



Low-Cost 3D Scanning with LiDAR



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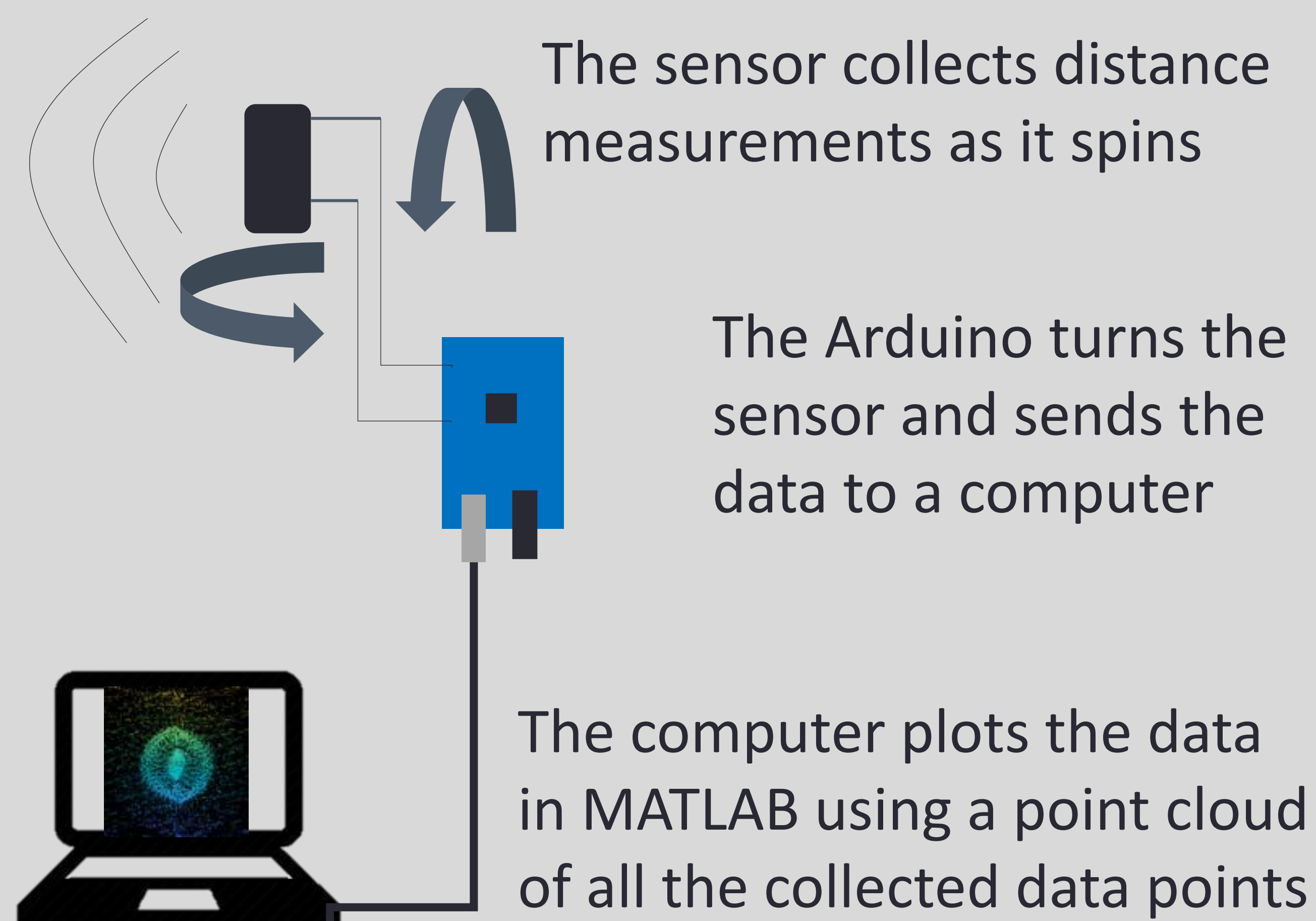
PROBLEM

