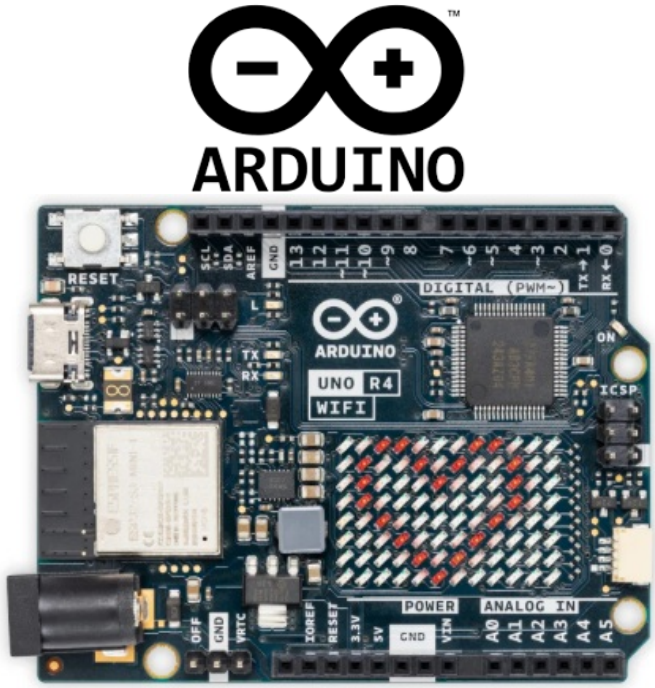


Contents [hide]

ABX00087 UNO R4 WiFi Development Board

Cricket Shot Recognition using Arduino UNO R4 WiFi + ADXL345 + Edge Impulse

This document provides a complete workflow for building a cricket shot recognition system using Arduino UNO R4 WiFi with an ADXL345 accelerometer and Edge Impulse Studio. The project involves collecting accelerometer data, training a machine learning model, and deploying the trained model back to the Arduino for real-time shot classification.

Cricket shots considered in this project:

– Cover Drive

– Straight Drive

– Pull Shot

Step 1: Hardware Requirements

– Arduino UNO R4 WiFi

– ADXL345 Accelerometer (I2C)

– Jumper wires

– Breadboard (optional)

– USB Type-C cable

Step 2: Software Requirements

– Arduino IDE (latest)

– Edge Impulse Studio account (free)

– Edge Impulse CLI tools (Node.js required)

– Adafruit ADXL345 library

Step 3: Wiring the ADXL345

Connect the ADXL345 sensor to the Arduino UNO R4 WiFi as follows:

VCC → 3.3V

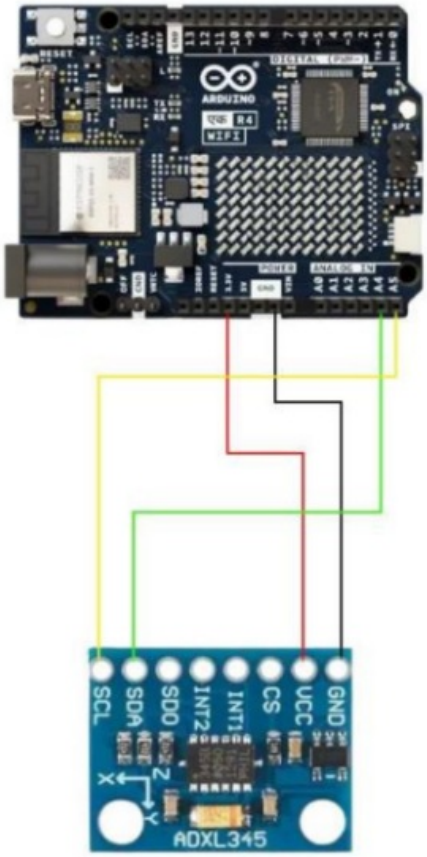
GND → GND

SDA → SDA (A4)

SCL → SCL (A5)

CS → 3.3V (optional, for I2C mode)

SDO → floating or GND



Step 4: Make IDE Sensor Ready

How to Install Sensor Libraries in Arduino IDE?

