Fabrication and Prototyping in the LearningLab

Midterm Presentation

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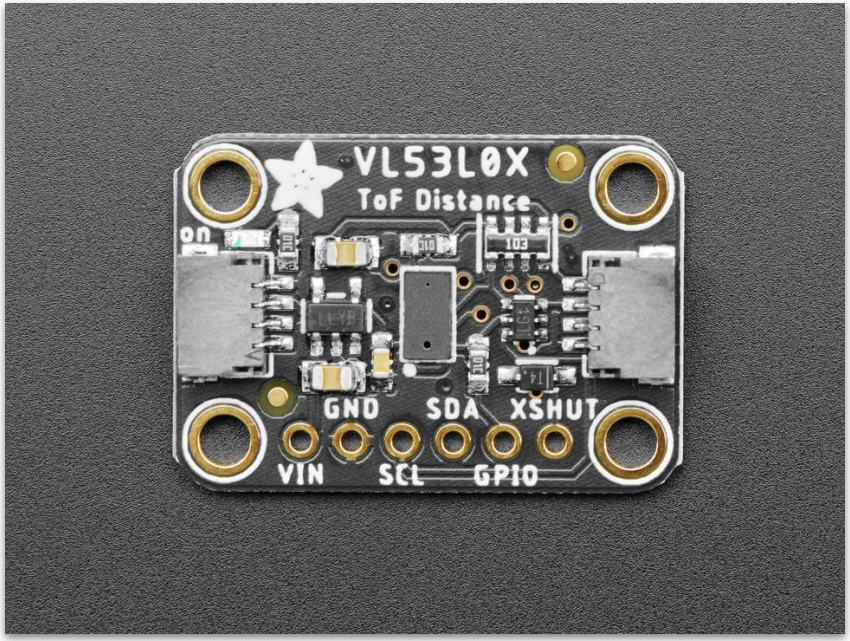
Motion detection

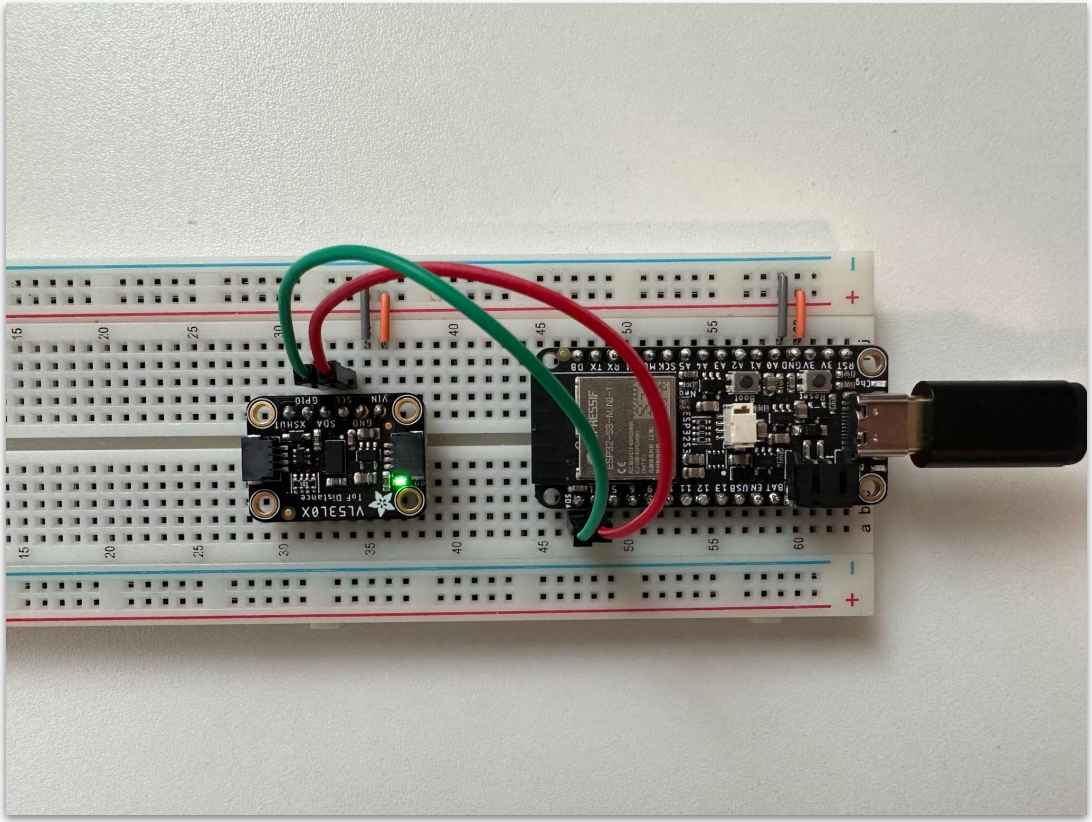
- detect when a person enters/leaves the door
- store data and generate statistics