- Need to make a system that can scan rooms but is low cost and light enough to fit on a drone



- Have a cheap LiDAR sensor and an Arduino starter kit
- Also needs a structure that can support the sensor, stepper, and servo
- Using Solidworks and 3D printers, a custom structure for this project was designed and built
- Using the Arduino starter kit and the sensor, a system was realized around the printed structure

DESIGN ABSTRACT

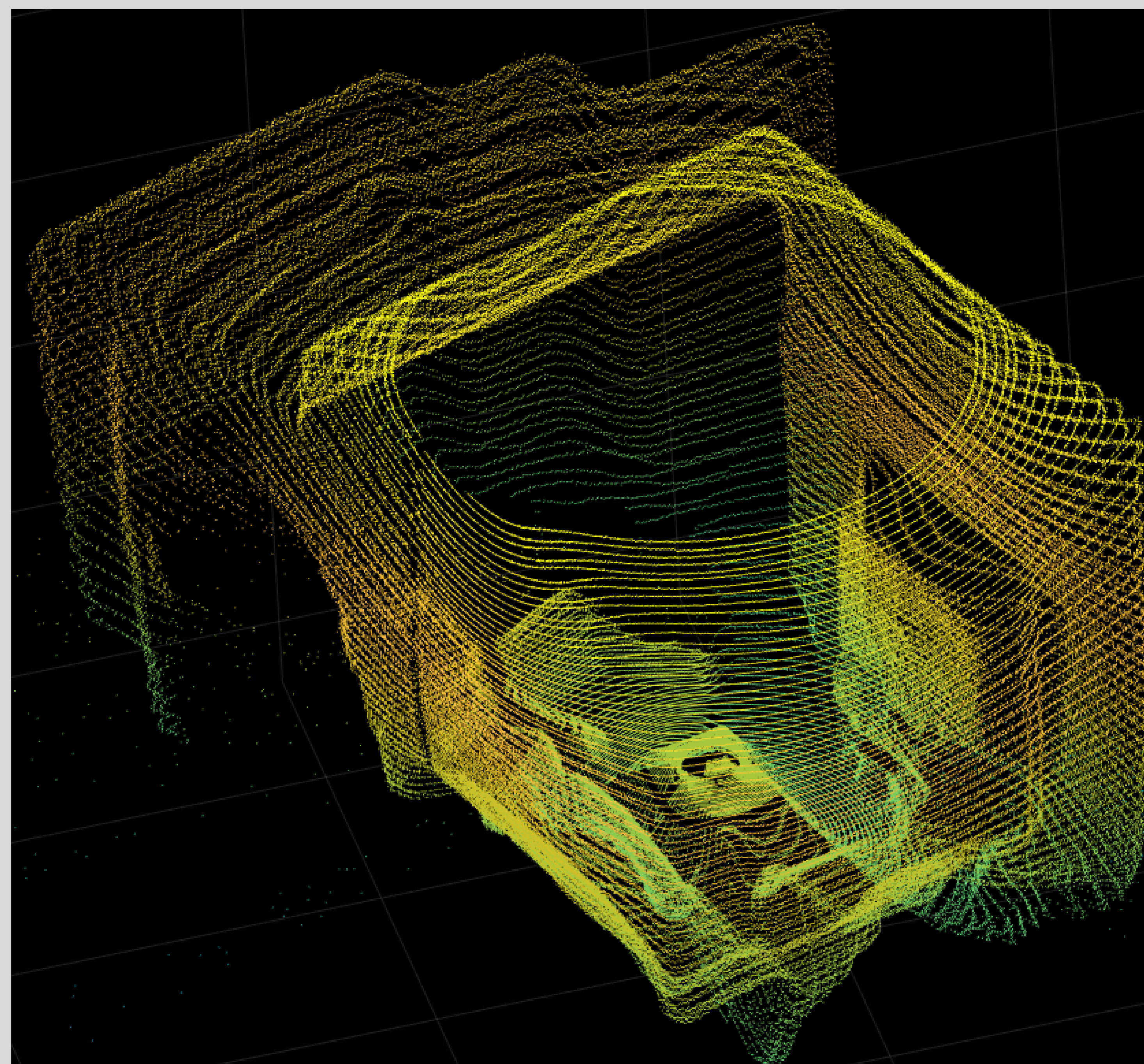


METHODS

- The sensor rotates along two axes, constantly collecting distance measurements
- The Arduino runs the hardware and sends the collected data to a computer as well as both axes' angles at each distance
- The computer interprets the data via a MATLAB script, which plots the data in a point cloud once the scan is complete
- MATLAB converts the coordinates from polar to cartesian so it can properly plot them
- The user determines when the scan stops