Open Arduino IDE

Open Tools → Manage Libraries… and install: Adafruit ADXL345 Unified Adafruit Unified Sensor

(If you have LSM6DSO or MPU6050 instead: install SparkFun LSM6DSO , Adafruit LSM6DS or MPU6050 accordingly.)

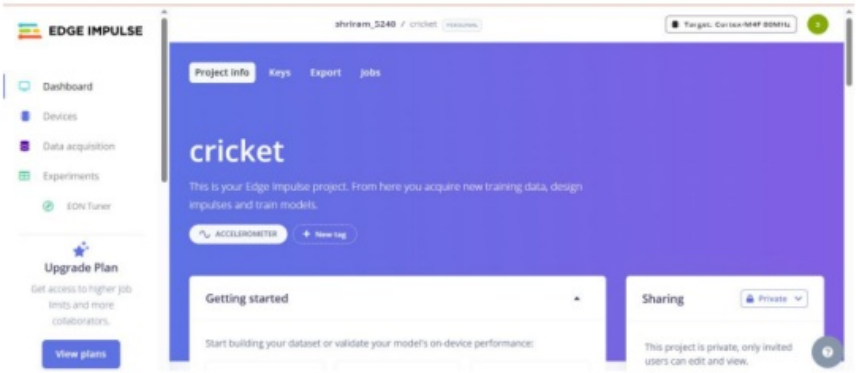
Step 5: Arduino Sketch for Data Collection

Upload this sketch to your Arduino UNO R4 WiFi. It streams accelerometer data in CSV format (x,y,z) at ~18 Hz for Edge Impulse.

```
#include <Wire.h>
#include <Adafruit_ADXL345_U.h>
Adafruit_ADXL345_Unified accel =
Adafruit_ADXL345_Unified(12345);
void setup() {
```

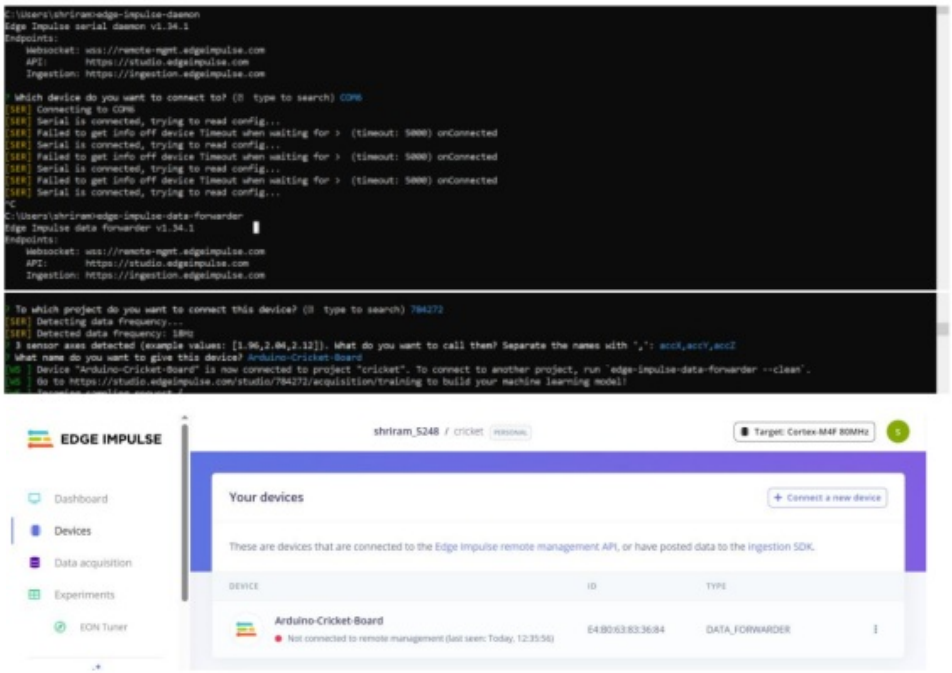
```
Serial.begin(115200);
if (!accel.begin()) {
Serial.println("No ADXL345 detected");
while (1);
}
accel.setRange(ADXL345_RANGE_4_G);
}
void loop() {
sensors_event_t e;
accel.getEvent(&e);
Serial.print (e.acceleration.x);
Serial.print(",");
Serial.print(e.acceleration.y);
Serial.print(",");
Serial.println(e.acceleration.z);delay(55); // ~18 Hz
}
```

