Arduino for Data Acquisition

KDoM Lab (2023)

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Date: 24/02/23

Arduino for Data Acquisition

Arduino is open-source microcontroller hardware and software that can be used for various applications that need to interact with the environment using various type of sensors and actuators. However, this document only covers reading an analog sensor and storing the data for further analysis.

In the context of the KDoM lab, voltage from various sensors needs to be measured. Arduino will be used to measure the voltage at a fast enough sampling rate. This document covers the installation procedure and method to capture the measured data to PC/laptop.

Arduinos are capable of communicating with different sensors and/or actuators via various protocols like SPI, i2c, UART, CAN, etc. To interface any sensor with Arduino, various circuit modules can be used. The main strength of the Arduino is its open-source community. Following are some of the sensing applications for the Arduino (hyperlinked):

- Acceleration measurement,
- Angular rate measurement,
- Temperature/humidity measurement,
- Displacement measurement,
- High precision voltage measurement,
- Light Sensing,
- Proximity sensing,
- Strain measurement,
- Shaft rotation measurement,
- Magnetic field testing
- Pressure sensing
- Load sensor

Technical specification: https://docs.arduino.cc/hardware/uno-rev3

Resources for further reading: https://www.halvorsen.blog/documents/technology/iot/arduino.php

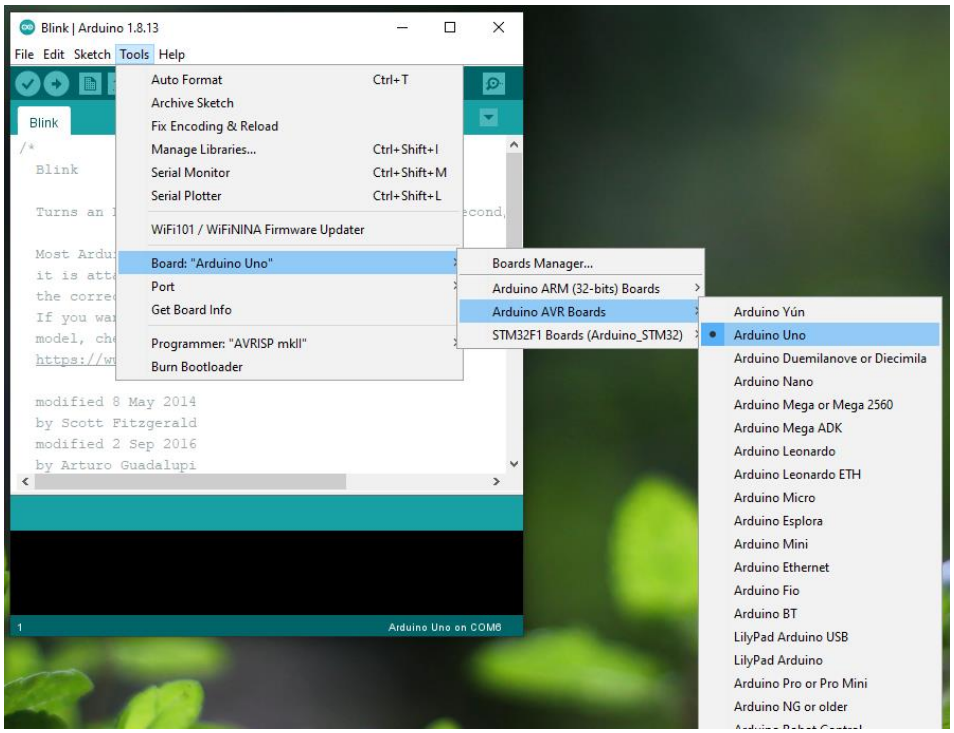
Installation

- The software can be downloaded on the following link:
  https://www.arduino.cc/en/software

