



IoT Project Challenge Environment setup

Project-1

Software Setup

- Arduino IDE setup
- Setting up a drone simulation environment
- Visual Studio Code (Latest version)
- Edge Impulse platform setup

Arduino IDE setup

Drivers

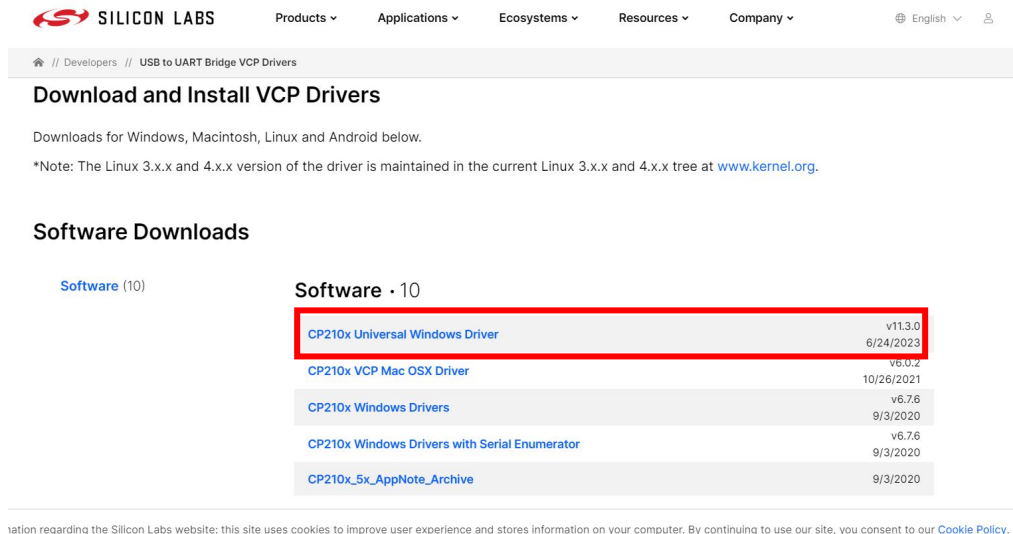
- Silicon Labs CP210x USB to UART Bridge driver

Software

- Arduino IDE – Version (latest)
 - MPU6050 by electronic cats
 - Websockets by Markus Sattler (2.4.0)
 - Esp32 by espressif (2.0.11)

Silicon Labs CP210x USB to UART Bridge VCP Drivers

- You need to install drivers for the USB-to-Serial chip on your ESP32 board.
<https://www.silabs.com/developers/usb-to-uart-bridge-vcp-drivers?tab=downloads>



The screenshot shows the Silicon Labs website page for downloading and installing VCP drivers. The page includes a navigation bar with links to Products, Applications, Ecosystems, Resources, and Company. Below the navigation bar, there is a breadcrumb trail: Home // Developers // USB to UART Bridge VCP Drivers. The main heading is "Download and Install VCP Drivers". Below this, it states "Downloads for Windows, Macintosh, Linux and Android below." and includes a note: "*Note: The Linux 3.x.x and 4.x.x version of the driver is maintained in the current Linux 3.x.x and 4.x.x tree at [www.kernel.org](\"http://www.kernel.org\")." The "Software Downloads" section shows a list of software items. The first item, "CP210x Universal Windows Driver", is highlighted with a red box. It shows version v11.3.0 and a date of 6/24/2023. Other items include "CP210x VCP Mac OSX Driver" (v6.0.2, 10/26/2021), "CP210x Windows Drivers" (v6.7.6, 9/3/2020), "CP210x Windows Drivers with Serial Enumerator" (v6.7.6, 9/3/2020), and "CP210x_5x_AppNote_Archive" (9/3/2020).

SILICON LABS Products ▾ Applications ▾ Ecosystems ▾ Resources ▾ Company ▾ English ▾

Home // Developers // USB to UART Bridge VCP Drivers

Download and Install VCP Drivers

Downloads for Windows, Macintosh, Linux and Android below.