Set Up Edge Impulse



Step 6: Connecting to Edge Impulse

1. Close Arduino Serial Monitor.
2. Run the command: edge-impulse-data-forwarder –frequency 18
3. Enter axis names: accX, accY, accZ
4. Name your device: Arduino-Cricket-Board
5. Confirm connection in Edge Impulse Studio under 'Devices'.



Step 7: Data Collection

In Edge Impulse Studio → Data acquisition:

– Device: Arduino-Cricket-Board

– Sensor: Accelerometer (3 axes)

– Sample length: 2000 ms (2 seconds)

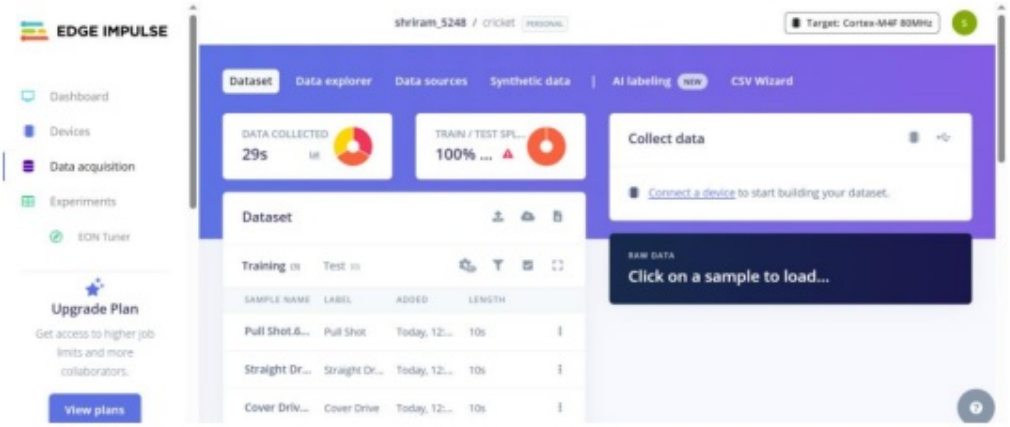
– Frequency: 18 Hz

Record at least 40 samples per class:

– Cover Drive

– Straight Drive

– Pull Shot



Collect Data Examples

Cover Drive

Device: Arduino-Cricket-Board

Label: Cover Drive

Sensor: Sensor with 3 axes (accX, accY, accZ)

Sample length: 10000ms

Frequency: 18 Hz

Example Raw Data:

accX -0.32

accY 9.61

accZ -0.12

Straight Drive

Device: Arduino-Cricket-Board

Label: Straight Drive

Sensor: Sensor with 3 axes (accX, accY, accZ)

Sample length: 10000ms

Frequency: 18 Hz

Example Raw Data:

accX 1.24

accY 8.93

accZ -0.42

Pull Shot

Device: Arduino-Cricket-Board

Label: Pull Shot

Sensor: Sensor with 3 axes (accX, accY, accZ)

Sample length:10000 ms

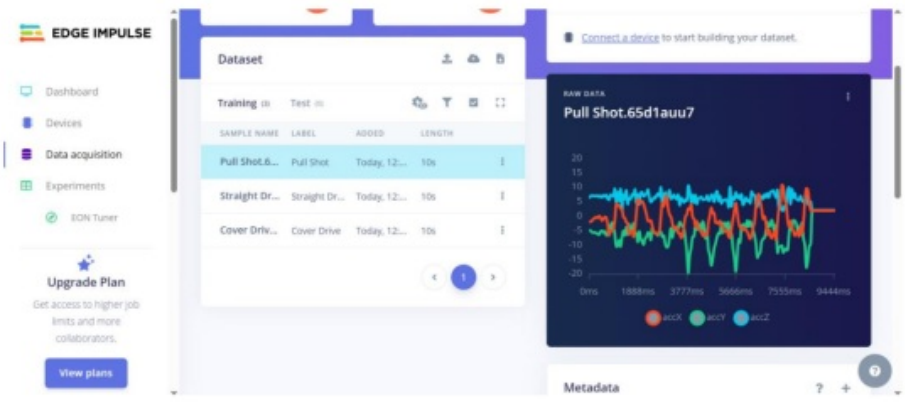
Frequency: 18 Hz

Example Raw Data:

