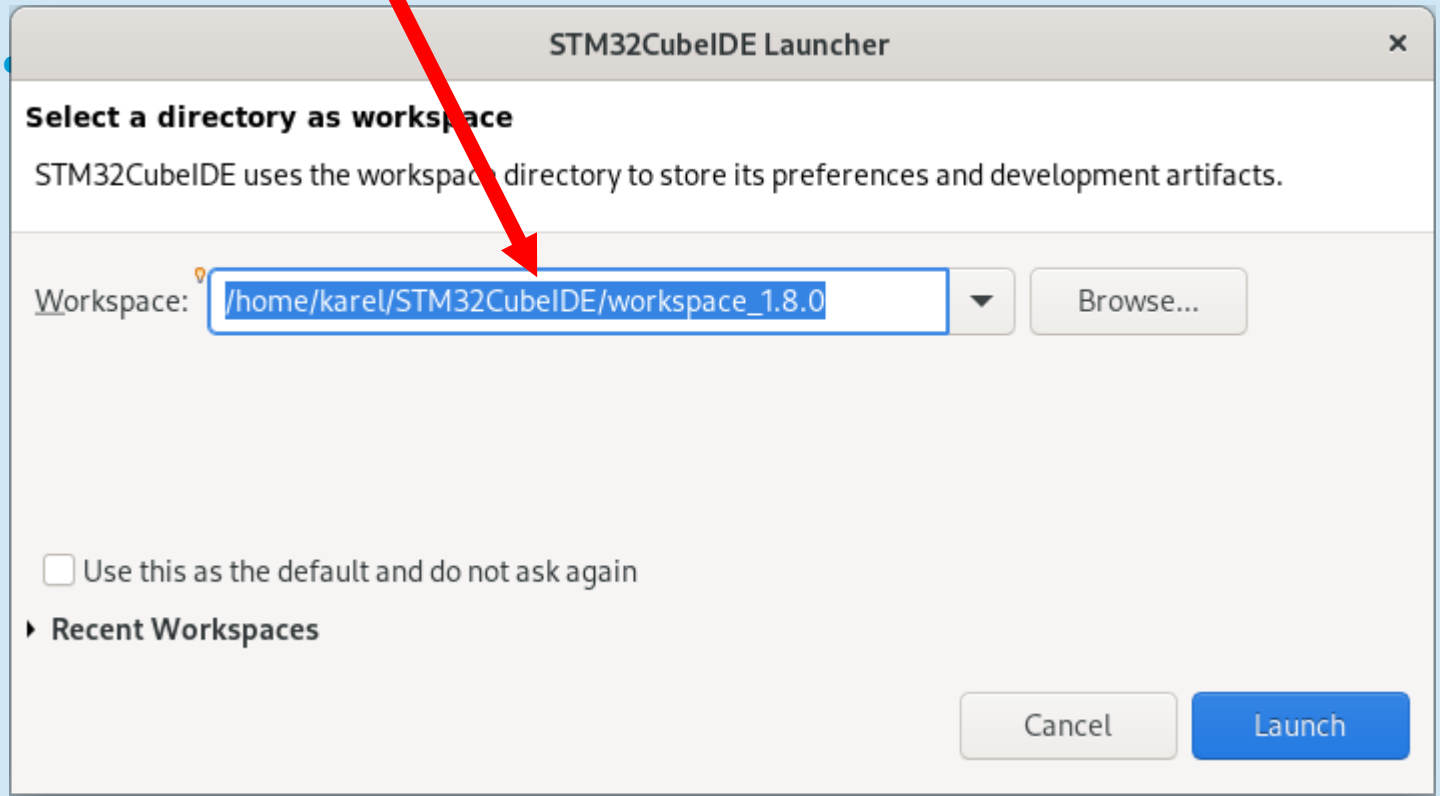
- File → Examples → 0.1Basic → Blink
- Tools → Upload Method: → STLink
- Sketch → Verify/Compile
- Sketch → Upload

