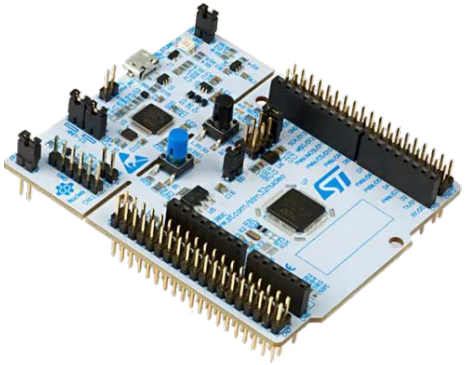
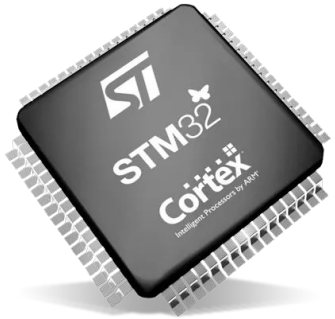


STM32 Night

Tufts Institute of Electrical and Electronics Engineers



VSCode and PlatformIO

Instructions:

1. Install VSCode
2. Go to extensions in VSCode (Symbol → )
3. Search for PlatformIO and Install PlatformIO IDE

Getting Started

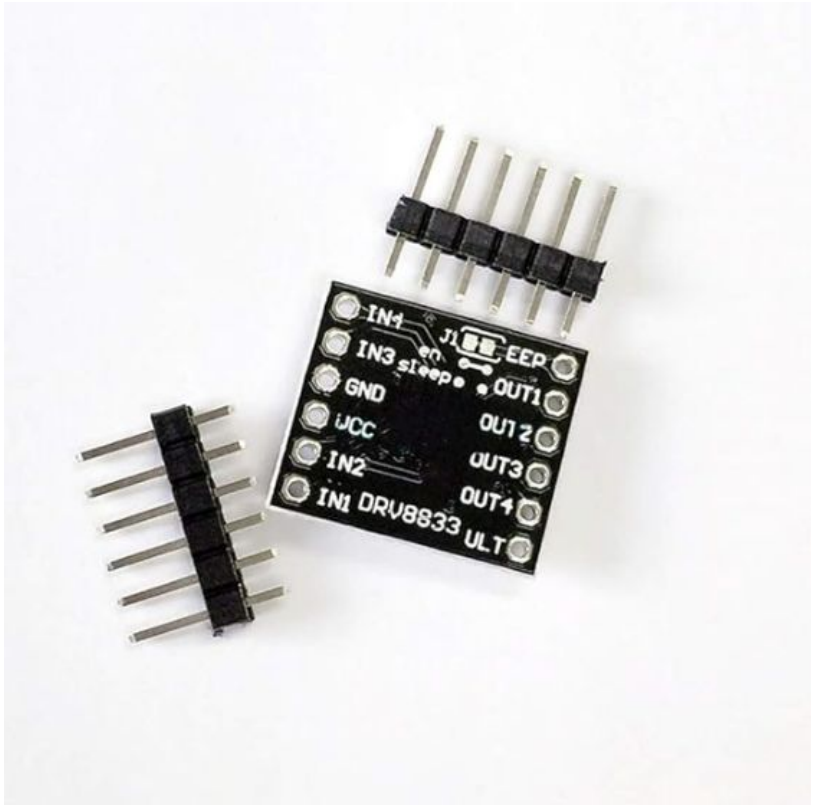
Instructions:

1. Go to https://ieee.ece.tufts.edu/ and copy the folder that says STM32Night.
2. Open that folder in VSCode and wait for PlatformIO to initialize.
3. Connect your STM32 to your computer.
4. Look at the top of your VSCode Interface, find a checkmark and click the dropdown. Press upload.

Motor Driver Pictures

Instructions:

◆ULT low level for sleep mode (need to disconnect the J2 short solder joint behind the module)
◆OUT1 and OUT2 are one H bridge, corresponding control is IN1 and IN2.
◆OUT3,OUT4 is the second H bridge, corresponding control is IN3,IN4.
◆EEP protects the output and is not used by default.
◆VCC input voltage from 3 to 10 V.



