

University of Northern Iowa

UNI ScholarWorks

---

Summer Undergraduate Research Program  
(SURP) Symposium

2023 Summer Undergraduate Research  
Program (SURP) Symposium

---

Jul 28th, 11:00 AM - 1:30 PM

## Integrating External Sensors with CrazyFlie Drones

Xiaowen Wang

*University of Northern Iowa*

Dheryta Jaisinghani

*University of Northern Iowa*

*See next page for additional authors*

*Let us know how access to this document benefits you*

Copyright ©2023 Xiaowen Wang, Dr. Dheryta Jaisinghani, and Dr. Andrew Berns

Follow this and additional works at: <https://scholarworks.uni.edu/surp>

---

### Recommended Citation

Wang, Xiaowen; Jaisinghani, Dheryta; and Berns, Andrew, "Integrating External Sensors with CrazyFlie Drones" (2023). *Summer Undergraduate Research Program (SURP) Symposium*. 11.

<https://scholarworks.uni.edu/surp/2023/all/11>

This Open Access Poster Presentation is brought to you for free and open access by the CHAS Conferences/Events at UNI ScholarWorks. It has been accepted for inclusion in Summer Undergraduate Research Program (SURP) Symposium by an authorized administrator of UNI ScholarWorks. For more information, please contact [scholarworks@uni.edu](mailto:scholarworks@uni.edu).

**Offensive Materials Statement:** Materials located in UNI ScholarWorks come from a broad range of sources and time periods. Some of these materials may contain offensive stereotypes, ideas, visuals, or language.

---

**Author**

Xiaowen Wang, Dheryta Jaisinghani, and Andrew Berns

# Integrating External Sensors with CrazyFlie Drones

Xiaowen Wang • Dr. Dheryta Jaisinghani • Dr. Andrew Berns

wangxay@uni.edu@uni.edu • dheryta.jaisinghani@uni.edu • andrew.berns@uni.edu

## Background & Motivation

- Drones are widely used: Mini drones such as Crazyflie 2.1 are used in a variety of fields.
- Grove Sound Sensor function: Grove Sound Sensor can capture sound, providing more application possibilities for drones.
- The potential of Crazyflie 2.1: Although Crazyflie 2.1 has the potential to be an integrated sensor platform, prior to this project, it was uncertain whether sensors could be connected on it.
- Project motivation: Our project aims to explore whether Crazyflie 2.1 can be connected to the Grove Sound Sensor and collect and process data from the sensor.
- Impact of the project: If successful, this project will open a new chapter in drone sensor integration and open up a wider range of possibilities for Crazyflie 2.1 applications.

## Problem Statement

- Determine the best programming language or software tool for programming Crazyflie 2.1 and Grove Sound Sensor.
- Additional code may affect the normal operation of Crazyflie 2.1. We need to make sure the code doesn't degrade the drone's performance or interfere with its other important functions.
- We also need to determine a safe and efficient way to transfer modified code to Crazyflie 2.1. This may involve wireless communication, programming interface selection, and transport protocol considerations.
- If crazyflie successfully reads this sensor's data, what form will be transmitted and displayed to the computer?