Arduino IDE

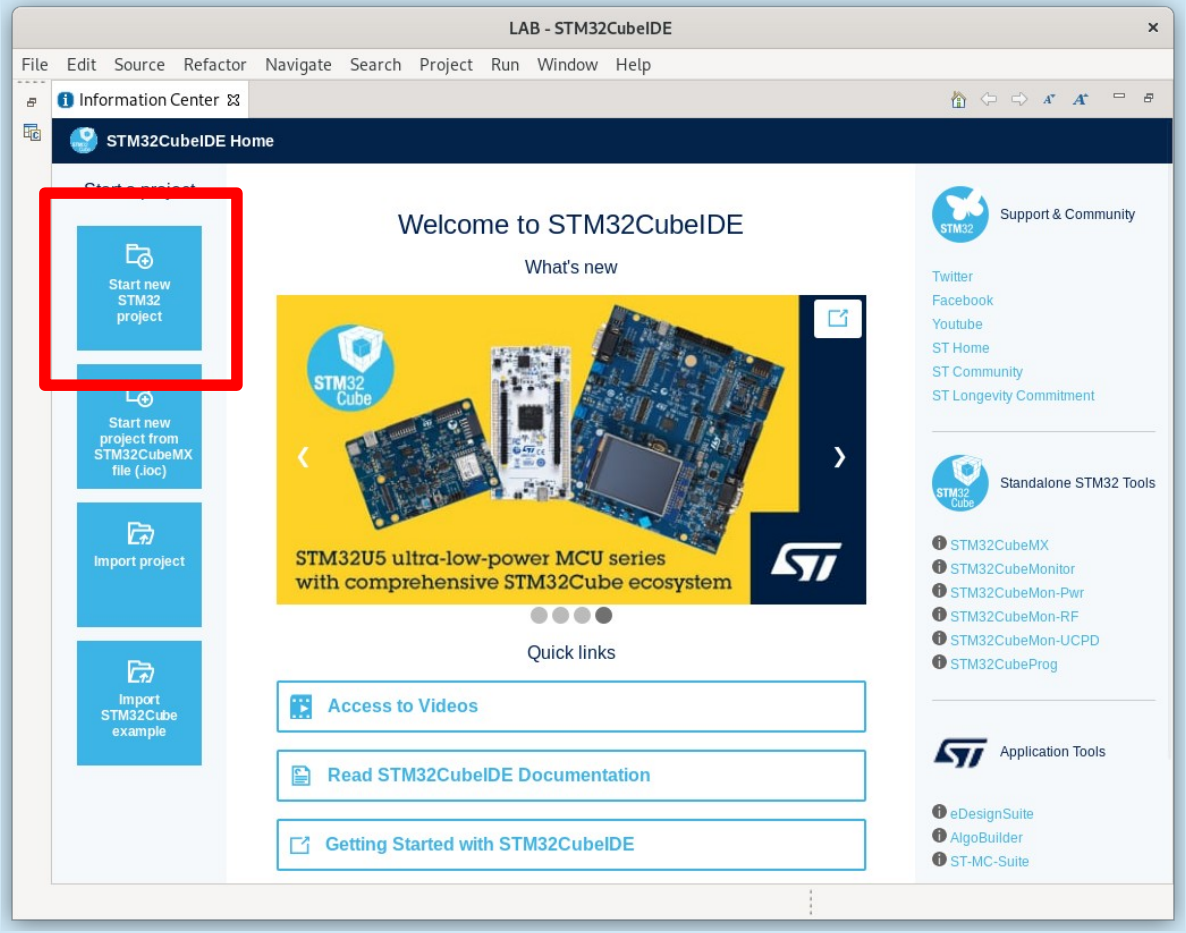
```
void loop() {
  digitalWrite(led, HIGH);   // turn the LED on
  delay(1000);               // wait for a second
  digitalWrite(led, LOW);    // turn the LED off
  delay(1000);               // wait for a second
}
```