Time of Flight Distance Sensor

- Adafruit VL53L0X
- 4 Pins needed:
  - Power
  - Ground
  - SDA + SCL



Time of Flight Distance Sensor



Time of Flight Distance Sensor- Adafruit_VL53L0X

- it works rarely and in mysterious ways
- *“Bottom line is: Everyone working with a VL53L0X said not to bother with it but get a VL53L1X instead…”* (source)

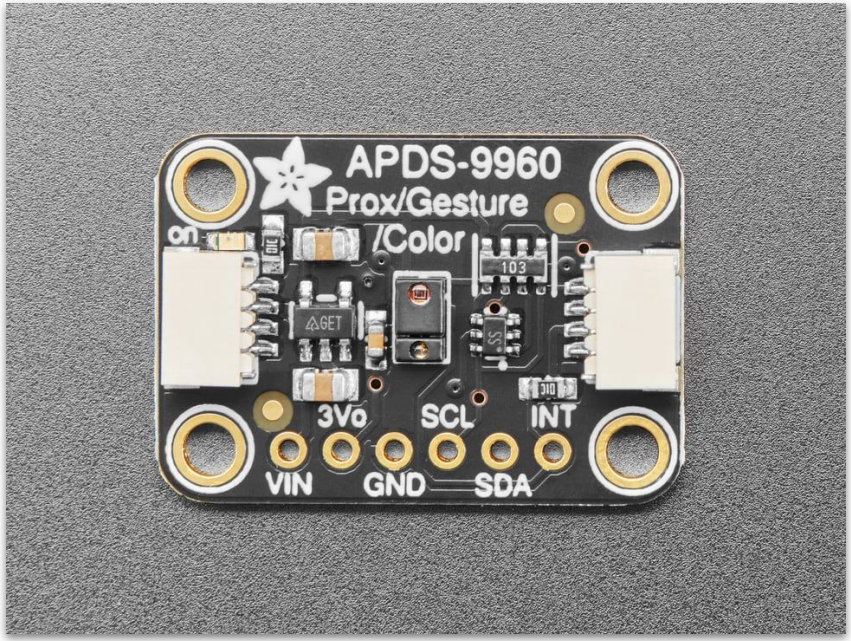
```
/* NVM value invalid */
if ((ApertureSpads > 1) || ((ApertureSpads == 1) && (count > 32)) || ((ApertureSpads == 0) && (count
    status_ST |= VL53L0X_perform_ref_spad_management(Dev, &refSpadCount,    &isApertureSpads);
else
    //status_ST |= VL53L0X_set_reference_spads(Dev, count, ApertureSpads);
```

Time of Flight Distance Sensor - Pololu’s VL53L0X

- fails to initialize less often
- gets stuck while reading data
- measurements are questionable

