Getting started with CY8CKIT-062S2-AI: PSoC™ 6 AI Evaluation Kit

1 Introduction

The PSoC™ 6 AI Evaluation Kit is a cost-effective small form-factor development kit. It provides the best of Infineon's solutions to drive adoption of Imagimob Studio for different use cases of machine learning and Infineon's software products.

This kit features a PSoC™ 6 MCU, a AIROC™ CYW43439 Wi-Fi/Bluetooth® combo module, a 512 Mb NOR flash, an onboard programmer/debugger (KitProg3), PDM-PCM digital microphone interface, Full-Speed USB device, two user LEDs, and one user button. The board supports operating voltages from 1.8 V to 3.3 V for the PSoC™ 6 MCU.

The kit provides various sensors such as 6-axis motion sensor (BMI270), magnetometer (BMM350), barometric pressure sensor (DPS368), and RADAR sensor (BGT60TR13C) for data collection and creating the machine learning models.

For more information, see CY8CKIT-062S2-AI.

1.1 Kit contents

The kit includes the following:

- PSoC™ 6 AI Evaluation Board
- Inlay card (a printed QR code points to a getting started webpage)

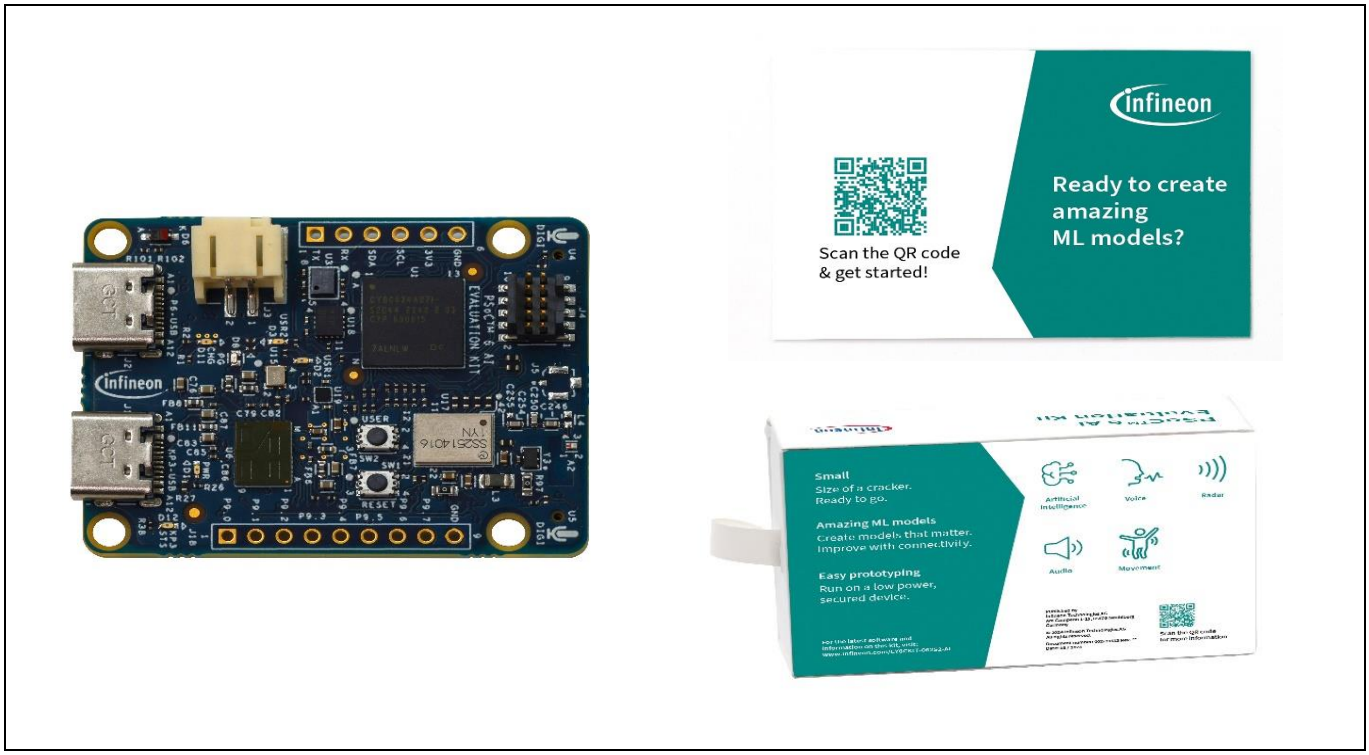

Figure 1 Kit contents

1.2 Requirements

Following softwares are required for getting started:

- ModusToolbox™ software v3.1 or later (for developing PSoC™ 6 MCU-based applications)
- Imagimob Studio v 4.6 (for developing machine learning models)
- UART terminal software such as Tera Term or Minicom

2 Out-of-box (OOB) application

The kit is pre-programmed with mtb-example-imagimob-streaming-protocol code example, that demonstrates sensor data collection from the USB port and store the data in the Imagimob Studio ready for labelling and machine learning model creation.

It is designed to collect the data from the motion sensor (BMI270) at 50 Hz sample rate, and PDM/PCM audio data at 16 kHz. For more details on implementation, see README.

2.1 Testing OOB application with serial terminal

1. Connect the board to the PC through PSoC™ 6 USB connector (J2) using a Type-C USB cable. This enables a serial port for sensor data collection.
2. Ensure that the power LED (D1) turns ON, indicating the board is powered.
3. In the terminal application, open the serial connection to the device. Connect to this port using Type-C USB cable with the following settings:

- Baud rate: 115200
- Data: 8-bit
- Parity: None
- Stop bit: 1-bit
- Flow control: None

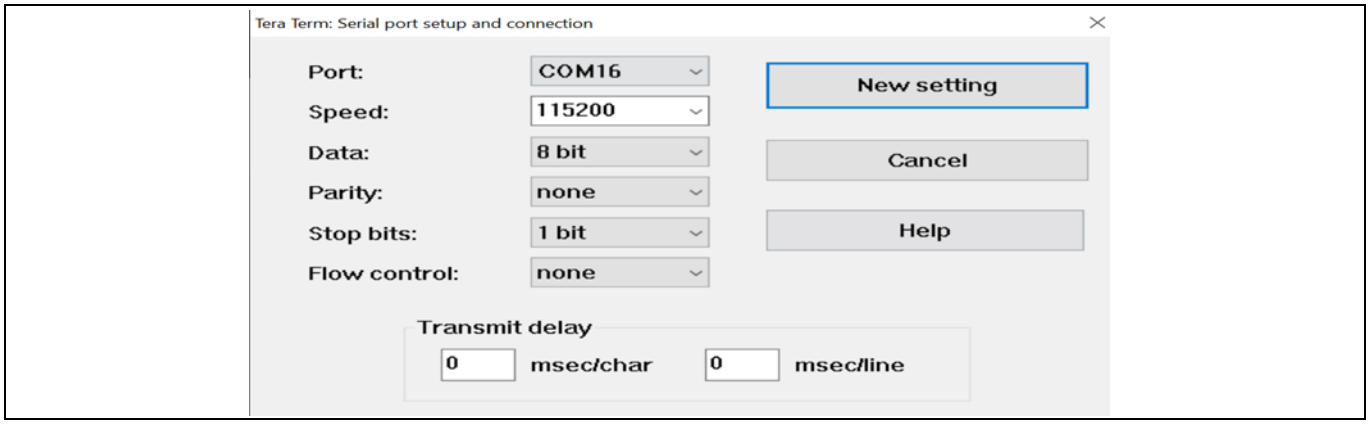

Figure 2 Serial port settings

4. Set the terminal settings as follows:

- Newlines should be transmitted as CR+LF
- Enable local echo

Out-of-box (OOB) application

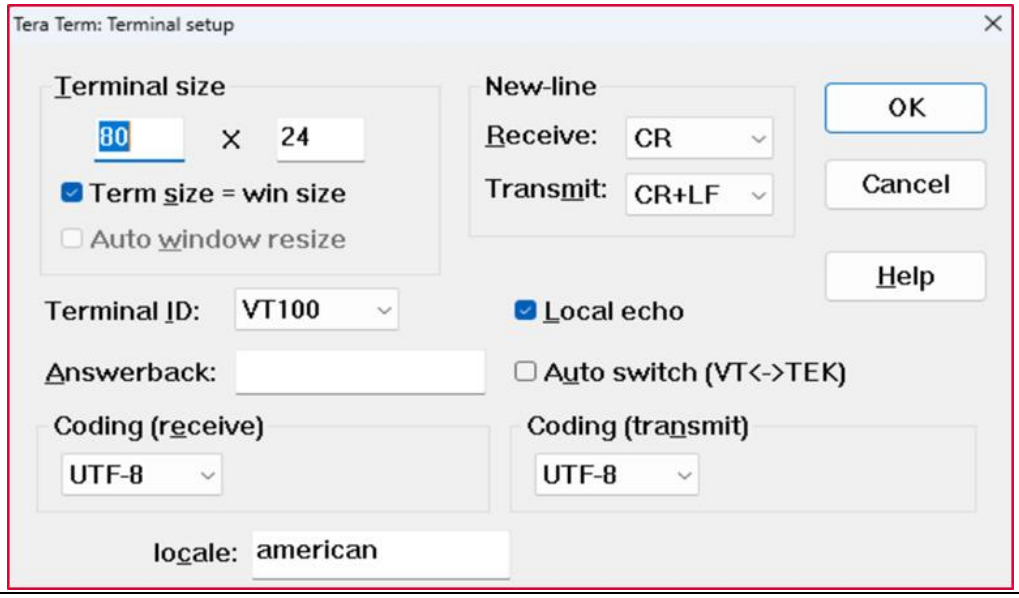

Figure 3 Terminal settings

5. Type **config?**, and press Enter key (to send CR+LF) and verify that the device responds with a JSON structure describing the protocol configuration.