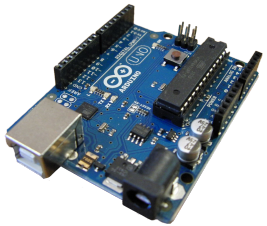
Setting up the Motor Driver

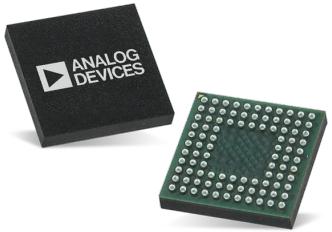
Instructions:

1. Connect GND and VCC pins of the motor driver to GND and 5V on the STM32 microcontroller.
2. Connect the D9 pin on the STM32 microcontroller to IN1 on the motor driver.
3. Connect IN2 of the motor driver to GND on the microcontroller.
4. Connect motor to OUT1 and OUT2. What do you notice depending on which wire you connect to OUT1 and OUT2?

What is a Microcontroller?

- A small computer-like chip that is designed to perform a **specific task** in an embedded system.
- There are so many types of microcontrollers!
  - **Programming Languages:** Micropython, Embedded C, and C++, etc.
  - **Companies:** STM32, Arduinos, Texas Instruments, Analog Devices, etc.
  - Microcontrollers from different companies may have some similarities and many differences, make sure to do your research before using them!





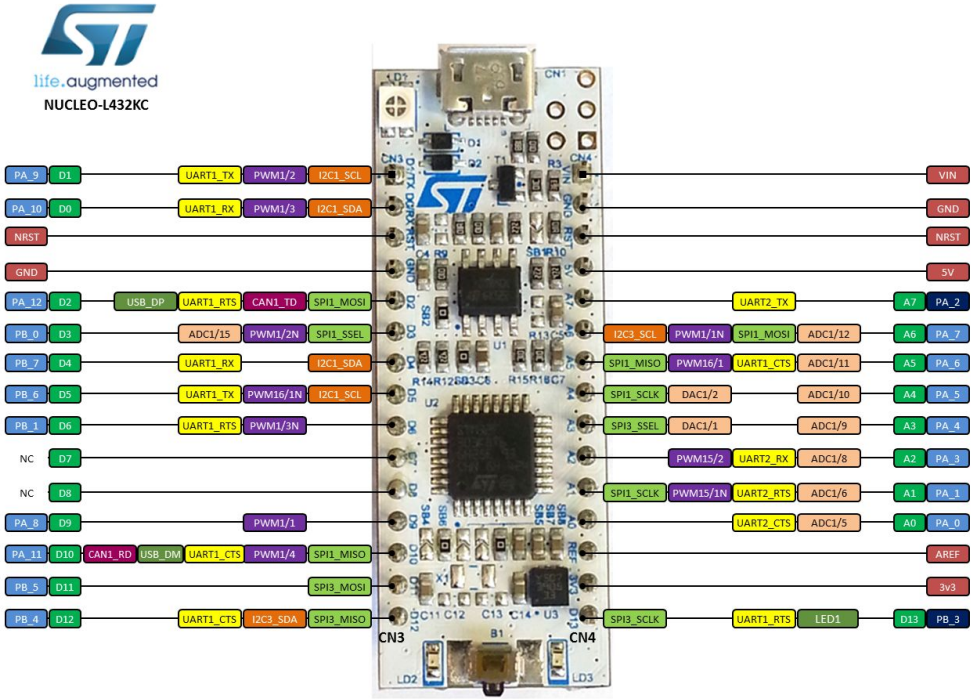
What are the peripherals of STM32 Microcontrollers?

- **Peripherals** - In simple terms, if you think of your microcontroller like your phone, the peripherals are your camera app, phone app, messages app, etc. They are parts of your microcontroller that allow it to interact with the outside world.
- List of Some Peripherals and Other Cool Microcontroller Capabilities:
  - GPIO (General Purpose Input Output) ← We're using this today!
  - DAC/ADC (Digital-Analog Converter/Analog-Digital Converter)
  - PWM (Pulse-Width Modulation) ← We're using this today!
  - Digital Communication Protocols (SPI, I2C, UART, etc.)
  - Timers/Counters

GPIO (General-Purpose Input Output)

- Configurable pins on the microcontroller that allow it to interact with external devices.
- Different modes of GPIO pins:
  - Input Mode
  - Output Mode
  - Analog Mode
  - Alternate Function Mode ← We're using this today!

STM32 Pinout



https://www.ece.tufts.edu/ee/14/labs/l432kc_pinout.png

PWM (Pulse-Width Modulation)

- A technique to control the average power delivered to a device.
- How it works:
  - You have a 5V signal that is only ON (delivering 5V) 50% of the time. Your average voltage to the device is then 5V * (0.5) = 2.5 V.
  - That percentage (50% in the example) of ON time is called your **duty cycle.**
  - If one period of your signal is 1 second, then a 50% duty cycle would mean your signal is at 5V for 0.5 seconds and 0V for the rest.