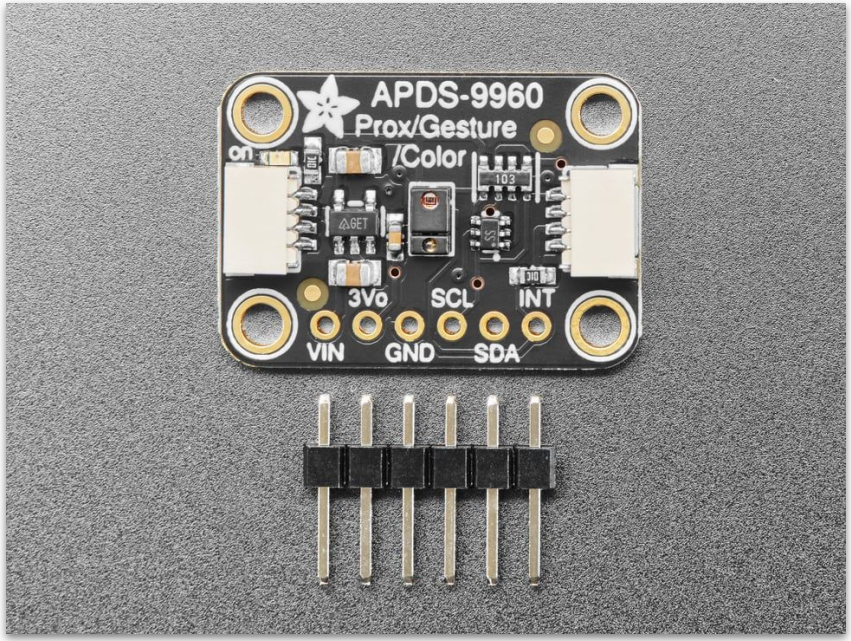
Proximity, Light, RGB, and Gesture Sensor