*Note: The Linux 3.x.x and 4.x.x version of the driver is maintained in the current Linux 3.x.x and 4.x.x tree at www.kernel.org.

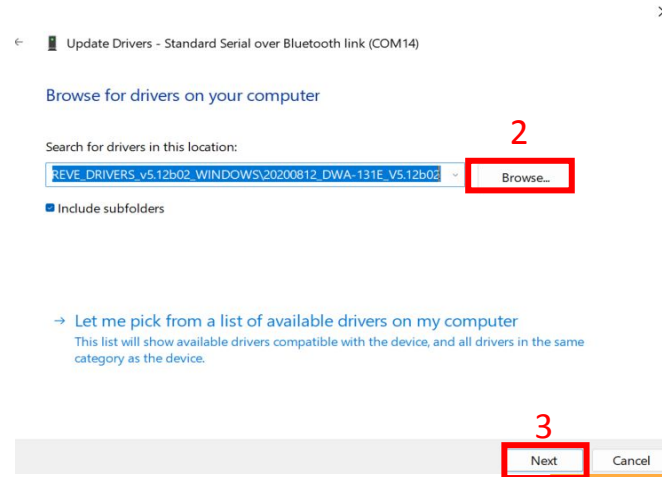
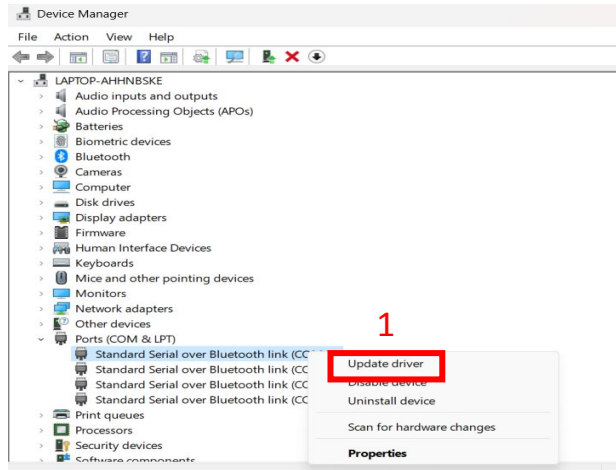
Software Downloads

Software (10)

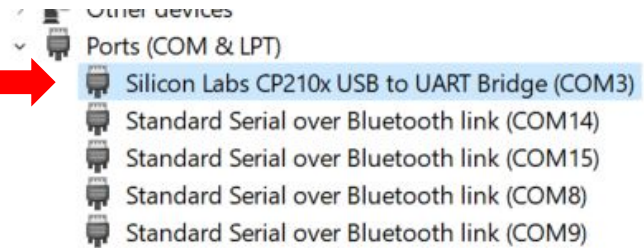
Software	Version	Date
CP210x Universal Windows Driver	v11.3.0	6/24/2023
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CP210x Windows Drivers	v6.7.6	9/3/2020
CP210x Windows Drivers with Serial Enumerator	v6.7.6	9/3/2020
CP210x_5x_AppNote_Archive		9/3/2020

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- Extract the folder
- Open Device Manager and Go to -> Ports
- Connect your esp32 to laptop using micro-USB cable
- It shows a new port, right click on it and select Update Driver
- Browse the driver for extracted folder and click next

