



Surrounding Environment Scanner

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Background

3D scanning has increasingly become an area of interest and has been found useful in many fields such as: architecture, agriculture, medicine, and security. Aside from commercial and industrial uses, 3D scanning has also gained popularity for personal uses in the rise of 3D printing and 3D modeling. As the demand for 3D scanners grow, the need for these systems to be more cost efficient and accurate also grows.

Project Goal

Our project goal is to create a portable device that will scan a wide area for its terrain geometry. This information will be stored and pieced together to make a file formatted to be displayed 3D computer model of the area scanned. This file will then be uploaded to our web-based application where it can be displayed as a 3D computer model.

Milestones

Distance/Angle Detection and point data acquisition/storage



Data processing - conversion of point data into the XYZ file format



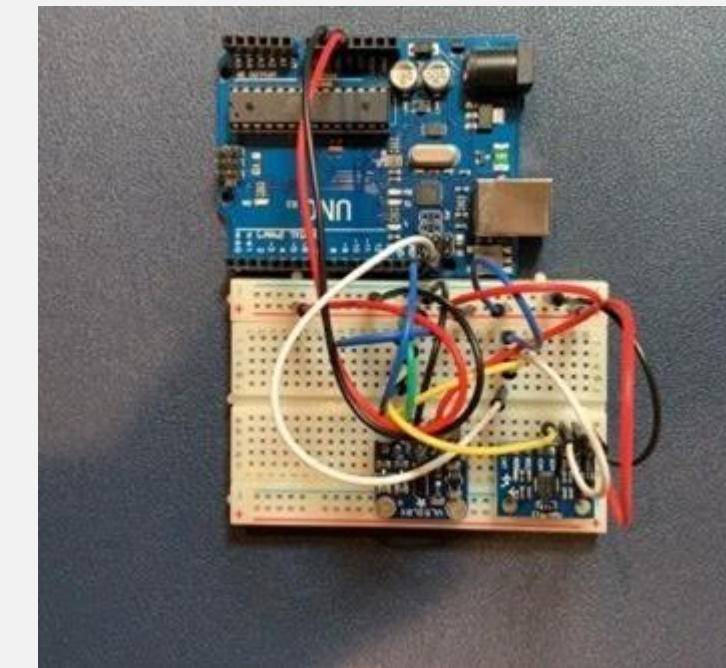
Data processing with added in motion detection to implement 3D modeling