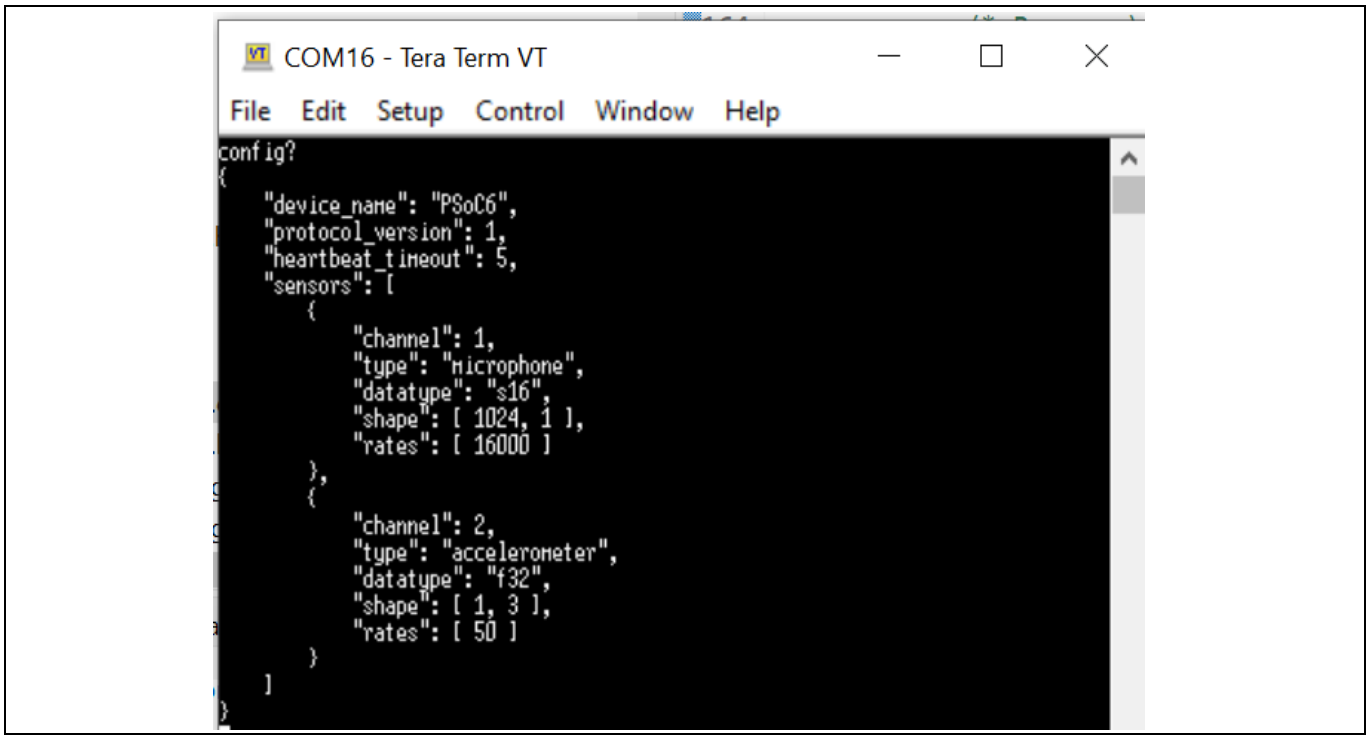

Figure 4 Configuration

6. **Type subscribe,1,16000** and verify that the device streams audio data. Observe that the sample collection stops after 5 seconds. The garbled text on the terminal is the audio data.
7. Type **subscribe,2,50** and verify that the device streams IMU data. Observe that the sample collection stops after 5 seconds. The garbled text on the terminal is the IMU data.

Out-of-box (OOB) application

Note: Currently backspace is not supported in terminal commands. If you encounter issues such as unable to see commands on the terminal or receiving unknown command errors, follow the steps below:

- *Reset the terminal and clear the buffer*
- *Reset board to ensure a fresh execution*