STM Cube

- **H:_profile\Documents\stm**

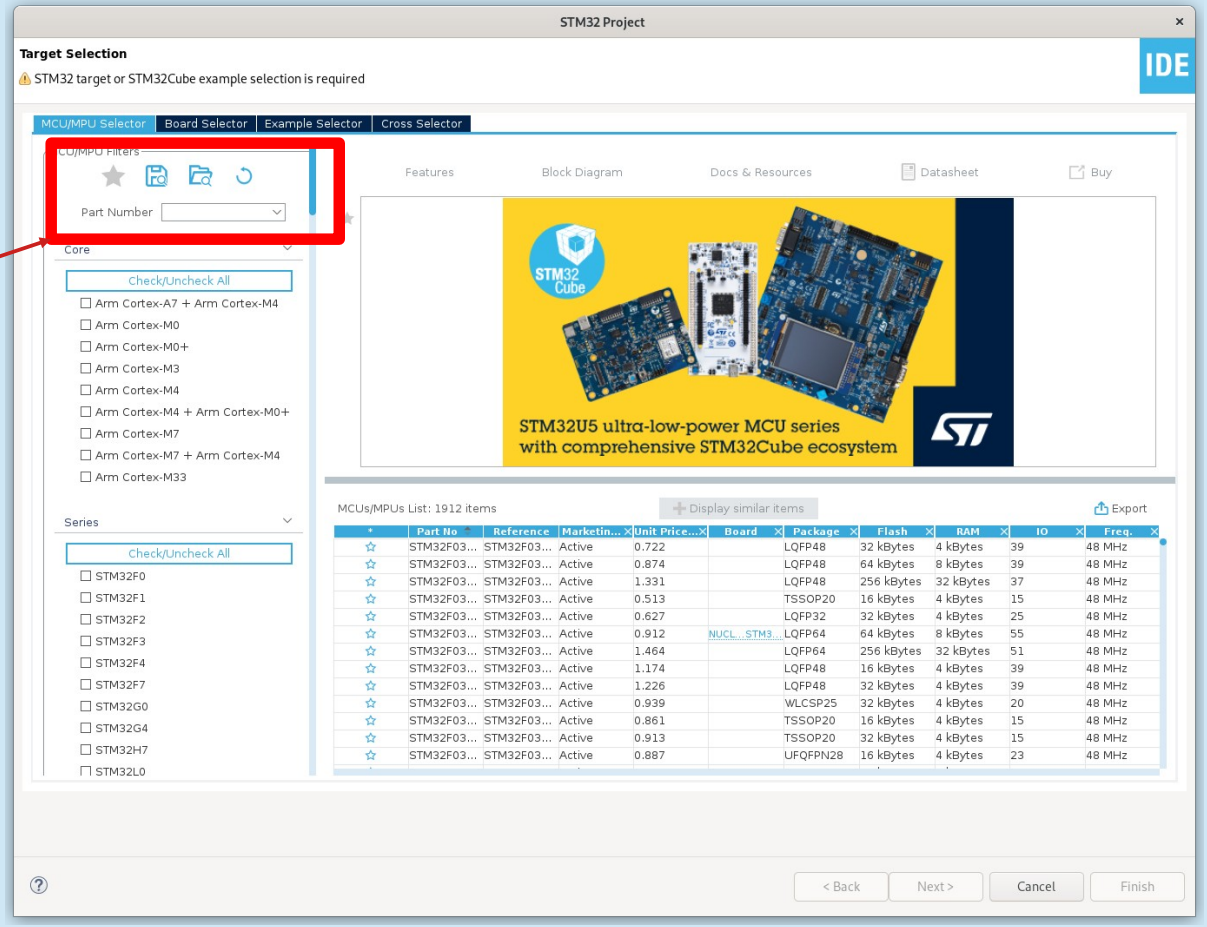


STM Cube – getting started



STM Cube – getting started

STM32F103C8T6