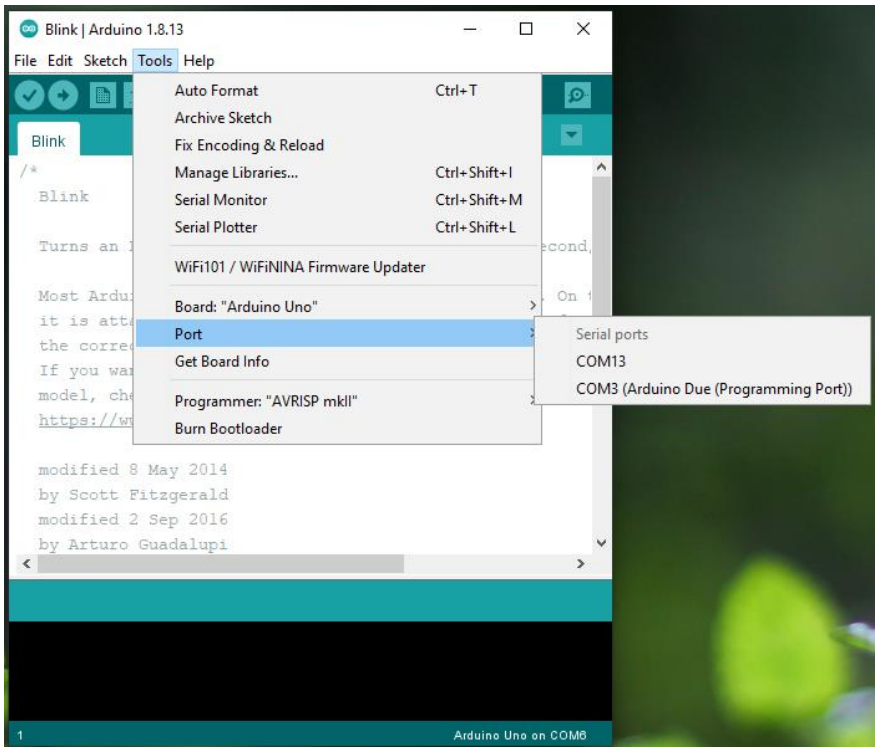
- The complete procedure for installation can be found on the following links:
  https://docs.arduino.cc/software/ide-v1/tutorials/Windowsm

Configuration

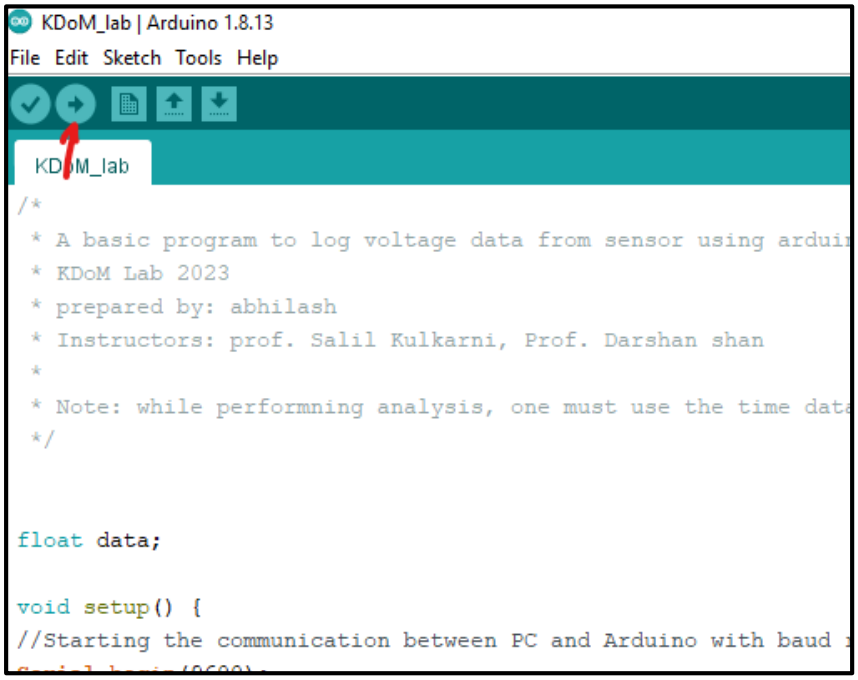
Choose Arduino Uno board from Tools>Boards> Arduino AVR Boards>Arduino Uno.