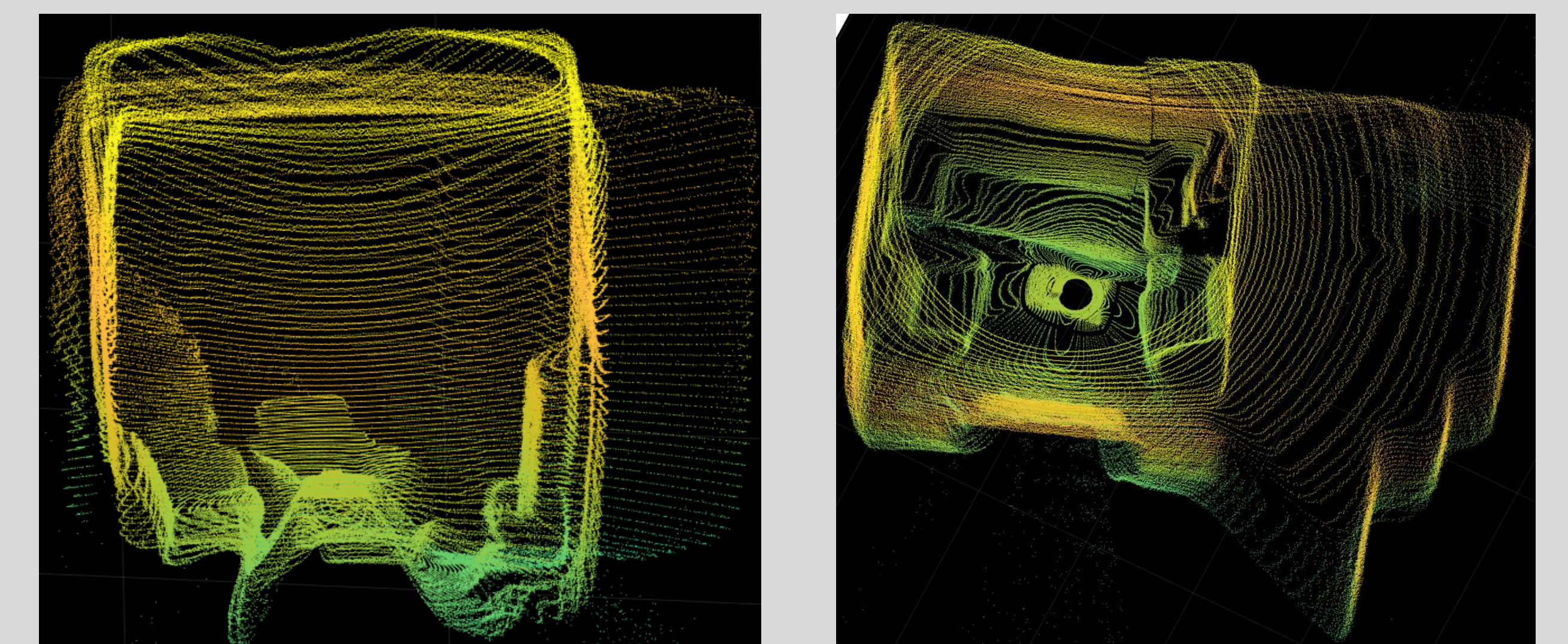
RESULTS

- Room scan of my