2.2 Testing OOB application with Imagimob Studio

2.2.1 Creating project in Imagimob Studio

1. Open **Imagimob** Studio and select **File**> **New Project**. The New Project window appears.

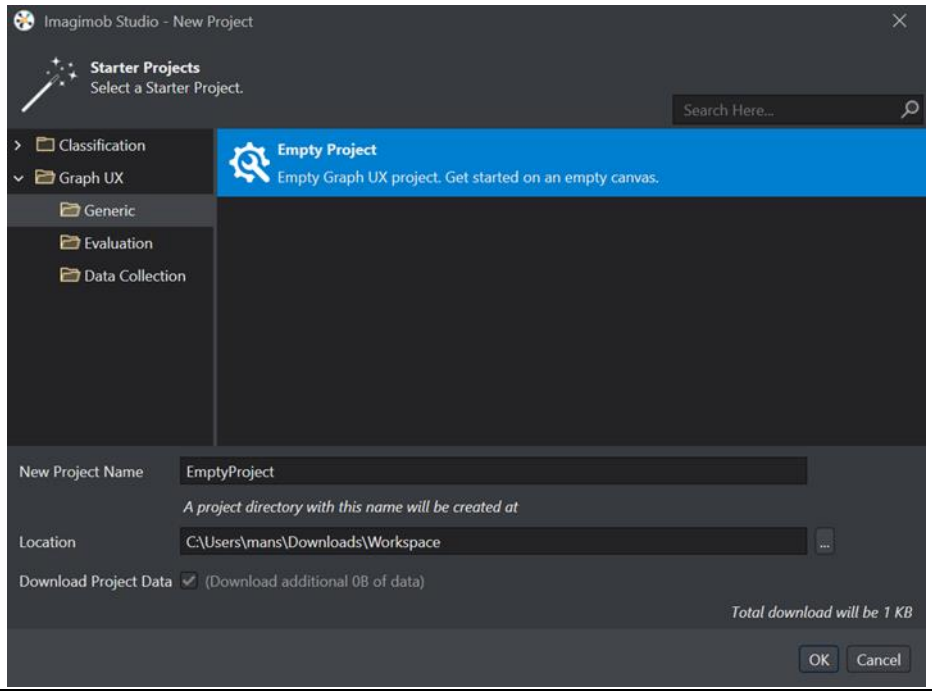

Figure 5 Create Empty Project

2. Under **Graph UX** > **Generic**, select **Empty Project**.
3. In **New Project Name**, enter the name of the project.
4. In **Location**, specify the location where you want to create the workspace and the project directory.
5. Click **OK** to create the project. The project directory is downloaded to the workspace in IMAGIMOB Studio.

Out-of-box (OOB) application

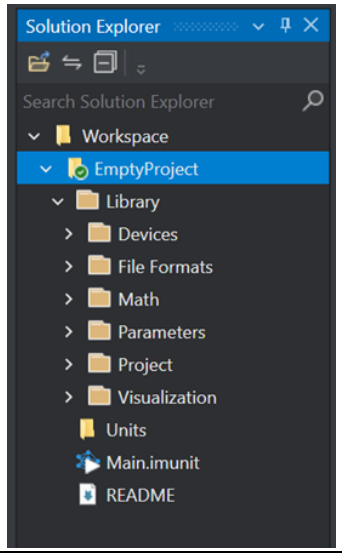

Figure 6 Project directory

2.2.2 Connecting and setting up Serial Capture and Predefined Labels units

Imagimob Studio provides the functionality to collect and label the real-time data simultaneously. Set the **Serial Capture** unit for collecting data and **Predefined** unit for labelling data on the canvas.

2.2.2.1 Setting up the Serial Capture

1. Connect the board to the laptop or PC through PSoC™ 6 USB connector (J2) using a Type-C USB cable.
2. Expand **EmptyProject** directory and double-click the **Main.imunit** to open the canvas.
3. Expand **Library** > **Devices** and drag and drop the **Serial Capture** unit onto the canvas.
4. Expand **Visualization** and drag and drop the **Data Track** unit onto the canvas.
5. Goto **Serial Capture** > **Properties** and select "**USB Serial Device**" port. To check the COM port at which the board is connected, open **Device Manager** > **Ports** and look for **USB Serial Device**.
6. Click on the red icon in the **Serial Capture** node and drag over to the gray icon in the **Data Track** node. This creates a connection between the two nodes.