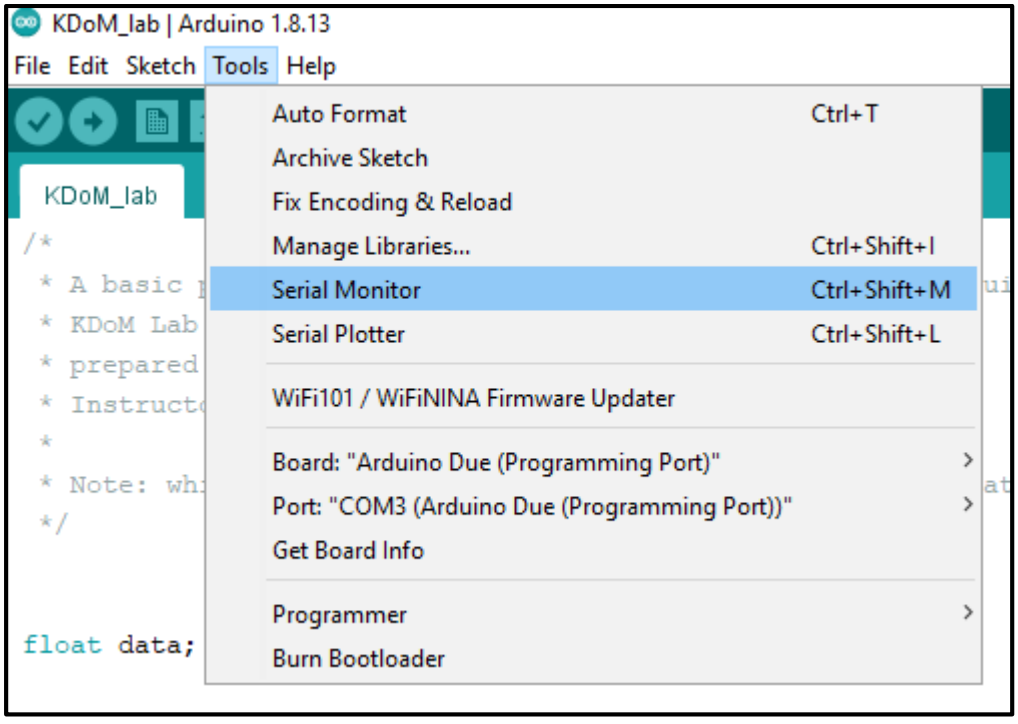
Choose the right port from the list. In the below case, Arduino Due board is connected to port 3. You should see “Arduino UNO” in one of the port.



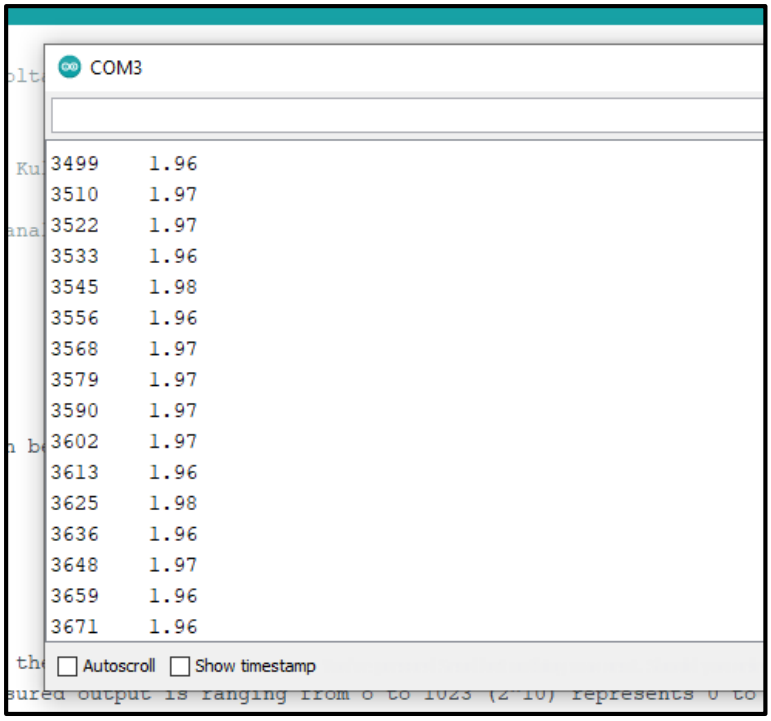
Uploading Program for data acquisition using the marked button.



