Interfacing Sensors With Raspberry Pi Zero 2 W

Installation of Sensor Libraries (Python) in Raspberry Pi Zero 2 W

01/08/2026

Estimated Time to Complete : 2 hrs

Objectives

Upon completion of this tutorial, you will be able to:

- **Know about different types of sensors**
- **Ways to connect sensors with the Raspberry Pi Zero 2 W**
- **Install required libraries and software to communicate with the sensors**
- **Explore the basic examples to collect and observe the sensor data**

Materials & Prerequisites

- **Materials/Equipment:**
  - Raspberry Pi Zero 2 W with Raspbian OS (32 bit Bookworm with headless setup)
  - Sensors (AHT20, BMI160, MPU6050, APDS9960, VL53L0XV2)
  - Jumper wires
- **Prerequisite Knowledge/Skills:**
  - Basic Linux Commands
  - Basic Python programming knowledge preferred

Procedure: Step-by-Step Instructions

- Step 1: Create a directory first. This directory will contain the sensor libraries and a virtual environment for Python
- Step 2: Create a virtual environment for Python and activate it
- Step 3: Install Git. It will be used to clone sensor library repositories with example code
- Step 4: Install the libraries for the sensor libraries
- Step 5: Connect the sensors with the RPi Zero 2 W with the jumper wires.
- Step 6: Explore the example codes with the sensor library to verify if the library and the sensor are working correctly.
- Step 7: Observe the sensor data

***** *for performing the above steps, students will be supplied with a separate file containing all the required commands and other information.*

Data Collection/Visualization

- Expected outcome
    - Connect AHT 20 and observe the room temperature and humidity in the terminal
    - Connect BMI 160, make some movement and observe the acceleration and rotation in the three axes
    - Connect MPU6050, make some movement and observe the acceleration and rotation in the three axes
    - Connect VL53L0XV2, put an obstacle in front of the sensor and observe the distance from the obstacle.
    - Connect APDS9960 and test its different functionalities like RGB color and proximity detection.

Results

- Students get to know about I2C bus and connect and communicate the sensors with RPi
- Students can install required software for the sensors
- Students can perform basic tests about the functionality of the sensors and collect basic data.

Summary & Inference

In this lab the students get hands-on experience on how to connect different sensors to the RPi Zero 2 W. Use different Python libraries to communicate with the sensors and collect data. Later, they can perform advanced processing on this data using machine learning and other techniques.