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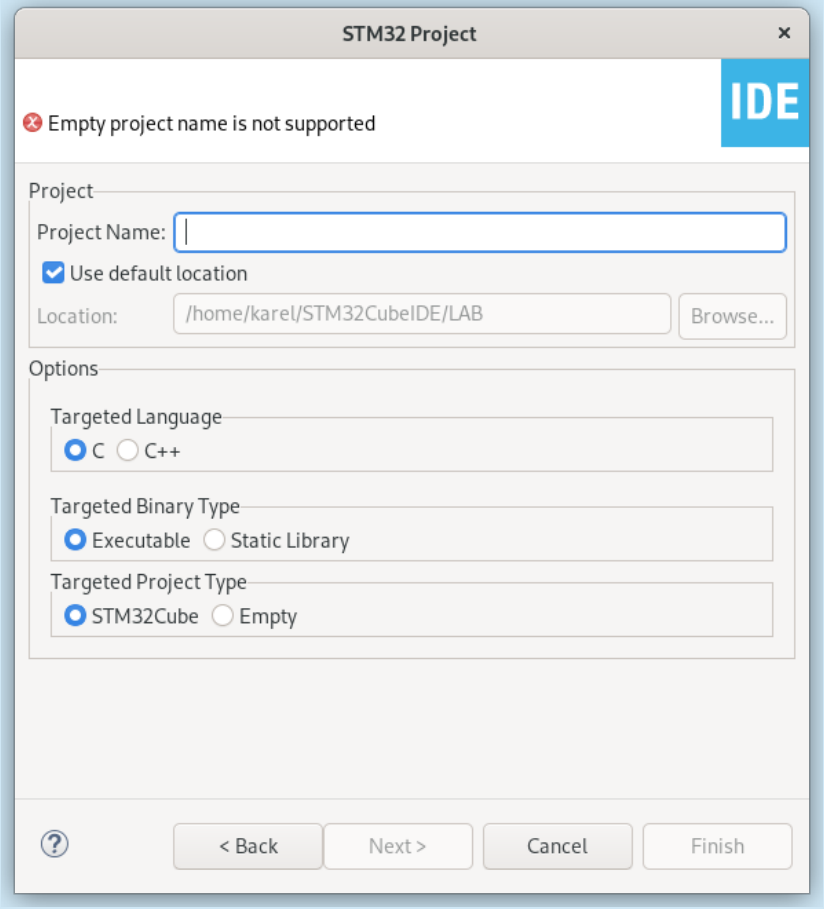

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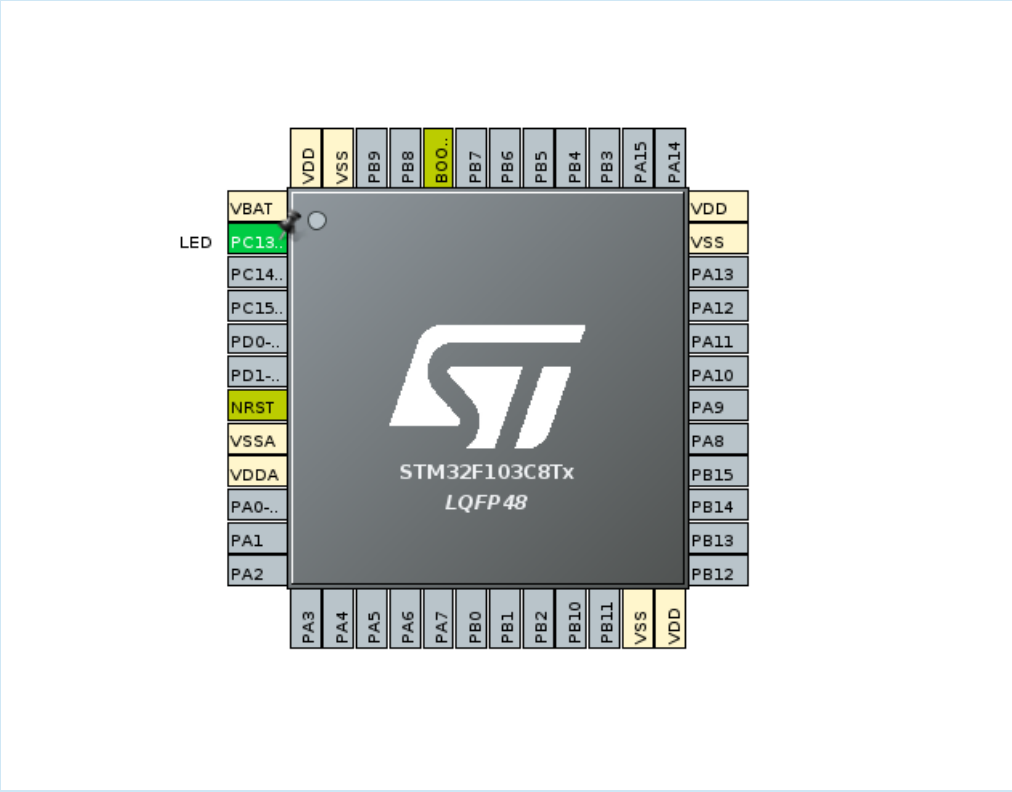