- Adafruit APDS-9960
- 4 Pins needed:
  - Power
  - Ground
  - SDA + SCL

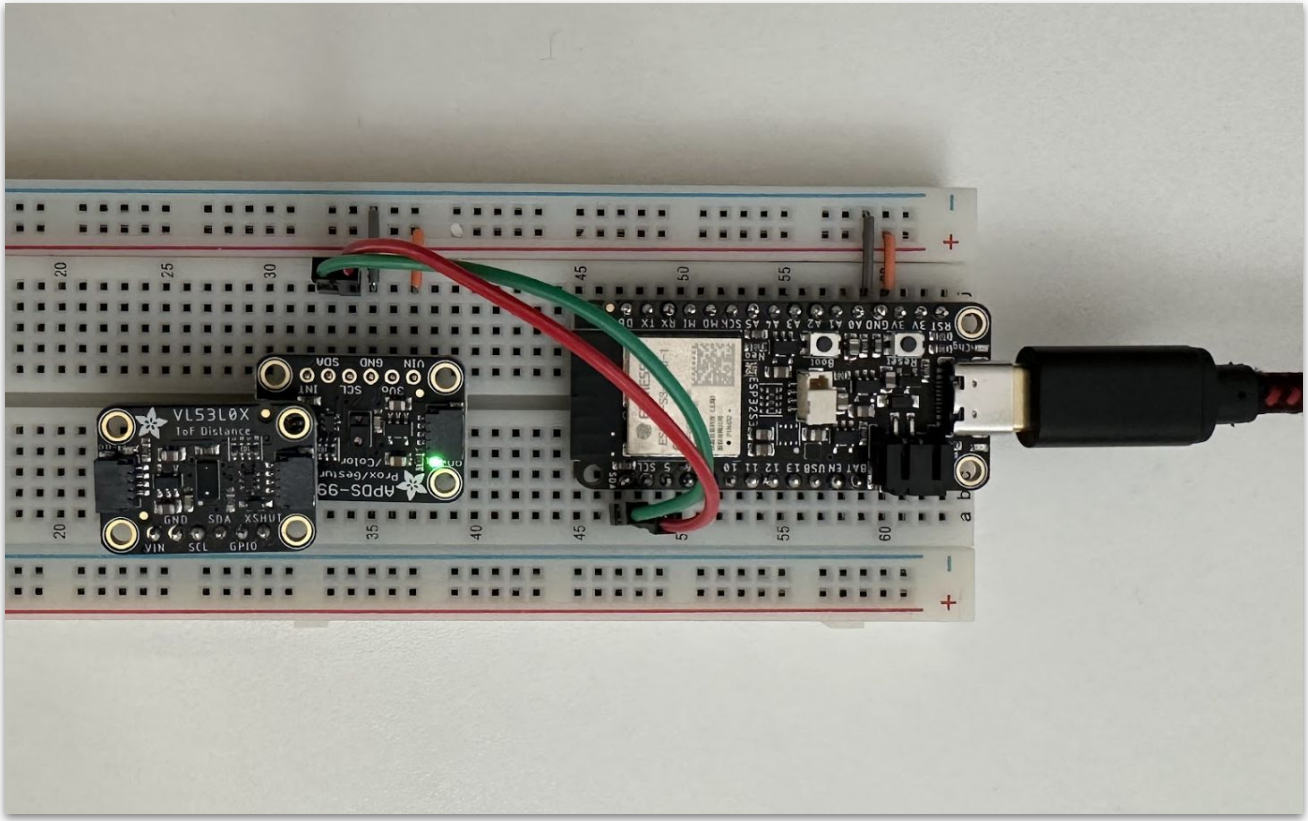


Proximity, Light, RGB, and Gesture Sensor

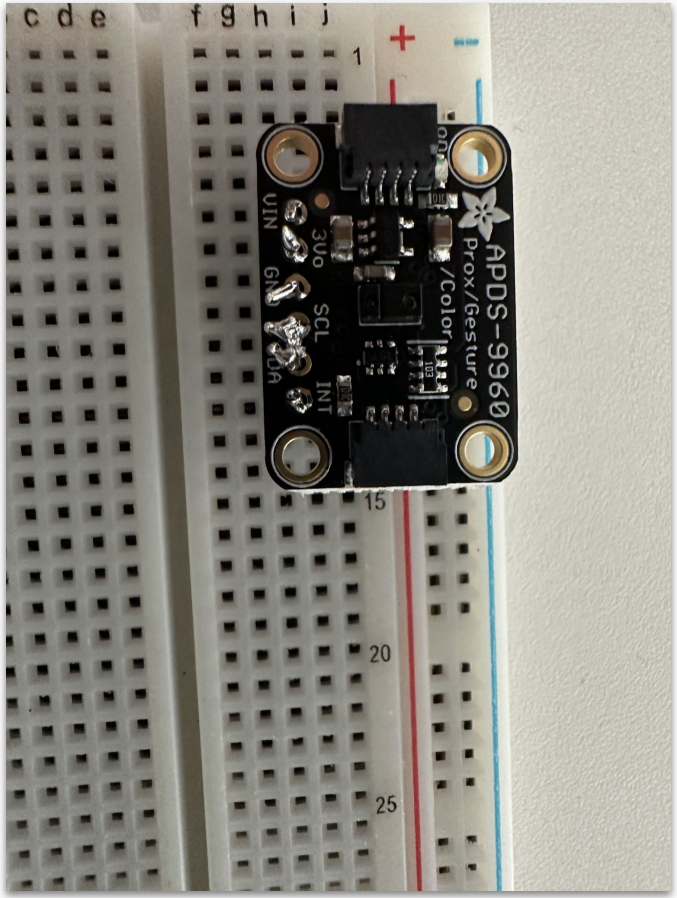
- new sensor
- needs soldering

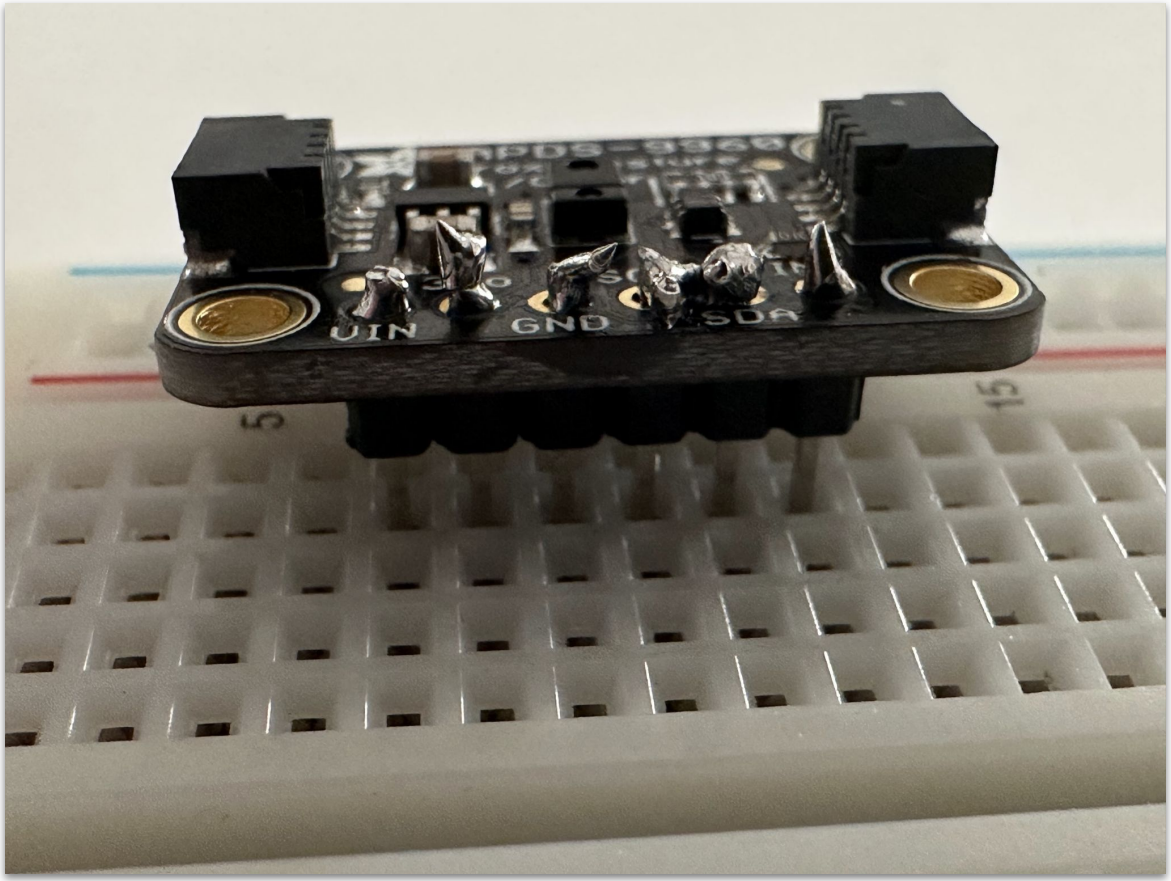


Proximity, Light, RGB, and Gesture Sensor - before soldering



Proximity, Light, RGB, and Gesture Sensor - 2 YouTube tutorials and 30 mins later





Proximity, Light, RGB, and Gesture Sensor - Adafruit_APDS9960

- no issues with the library
- proximity sensor is not exactly what I wanted
  - range is really small (a few cm only)
  - values from 0 to 255
- gesture sensor might be helpful