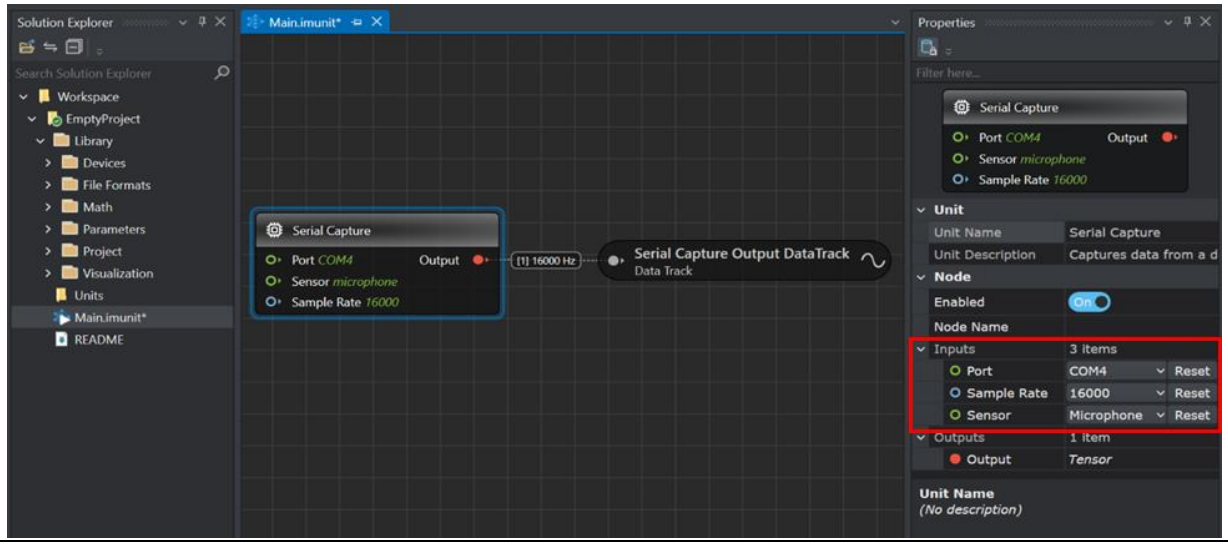

Figure 7 Connection setup between two nodes

Out-of-box (OOB) application

Note: The microphone collects data at a sampling rate of 16000 and an accelerometer collects data at a sampling rate of 50.

Note: The connection might not establish if the COM port is already in use in Imagimob Studio or another tool.

After setting up the Serial Capture, you can utilize the same graph to label the real-time data, by adding a Predefined Labels unit onto the canvas. Define the classes in the Predefined Labels node for one time and utilize the defined classes to label the data on a click of button.

2.2.2.2 Setting up the Predefined Labels

1. Expand **Project** and drag and drop the **Predefined Labels** unit onto the canvas. The **Predefined Labels** unit displays the default classes.
2. Define the classes in **Predefined Labels** node by entering every class in a new line.