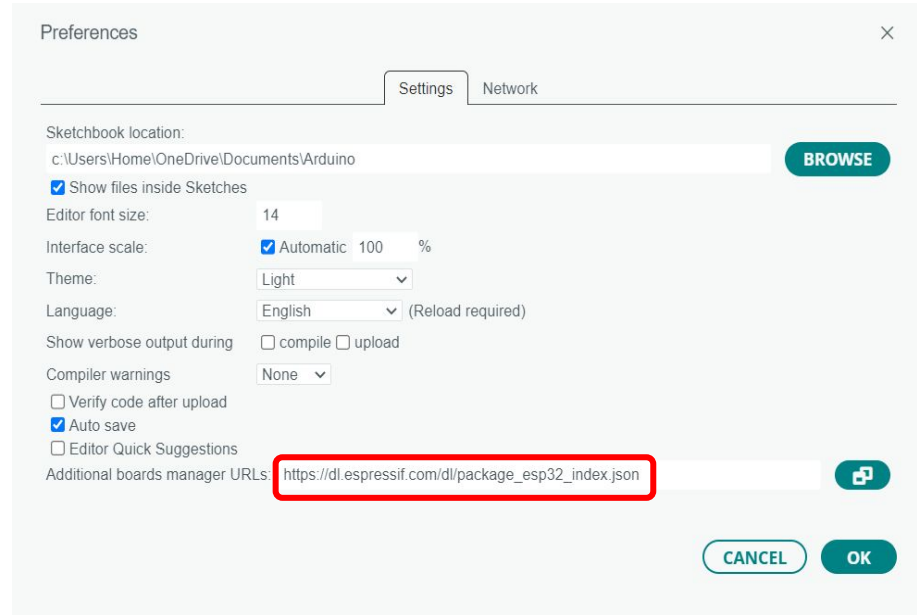


- After uploading it shows




ESP32 BOARD SUPPORT TO ARDUINO IDE

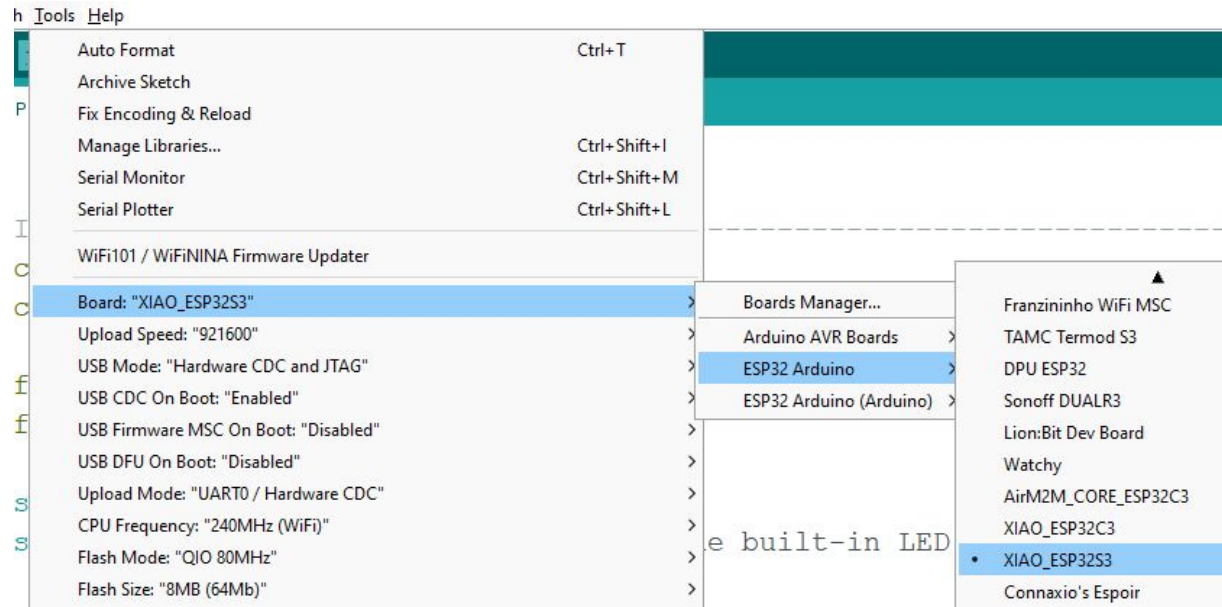
- Open Arduino IDE.
- Go to File -> Preferences.
- In the "Additional Boards Manager URLs" field, add this URL: https://dl.espressif.com/dl/package_esp32_index.json
- Click OK to close the Preferences window.



INSTALL ESP32 BOARD PACKAGE

- Go to Tools -> Board -> Boards Manager.
 - Type "ESP32" in the search bar.
 - Install "esp32" by Espressif Systems.
 - Go to Tools -> Board.
 - Select your ESP32 board from the list. ("XIAO_ESP32S3" for most generic ESP32 boards)
- 
- A large orange triangle is positioned in the bottom right corner of the slide, pointing towards the top right.