  - left vs right: person in entering or leaving

Fallback: Arduino Uno

- Issue: no wifi
- No way to access the data

Raspberry Pi - OS issues

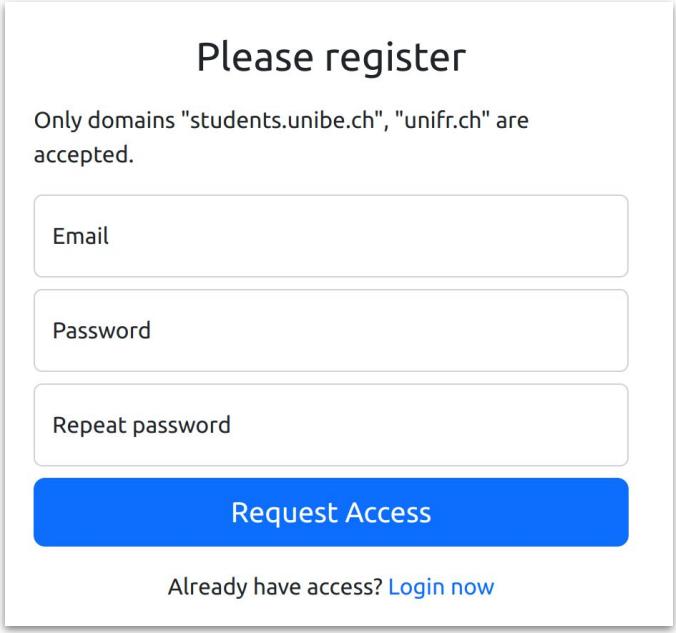
- failed to reinstall from my personal laptop (running Ubuntu)
- worked (with the same OS version and settings) from a Windows machine

Web Server on Raspberry PI

- Flask
- Flask-Login + SQLite for user session management
- Manage access

Web Server on Raspberry PI

- Page accessible for everyone in the network to request access
- Allowlisted domain names
  - students.unibe.ch
  - unifr.ch



Grafana

- No ARMv6 Docker image
- Running as service
- Requires users to be signed in

Thank you!