Once the program is uploaded, one can either see the values or plots in real-time using the “Serial Monitor” and “Serial Plotter” buttons.



The data output from the Arduino looks like the following screenshot.

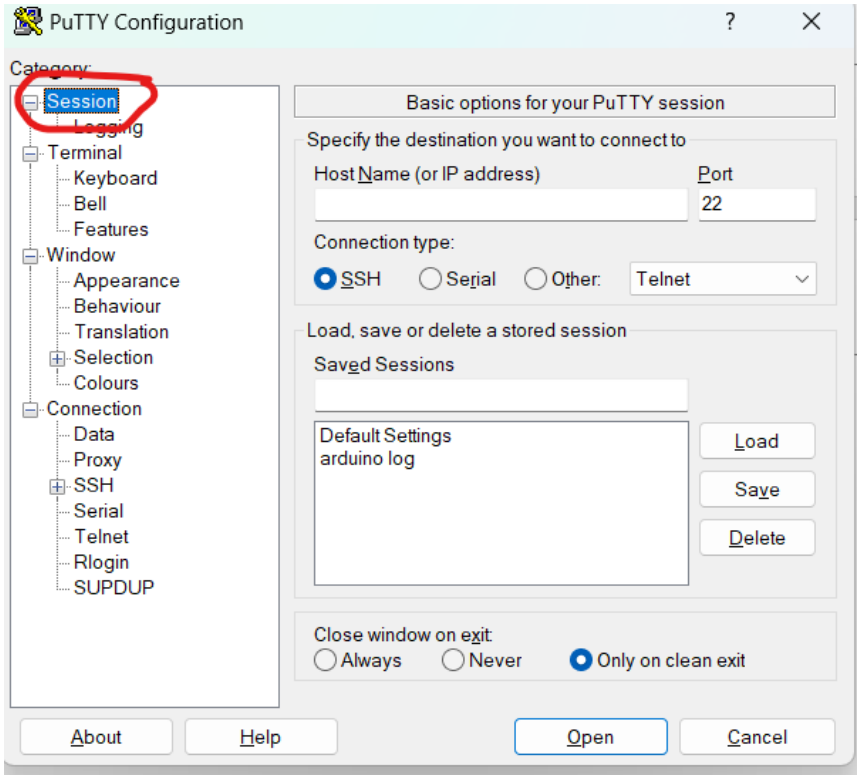


Data acquisition and storage

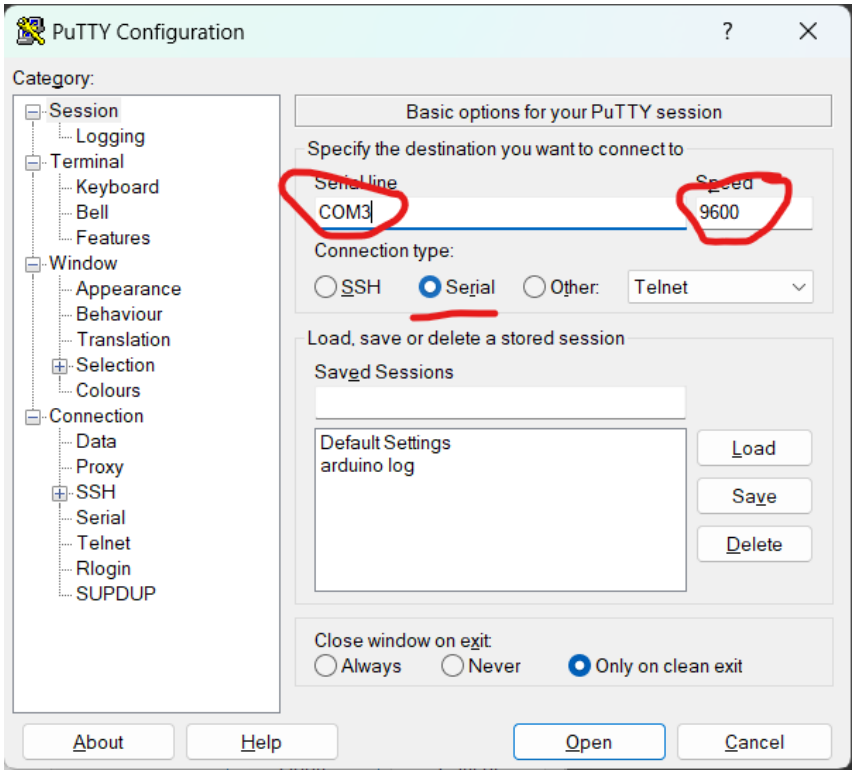
To record the data, one can simply copy the complete data from the serial monitor and paste it into a spreadsheet or text document (ensure auto-scroll is unchecked before this operation).