- Open Arduino ide and select board and port
- After selecting Board and Port you are good to upload your code.



Setting up a Drone Simulation Environment

Software Requirements

- Python - Version 3.7.0 (Include following libraries)
 - ❑ Dronekit - Version 2.9.2
 - ❑ Dronekit Sitl - Version 3.3.0
 - ❑ Pymavlink - Version 2.4.8
 - ❑ Websocket-client – Version 1.6.1
- Mavproxy - Version 1.8.69
- Visual studio code

Software Installation Commands (Windows)

- Python - Version 3.7.0 ([Install](#))
- Dronekit - Version 2.9.2
 - `py -3.7 -m pip install dronekit==2.9.2`
- Dronekit Sitl - Version 3.3.0
 - `py -3.7 -m pip install dronekit-sitl==3.3.0`
- Pymavlink - Version 2.4.8
 - `py -3.7 -m pip install pymavlink==2.4.8`
- Websocket-client – Version 1.6.1
 - `py -3.7 -m pip install websocket-client==1.6.1`
- Mavproxy - Version 1.8.69 ([Install](#))

Simulation Environment setup

- Run dronekit-sitl in command prompt using
 - `py -3.7 -m dronekit-sitl copter`
(Or)
 - `dronekit-sitl copter`
- Open another terminal and run mavproxy map
 - `mavproxy.exe --master tcp:127.0.0.1:5760 --out 127.0.0.1:14550 --out 127.0.0.1:14551 --map`