## Work Done

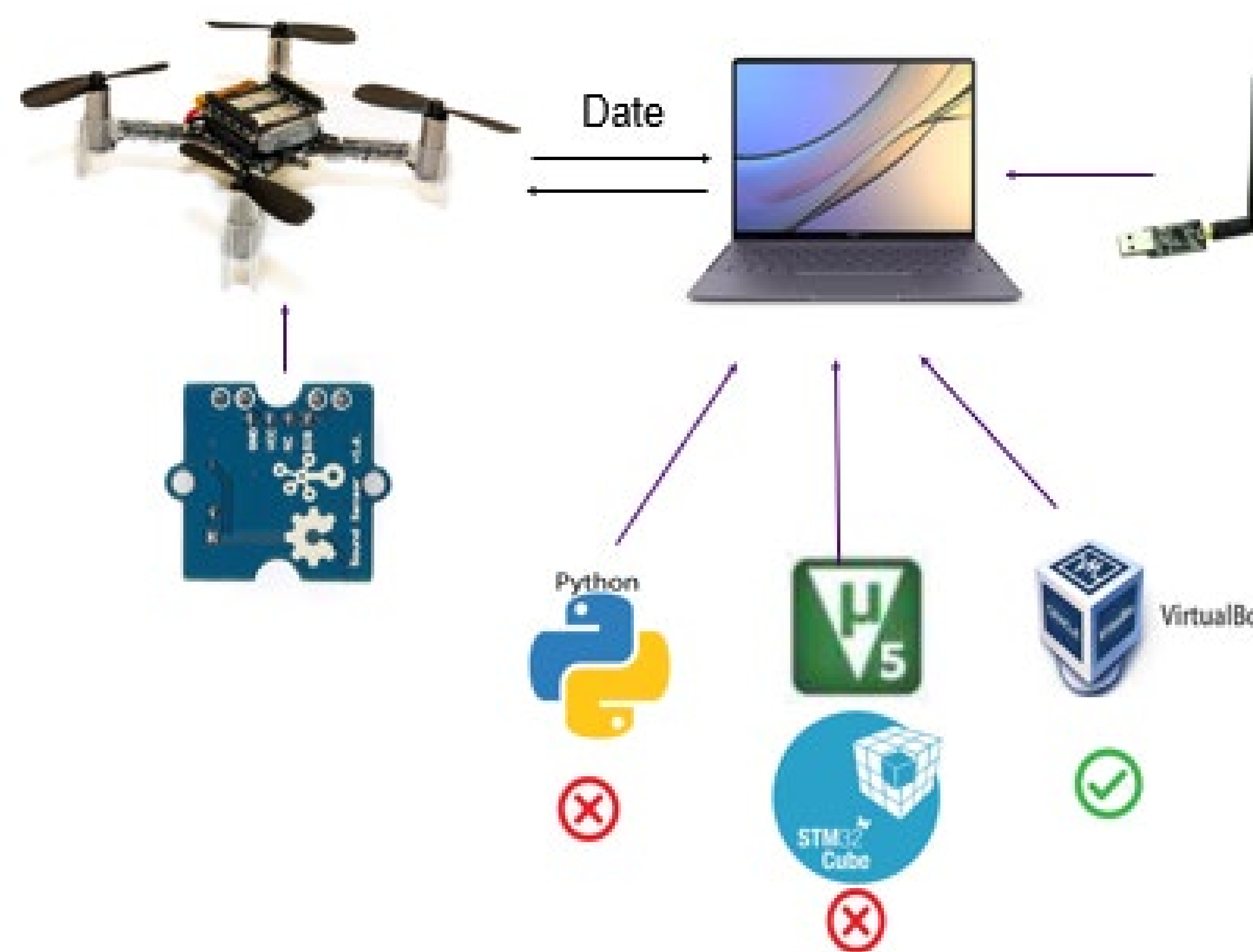


Fig 1: Software Used

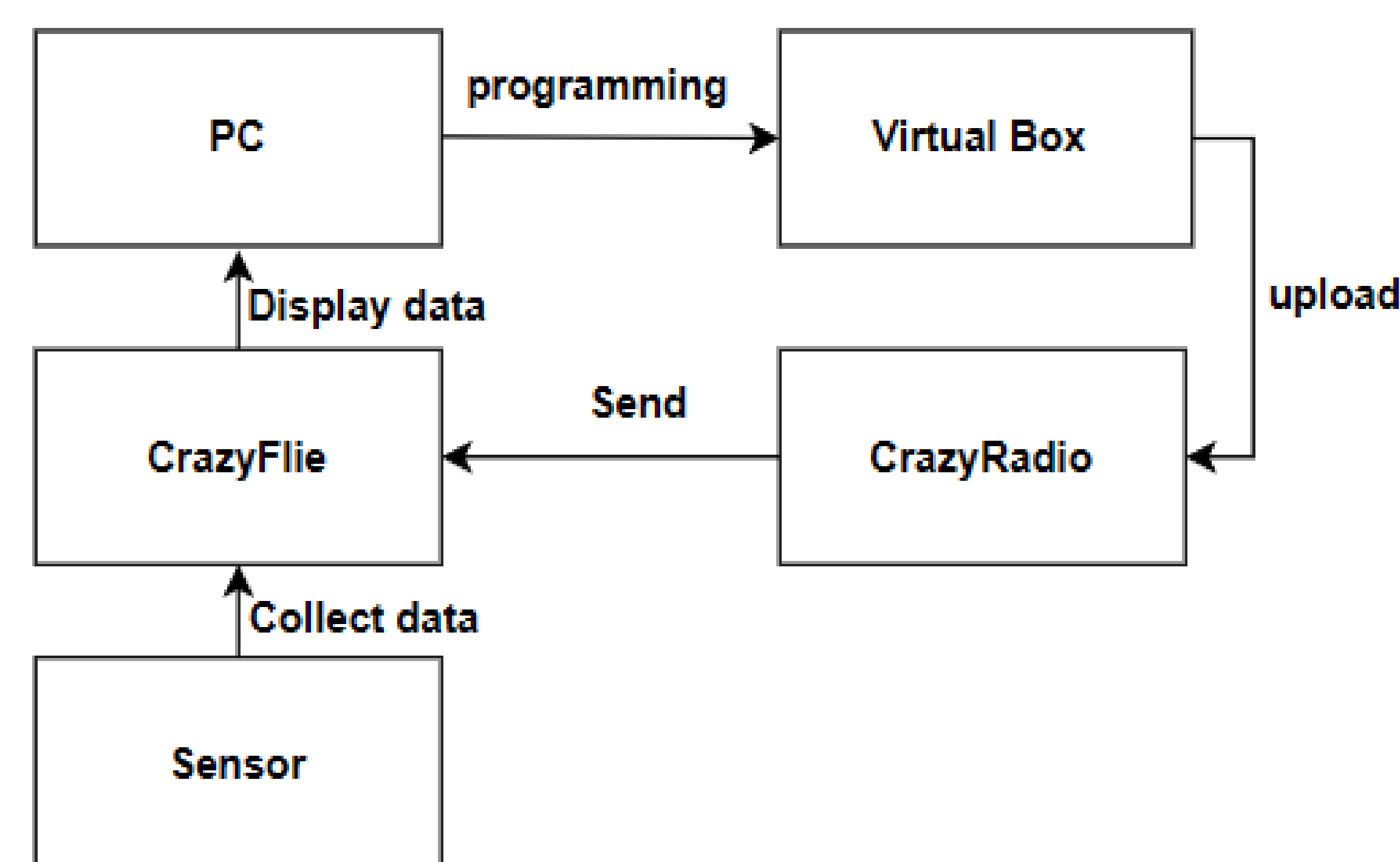


Fig 2: Flowchart

- Python: I found it impossible to upload edited code to a Crazyflie 2.1 drone via Crazyradio.
- Keil uVision5 and STM32Cube MX: Lack a data upload interface, and Crazyflie's USB interface cannot be used for data transfer.
- Virtual Box: Final success. After modifying a given code, it can be uploaded to Crazyflie via Crazyradio.