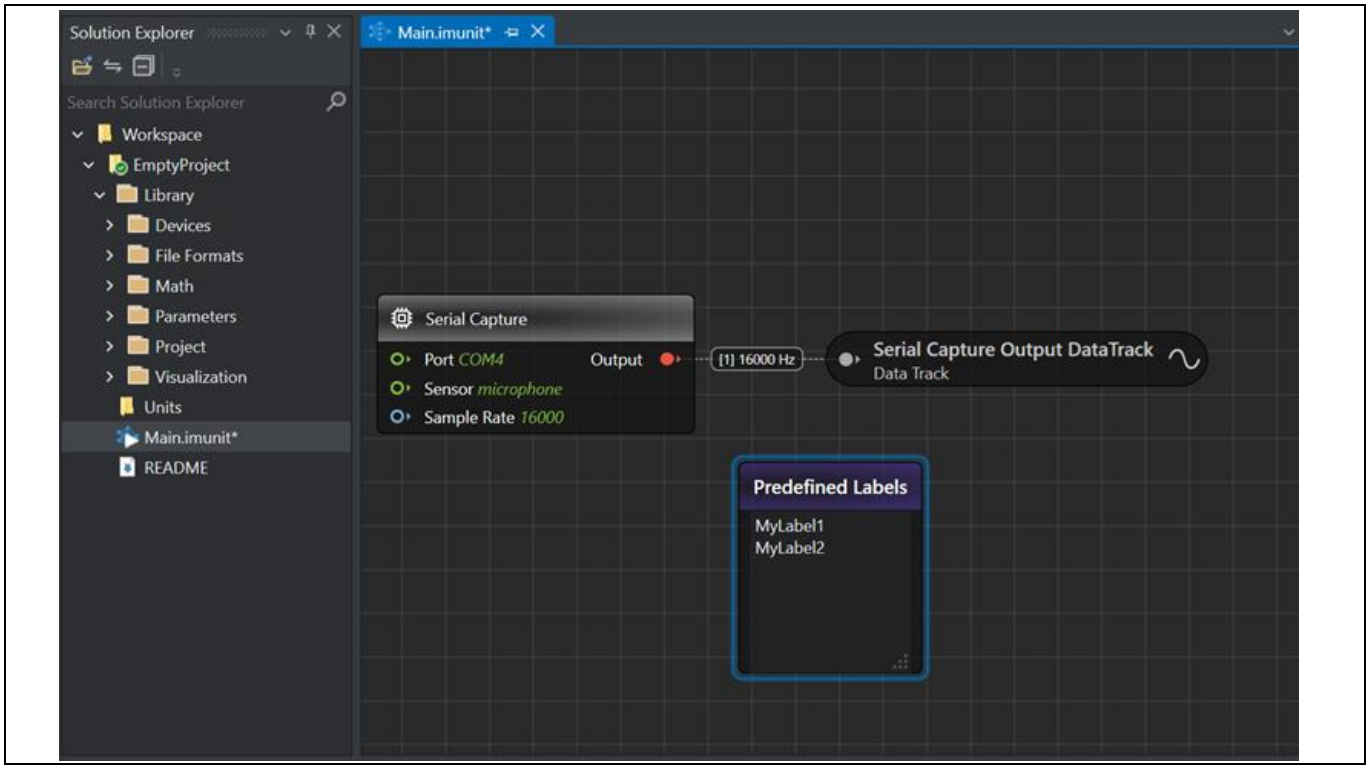

Figure 8 Predefined Labels

After defining the classes, start collecting and labelling data simultaneously.

Out-of-box (OOB) application

2.2.3 Real-time data collection and data labelling

1. Navigate to the toolbar and click the **Start** button to open the session file (main.imsession). An empty session file opens displaying the pre-defined classes in the **Labels bar**.
2. Click the **Record** button to start capturing the real-time data.