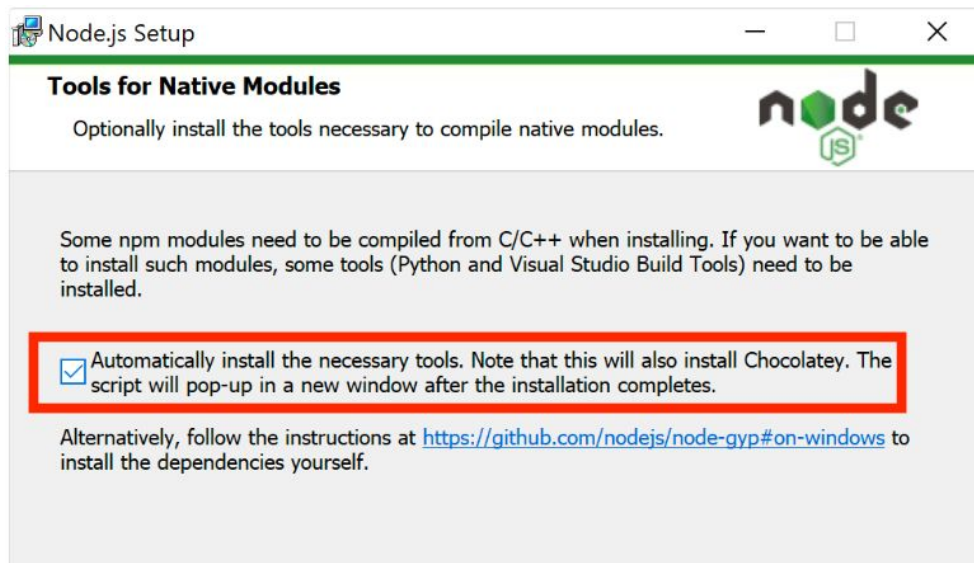
Edge Impulse Setup

Software Requirements

- Edge impulse
 - Nodejs-latest version
 - edge impulse cli

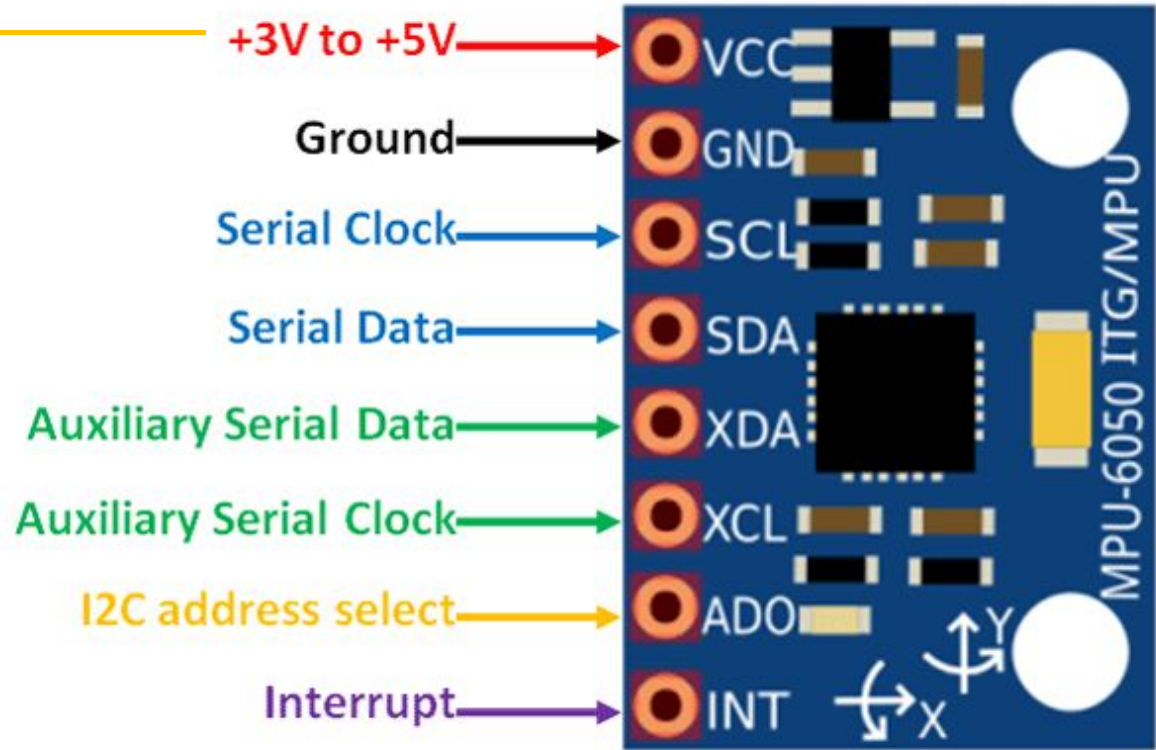
Installation of Edge Impulse CLI

- Install [Node.js](#) v18 on your host computer.
- For Windows users, install the Additional necessary Node.js tools when prompted.



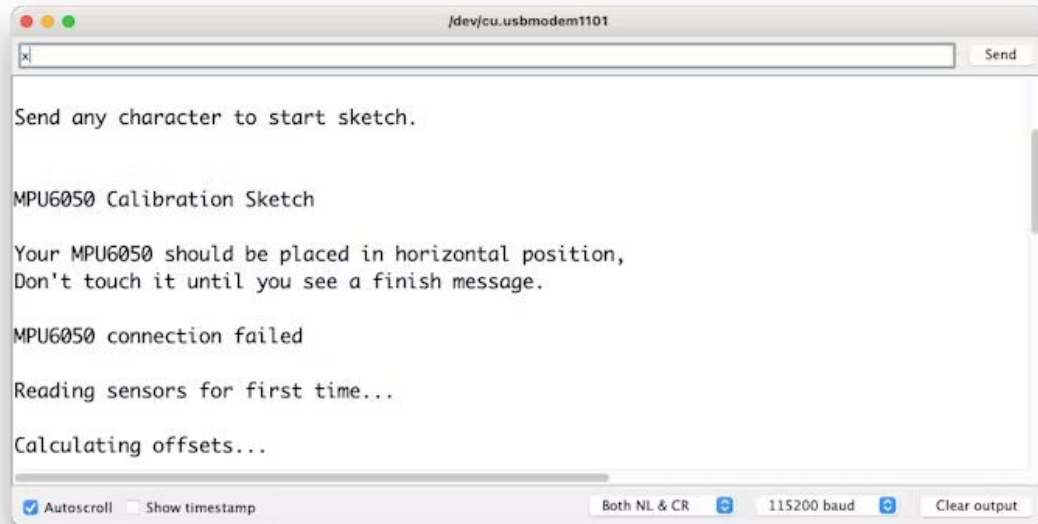
- Install the CLI tools via:
`npm install -g edge-impulse-cli --force`
- Run the edge impulse data forwarder via:
`Edge-impulse-data-forwarder`