accX 2.01

accY 7.84

accZ -0.63



Step 8: Impulse Design

Open Create impulse:

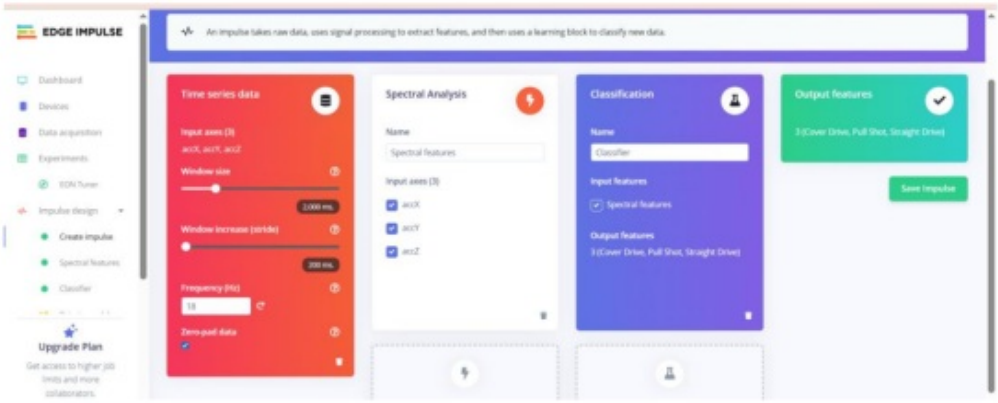
Input block: Time series data (3 axes).

Window size: 1000 ms Window increase (stride): 200 ms Enable: Axes, Magnitude (optional), frequency 18.

Processing block: Spectral analysis (a.k.a. Spectral Features for motion). Window size: 1000 ms Window increase (stride): 200 ms Enable: Axes, Magnitude (optional), keep all defaults first.

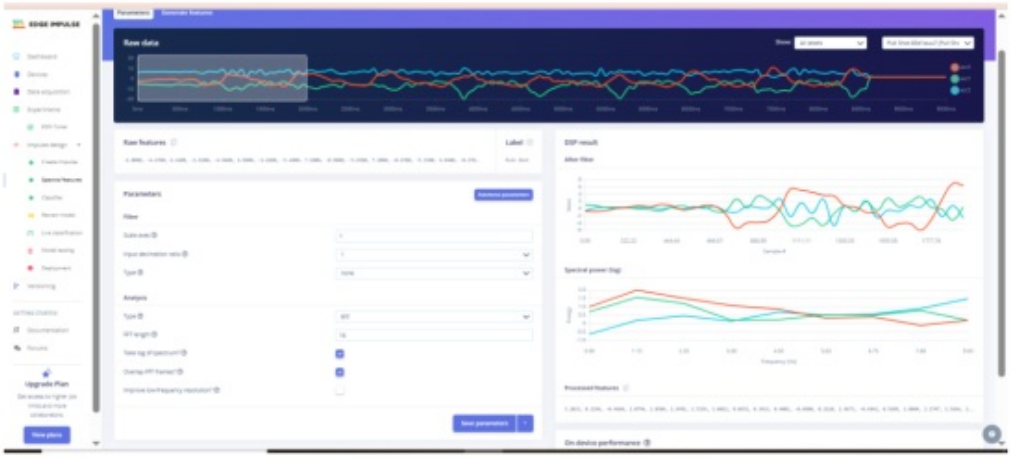
Learning block: Classification (Keras).

Click Save impulse.



Generate features:

Go to Spectral analysis, click Save parameters, then Generate features for the training set.