Web based app to show scanning / processing in real time

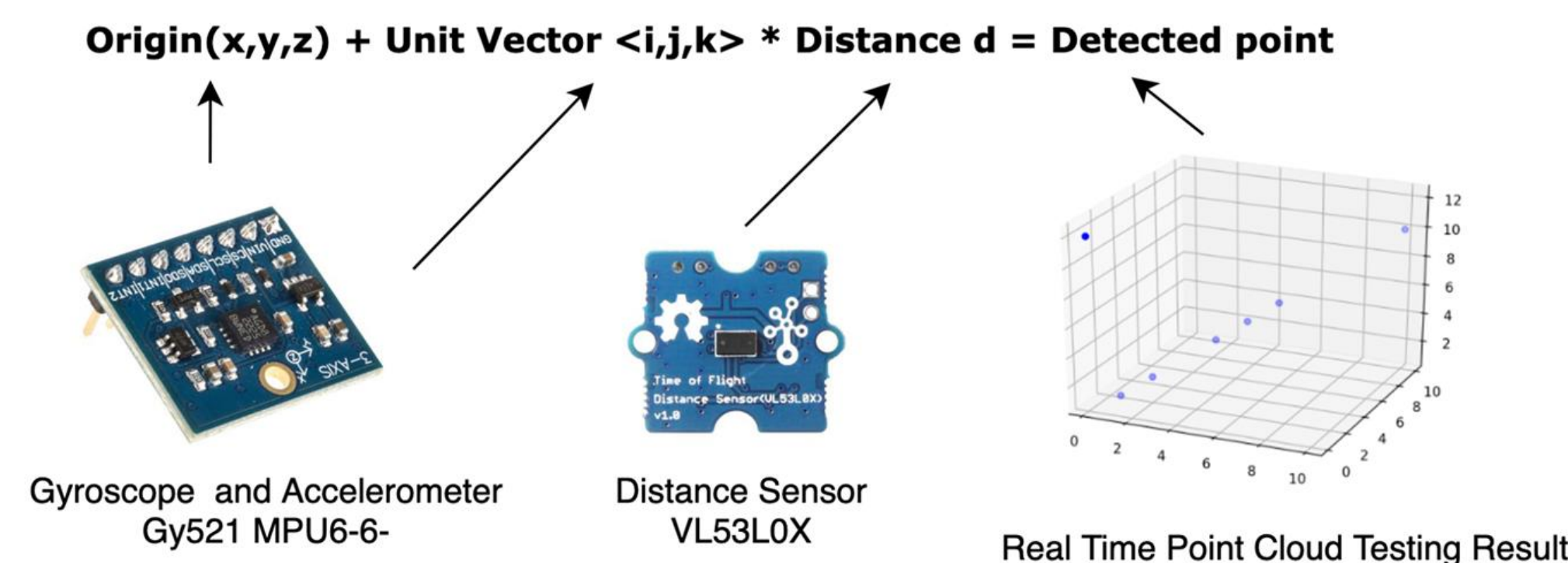
Materials

- Arduino Uno/Raspberry Pi 4
- Adafruit VL53L0X (Distance Sensor)
- Stepper Motors (small and medium)
- Breadboard
- Jumper Cables
- Portable Battery
- Gy-521 MPU-6050 (Accelerometer)

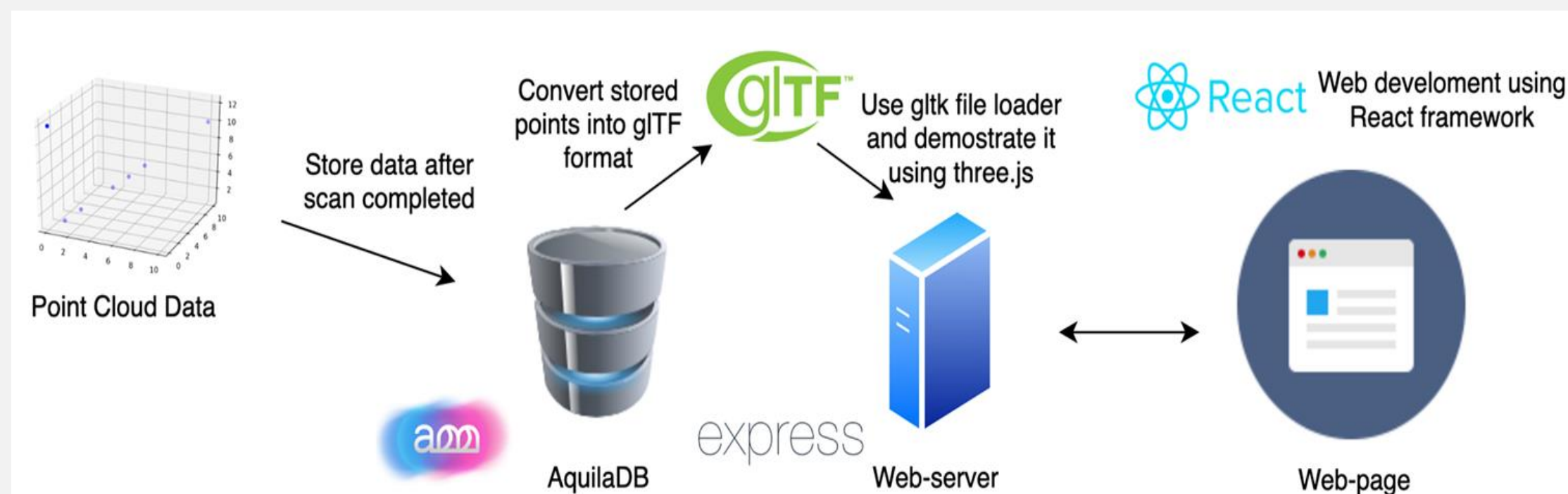


System Architecture

Hardware:



Software:



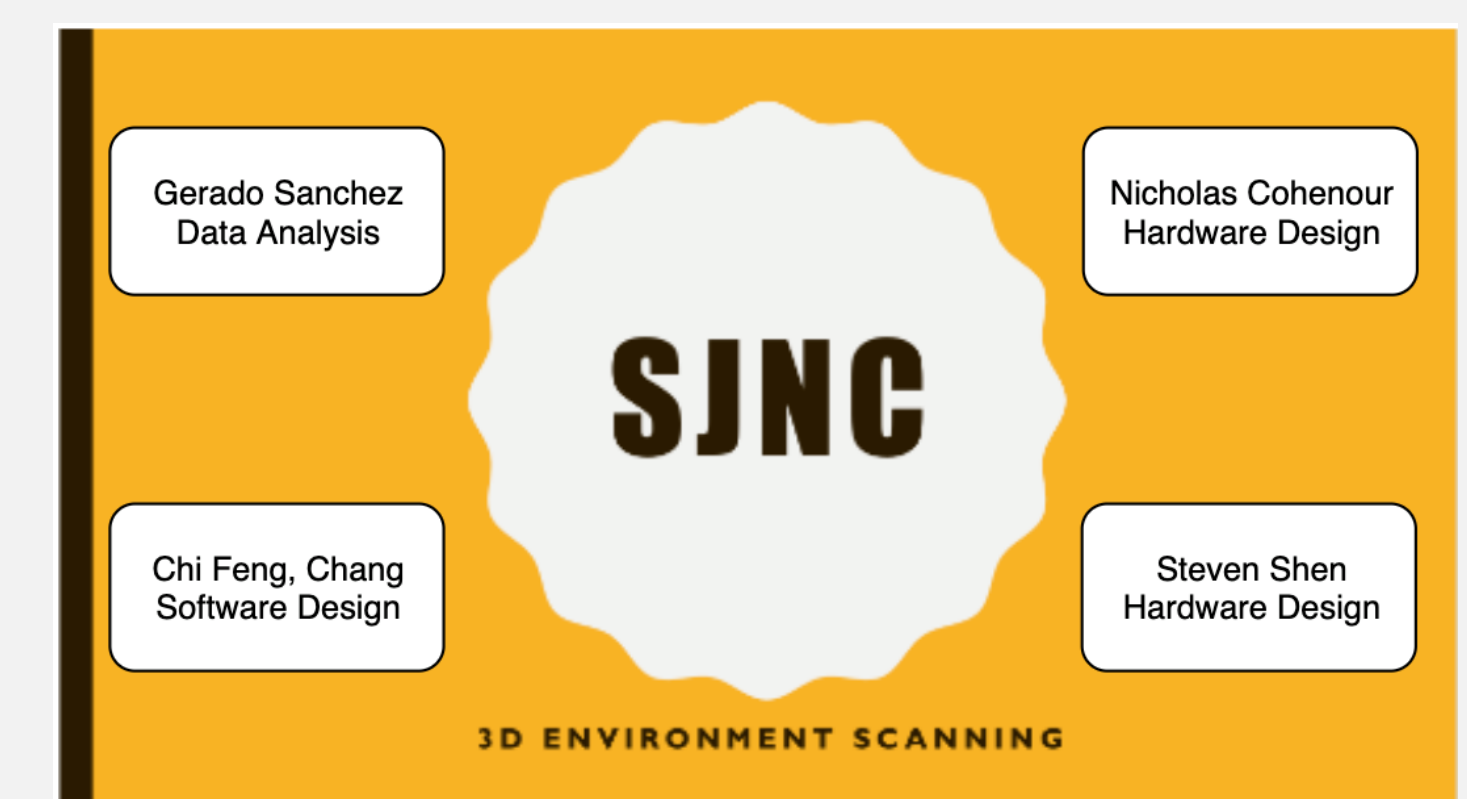
Progress

- Q1: Week 1-2: Established group/project idea
- Week 3: Researched web application environment
- Week 4: Purchased and gathered materials
- Week 5: Tested distance and angle detection
- Week 6: Researched file format for data acquired
- Week 8-10: Assemble and test hardware
- Q2: Week 1-3: Modify hardware and add motors

Future Work

- Continue creating the prototype that has all working sensors of chassis
- Add temperature, RGB, and additional lidar sensors
- Develop working real time scan interface

Team Organization



References

Morales, J., Plaza-Leiva, V., Mandow, A., Gomez-Ruiz, J. A., Serón, J., & García-Cerezo, A., "Analysis of 3D Scan Measurement Distribution with Application to a Multi-Beam Lidar on a Rotating Platform," *Sensors* (14248220), vol. 18, no. 2, p. 395, Feb. 2018. Accessed on: October, 12, 2019.[Online]. Available doi: 10.3390/s18020395

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