A better way for automated data storage is to use software, such as putty (https://www.putty.org/)

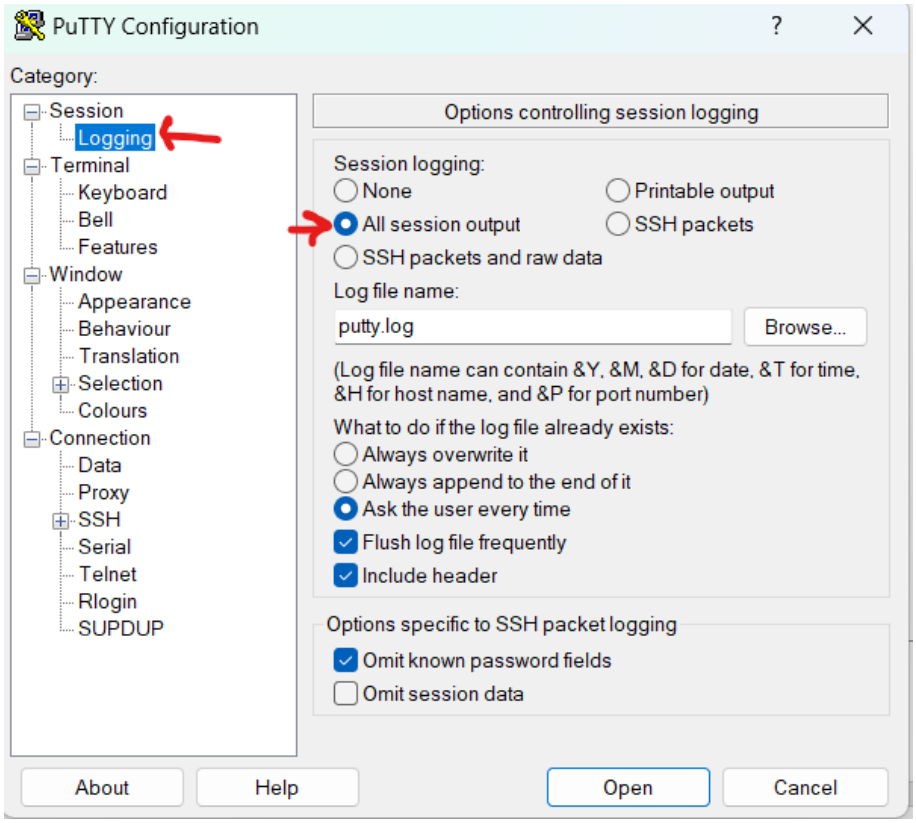
Go to session settings



Set the “Serial” followed by right com value (refer the Com port shown in Arduino IDE software) and baud rate.



Go to logging and select “all session output”.



Press “Open” you will be able to see the data in terminal. The same data is also recorded as log file in the specified location.