Train a small model

Go to Classifier (Keras) and use a compact config like:

Neural network: 1–2 dense layers (e.g., 60 → 30), ReLU

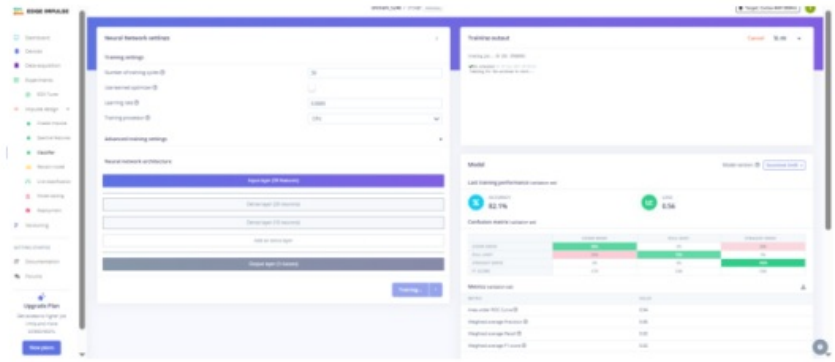
Epochs: 40–60

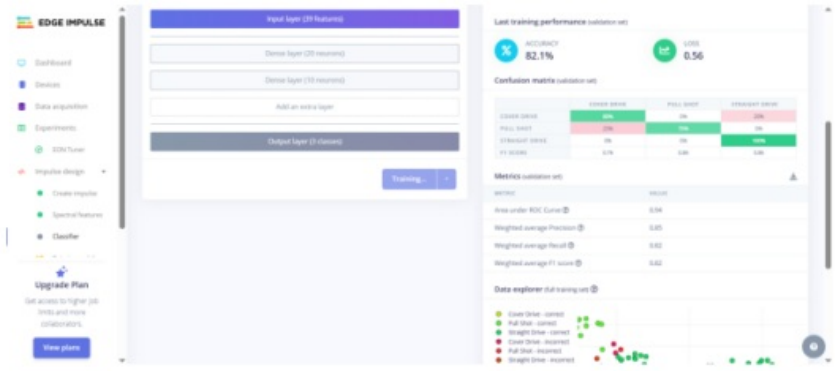
Learning rate: 0.001–0.005

Batch size: 32

Data split: 80/20 (train/test)

Save and train the data





Evaluate and Check Model testing with the holdout set.

Inspect the confusion matrix; if circle and up overlap, collect more diverse data or tweak

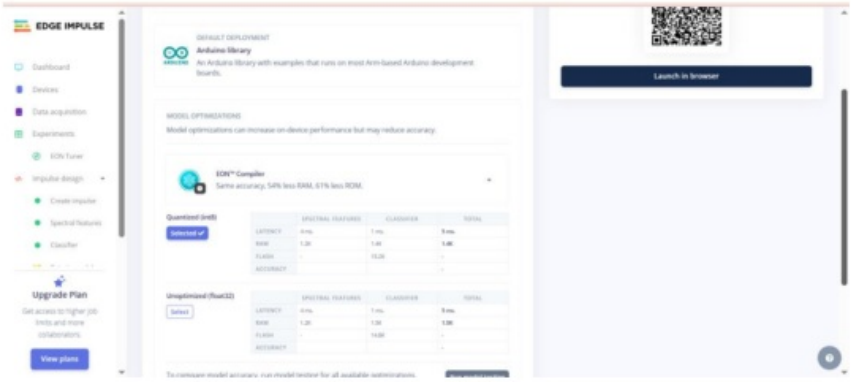
Spectral parameters (window size / noise floor).

Step 9: Deployment to Arduino

Go to Deployment:

Choose Arduino library (C++ library also works).

Enable EON Compiler (if available) to shrink the model size.



Download the .zip, then in Arduino IDE: Sketch → Include Library → Add .ZIP Library…

This adds examples like Static buffer and Continuous under File → Examples → Your Project Name – Edge Impulse. Inference sketch for Arduino UNO EK R4 WiFi + ADXL345.

