

Activity

Lesson Plan

Activity Name		Lesson Name	Lesson #
Accelerometer Data Logging & Motion Analysis		Micro:Bit Accelerometer Data Collection with Colab	3
Lesson Description:	In this lesson, students will learn how to connect two micro:bit V2 devices using radio communication to transmit and log accelerometer data. They will export the logged data as a text file and analyze it in Google Colab. Using Python and Jupyter notebooks, students will create plots, explore motion data patterns, and interpret results in terms of pitch, roll, and yaw. This activity demonstrates how IoT devices can be used for real-world motion tracking and data analysis.		
Lesson Objective(s):	The learner will configure and flash two micro:bits with a pre-built transmitter and logger programs, collect and export accelerometer data as a txt file, perform exploratory data analysis(EDA) using Python and visualizations in Colab, and interpret motion data to understand the relationship between acceleration and movement.		
Equipment & Supplies	<ul style="list-style-type: none"> • 2x micro:bit (V2 recommended) • 2 AAA batteries and a micro:bit battery holder • 1 USB-C Cable • Access to a computer with internet access and a running camera 		
Room Preparation & Materials Setup	The stations for the attendees need to include a computer for each with 2 micro:bits, a USB-C Cable(not type-C), and battery for the transmitter micro:bit. The instructor will need a large screen connected to their computer to demonstrate flashing, logging, and data analysis steps.		

Instructional Steps	Facilitation Tips:
<ol style="list-style-type: none"> 1. Introduce the repository: <ul style="list-style-type: none"> Show the GitHub repo on your screen(Introduction-to-Electronics-on-microbit/4-Microbit-Accelerator_Data-Analysis/Microbit_Setup at main · WestHoustonInstitute/Introduction-to-Electronics-on-microbit). Confirm all attendees navigate to: 4-Microbit_Accelerometer_Data_Analysis/Accelerometer_Data-Analysis/Microbit_Setup 2. Software Setup: <ul style="list-style-type: none"> Download and flash the prepared transmitter and logger hex files to your micro:bit using Microsoft MakeCode for micro:bit(Import the .hex file to your workspace, open one page for transmitter and one for the logger). Walk students through flashing the .hex to the micro:bit via USB. 3. Hardware_Setup: <ul style="list-style-type: none"> After the flashing phase, one micro:bit now is the logger and the other is transmitter. Unplug USB cable from the transmitter and plug the battery to it. Logger will be connected via USB to your computer. After plugging the USB Cable, open the logger micro:bit program, and click on “Show Data Device” button to see the movement changes in the x,y, and z dimensions. Move/accelerate the transmitter micro:bit and confirm the logger receives motion data. 4. Data Logging & Export: <ul style="list-style-type: none"> After running the experiment click “Save raw text” in the MakeCode data logger screen. Export the text file (eg. microbit-console-2024-10-15T20-25-42-764Z.txt) Walk around to ensure all participants downloaded the data successfully. 5. Data Analysis & ML in Colab: <ul style="list-style-type: none"> Download the analysis notebook from 4-Microbit-Accelerator_Data-Analysis/Accelerometer_Data-Analysis Upload the notebook to Colab and follow the steps to upload the txt file. After that, “Run All” and interpret the results. Check everybody’s results. 	<p>The best setting to do this module activity is a “computer lab” where each participant has their own computer and the instructor also has a computer connected to a large screen that every participant can follow comfortably. The best way to track the success of the participant is to go and see their screen after each instruction step if it is doable (the number of attendees matter in this).</p>

Lesson Reflections	Future Actions