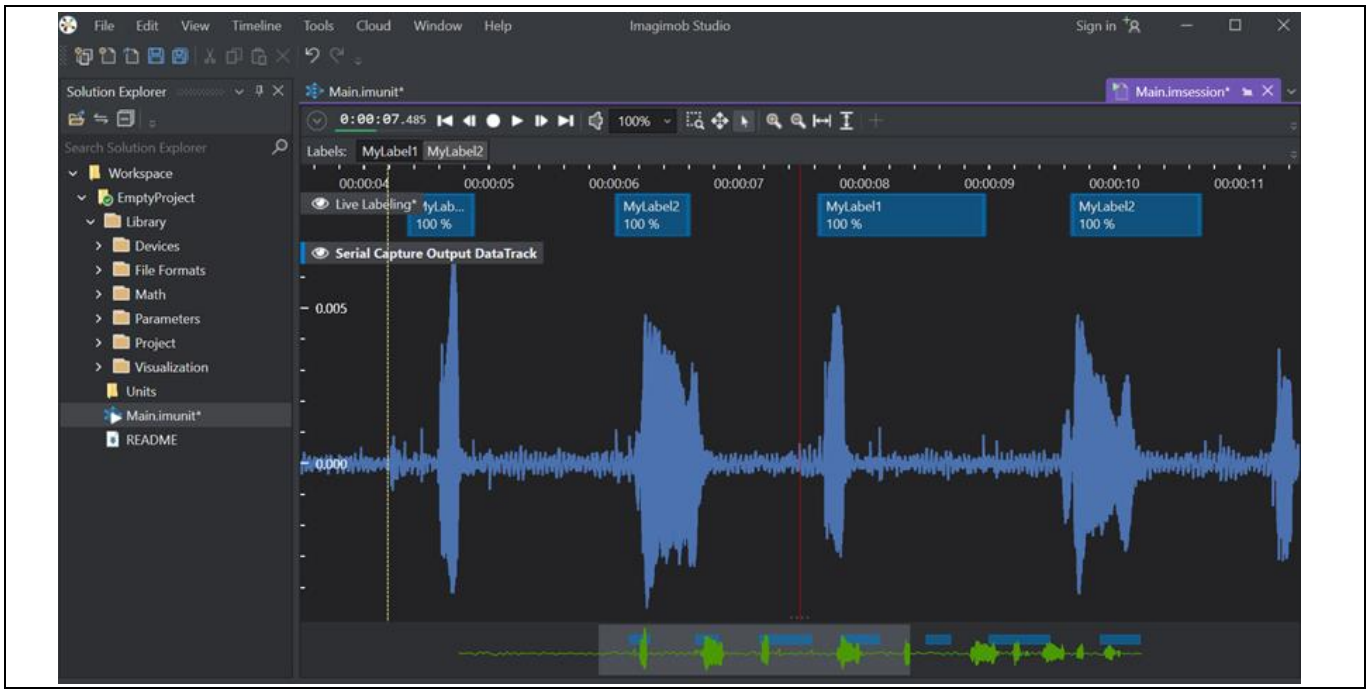

Figure 9 Real time data collection

3. In the **Labels bar**, select a class to start adding labels to the streaming data.
4. Deselect the same class to stop adding the labels. Similarly, you can enable or disable the other classes and label the data.
5. Click the **Record** button to stop collecting the data.
6. Select **File** > **Save** to save the session file, data track and label track. The **Save New Session** window appears.

Out-of-box (OOB) application

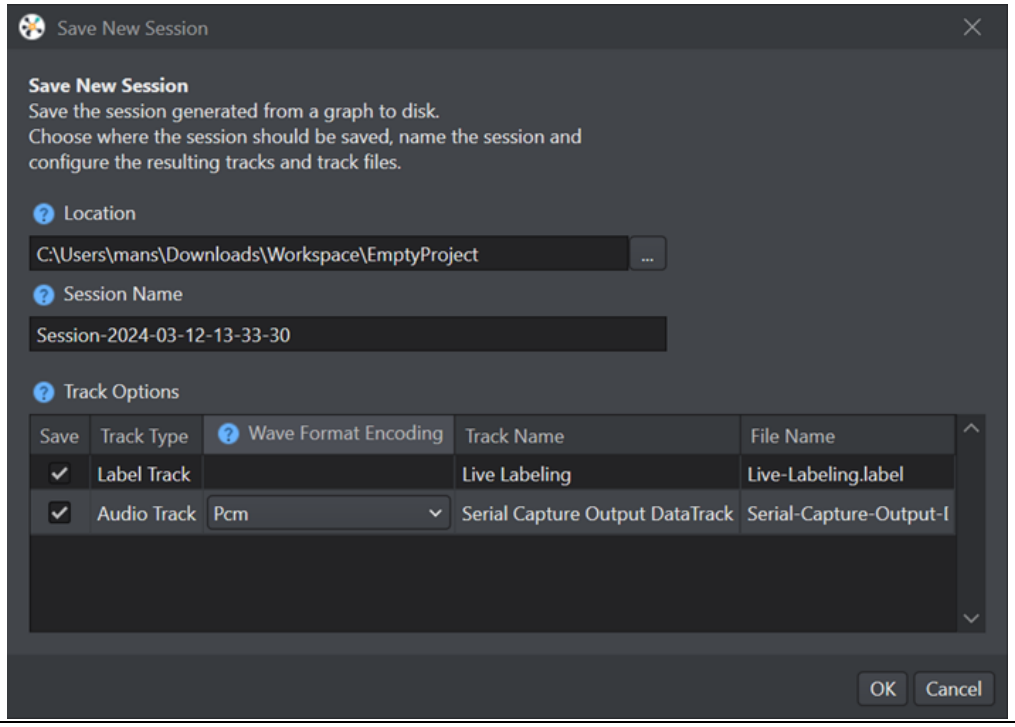

Figure 10 Save data track and label track

7. In **Location**, click the three dot and select the desired location to save the files.
8. In **Session Name**, enter the name of the session file.
9. Under **Track Options**, set the following:

- In **Wave Format Encoding**, select the encoding format for the audio tracks
- In **Track Name**, double-click the column to edit the track name, if required
- In **File Name**, double-click the columns to edit the track name, if required

10. Select the save checkbox corresponding to the tracks you want to save.
11. Click **OK** to save the files.
12. Repeat the instructions from step 2 to collect and save data in multiple session files.

After the required data is collected and labelled, add data to the project in Imagimob Studio and start with the machine learning workflow. To know how to add data, Create Classification project and Add data to project.

Revision history

Document revision	Date	Description of changes
**	2024-05-27	Initial release

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