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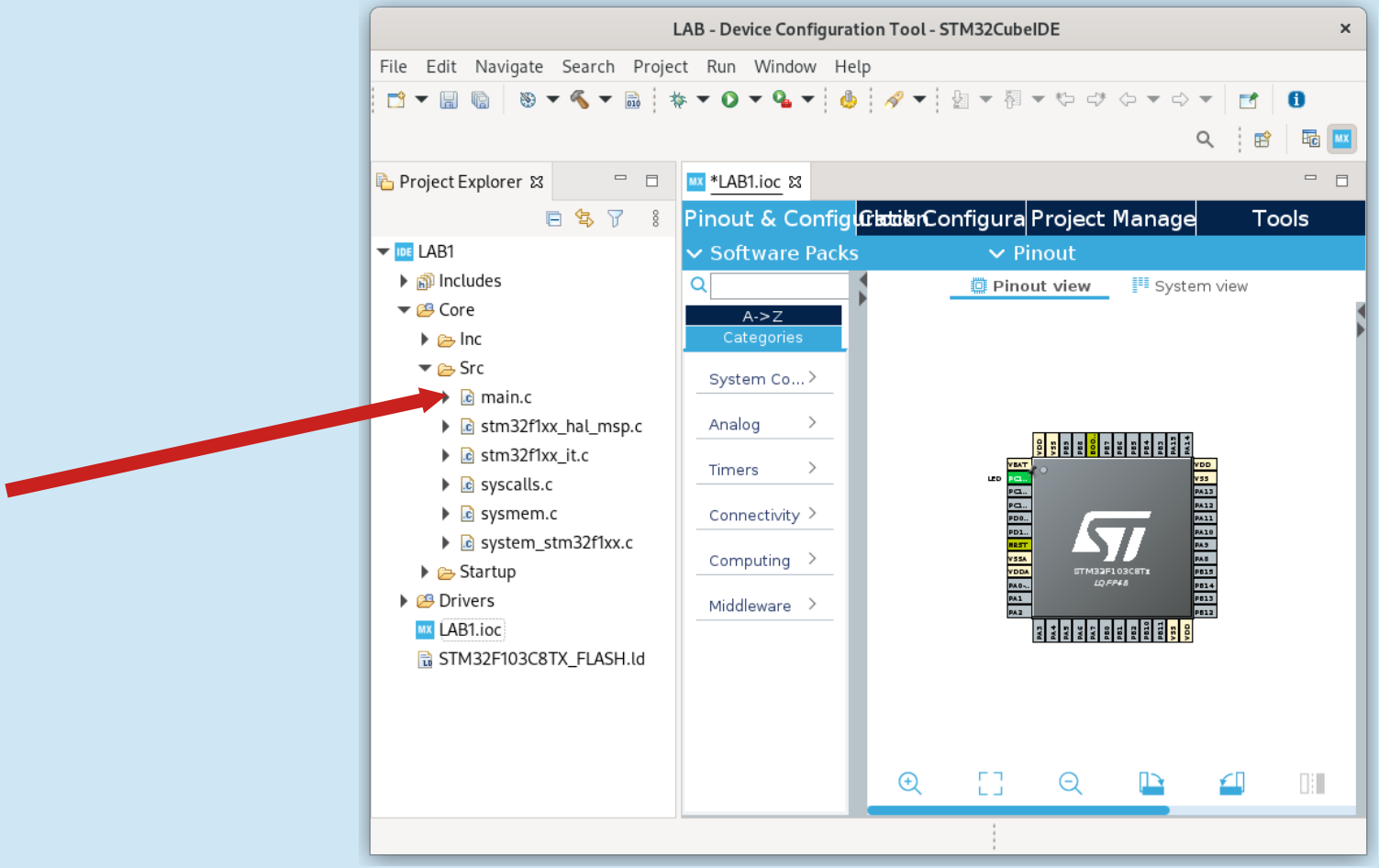

STM Cube – C programming

- Main.c

```
while (1)
 {
    // LED OFF
    HAL_GPIO_WritePin(GPIOC, GPIO_PIN_13, GPIO_PIN_SET);
    HAL_Delay(100);
    // LED ON
    HAL_GPIO_WritePin(GPIOC, GPIO_PIN_13, GPIO_PIN_RESET);
    HAL_Delay(100);
 }
```

Please consider both Arduino IDE and STM Cube