## Results

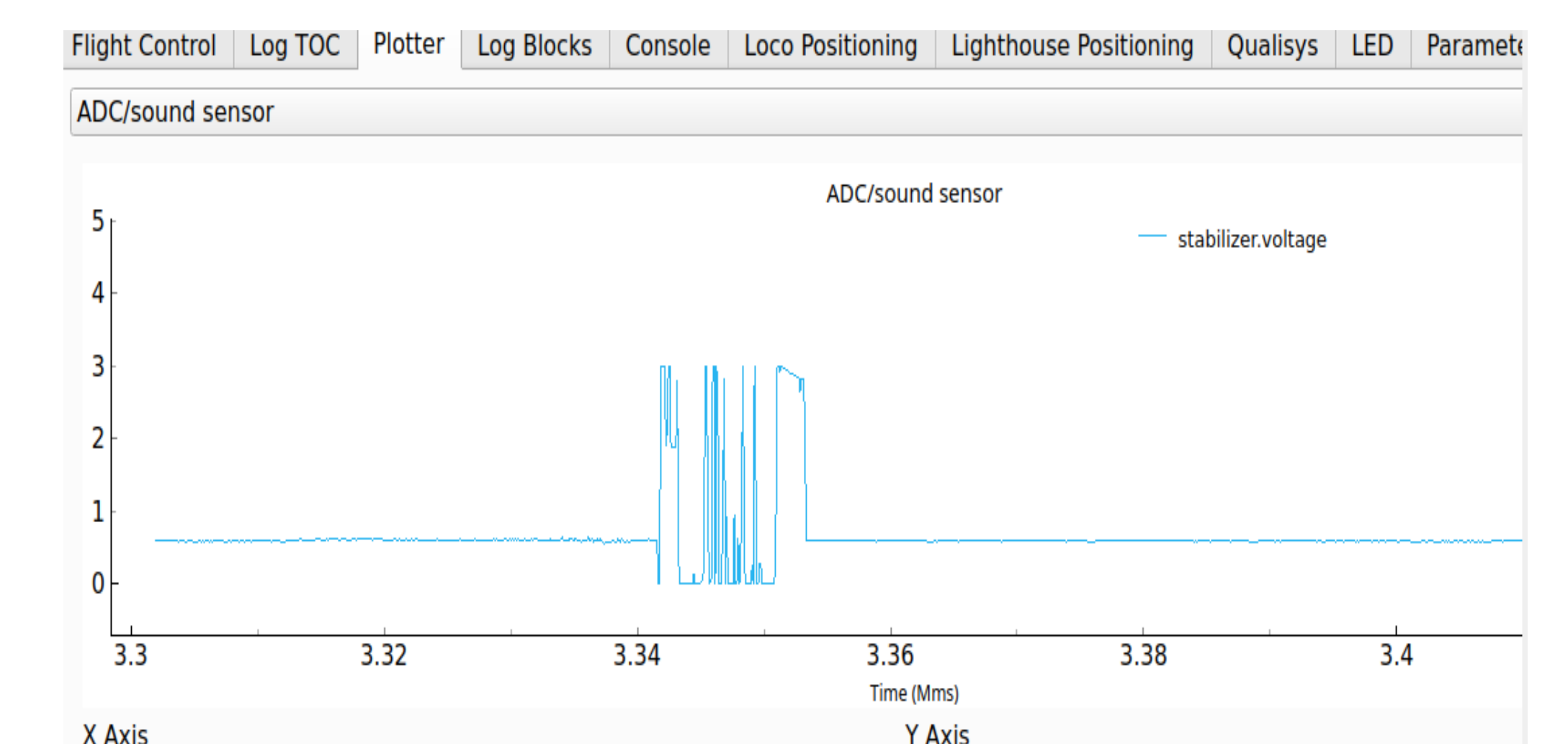


Fig.3 Data from virtual box

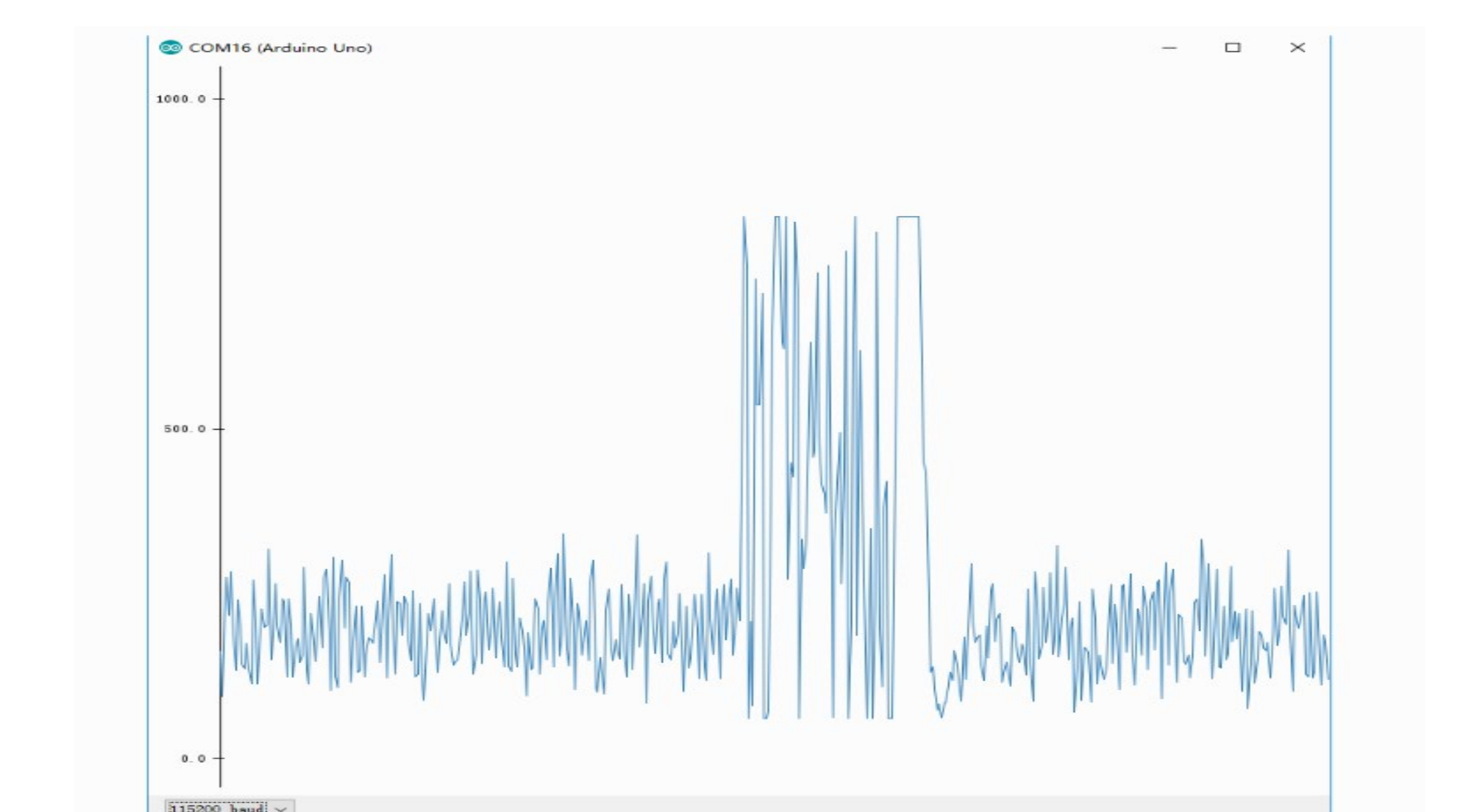


Fig.4 Data from Arduino

## Conclusion

After trial and comparison, it was found that Virtual Box successfully connected Grove Sound Sensor to Crazyflie 2.1 and was able to display data through the display board of the client. The curve on the display board clearly reflects the change of sound, which is consistent with the data obtained through Arduino. This result proves that Crazyflie 2.1 can indeed connect and read Grove Sound Sensor data efficiently, confirming our initial assumptions and providing valuable information for further research and development.