Step 10: Arduino Inference Sketch

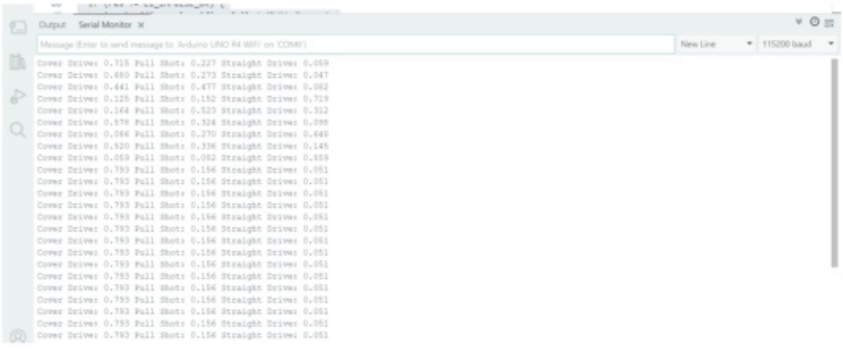
```
#include <Wire.h>
#include <Adafruit_ADXL345_Unified.h>
#include <your_project_inference.h> // Replace with Edge Impulse header
Adafruit_ADXL345_Unified accel =
Adafruit_ADXL345_Unified(12345);
static bool debug_nn = false;
void setup() {
Serial.begin(115200);
while (!Serial) {}
if (!accel.begin()) {
Serial.println("ERROR: ADXL345 not detected");
while (1);
}
accel.setRange(ADXL345_RANGE_4_G);
}
void loop() {
float buffer[EI_CLASSIFIER_DSP_INPUT_FRAME_SIZE] = {0};
for (size_t ix = 0; ix < EI_CLASSIFIER_DSP_INPUT_FRAME_SIZE; ix +=
3) {
uint64_t next_tick = micros() + (EI_CLASSIFIER_INTERVAL_MS *
1000);
sensors_event_t e;
accel.getEvent(&e);
buffer[ix + 0] = e.acceleration.x;
buffer[ix + 1] = e.acceleration.y;
buffer[ix + 2] = e.acceleration.z;
int32_t wait = (int32_t)(next_tick – micros());
if (wait > 0) delayMicroseconds(wait);
```

```
}
signal_t signal;
int err = numpy::signal_from_buffer(buffer,
EI_CLASSIFIER_DSP_INPUT_FRAME_SIZE, &signal);
if (err != 0) return;

ei_impulse_result_t result = {0};
EI_IMPULSE_ERROR res = run_classifier(&signal, &result,
debug_nn);
if (res != EI_IMPULSE_OK) return;

for (size_t ix = 0; ix < EI_CLASSIFIER_LABEL_COUNT; ix++) {
ei_printf("%s: %.3f ", result.classification[ix].label,
result.classification[ix].value);
}
#if EI_CLASSIFIER_HAS_ANOMALY == 1
ei_printf("anomaly: %.3f", result.anomaly);
#endif
ei_printf("\n");
}
```

Output example:



Tips:

Keep EI_CLASSIFIER_INTERVAL_MS in sync with your data forwarder frequency (e.g., 100 Hz → 10 ms). The Edge Impulse library sets this constant automatically from your impulse.

If you want continuous detection (sliding window), start from the Continuous example included with the EI library and swap in the ADXL345 reads.

We will be adding video tutorials soon; till then, stay tuned – https://www.youtube.com/@RobuInlabs

And If you still have some doubts, you can check out this video by Edged Impulse: https://www.youtube.com/watch?v=FseGCn-oBA0&t=468s

Documents / Resources

	Arduino ABX00087 UNO R4 WiFi Development Board [pdf] User Guide R4 WiFi, ADXL345, ABX00087 UNO R4 WiFi Development Board, ABX00087, UNO R4 WiFi Development Board, WiFi Development Board, Development Board, Board

References

- User Manual

ARDUINO

ABX00087, ABX00087 UNO R4 WiFi Development Board, ADXL345, ARDUINO, Board, Development Board, R4 WiFi, UNO R4 WiFi Development Board, WiFi Development Board

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