MPU6050 Sensor



Calibrating MPU 6050 Sensor

- The MPU6050 can be calibrated using the sketch:
[mpu6050-calibration.ino](#)
- Run the code. The following will be displayed on the Serial Monitor:

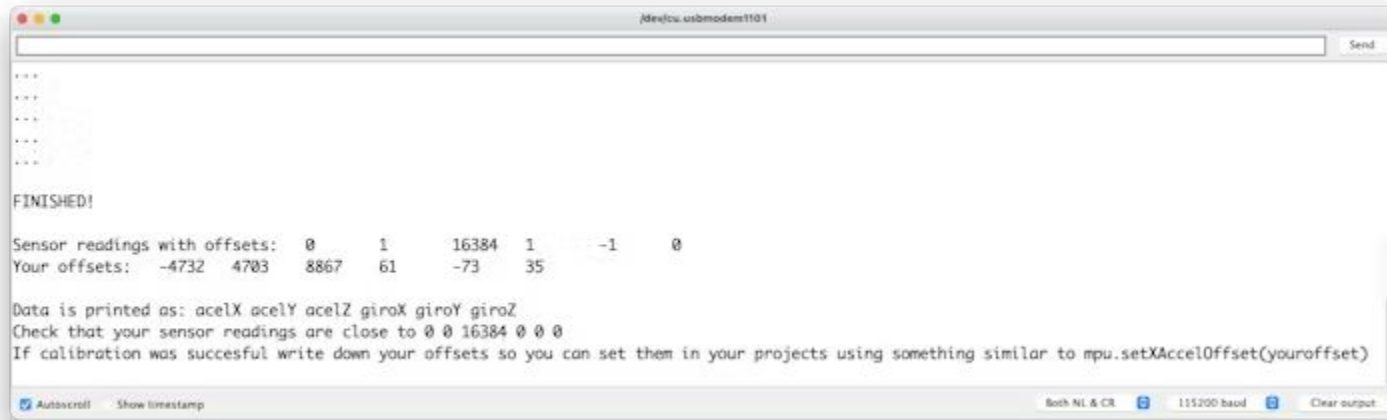


The screenshot shows a Serial Monitor window titled "/dev/cu.usbmodem1101". The text displayed in the window is as follows:

```
Send any character to start sketch.  
  
MPU6050 Calibration Sketch  
  
Your MPU6050 should be placed in horizontal position,  
Don't touch it until you see a finish message.  
  
MPU6050 connection failed  
  
Reading sensors for first time...  
  
Calculating offsets...
```

At the bottom of the window, there are several controls: a checked "Autoscroll" checkbox, an unchecked "Show timestamp" checkbox, a "Both NL & CR" button, a baud rate dropdown set to "115200 baud", and a "Clear output" button.

- Send any character (in the serial monitor), and the calibration should start.
- In the end, you will receive the offset values to be used on all your sketches:



The screenshot shows a serial monitor window titled 'Mec/ou.usbmodem1101'. The output text is as follows:

```
...  
...  
...  
...  
...  
  
FINISHED!  
  
Sensor readings with offsets:  0      1      16384  1      -1      0  
Your offsets:  -4732  4703  8867  61      -73  35  
  
Data is printed as: accelX accelY accelZ gyroX gyroY gyroZ  
Check that your sensor readings are close to 0 0 16384 0 0 0  
If calibration was succesful write down your offsets so you can set them in your projects using something similar to mpu.setXAccelOffset(youroffset)
```

At the bottom of the window, there are checkboxes for 'Autoscroll' (checked) and 'Show timestamp' (unchecked). On the right side, there are settings for 'Both NL & CR', a baud rate of '115200 baud', and a 'Clear output' button.

- Write down your offsets so you can set them in your projects.