suite living room

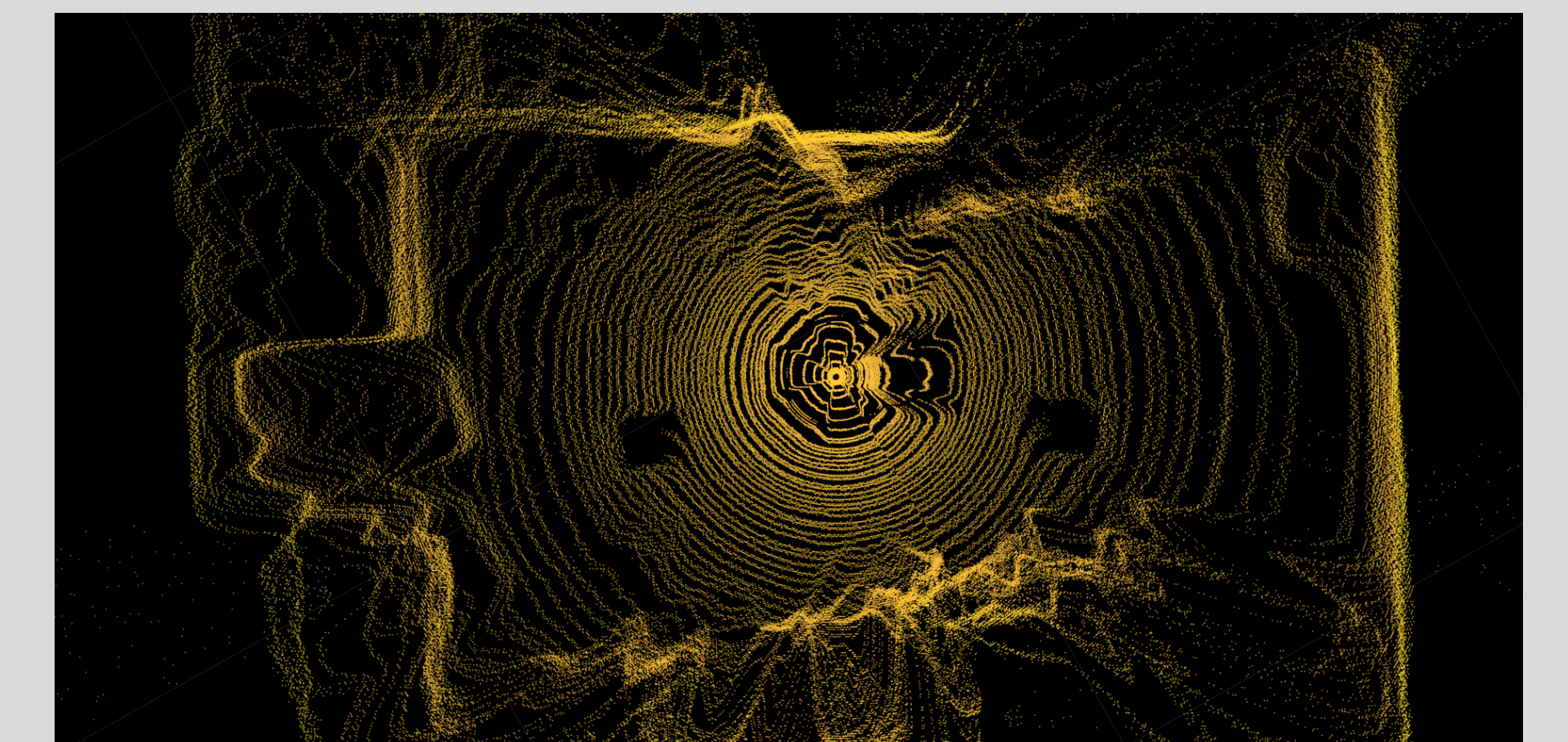


RESULTS

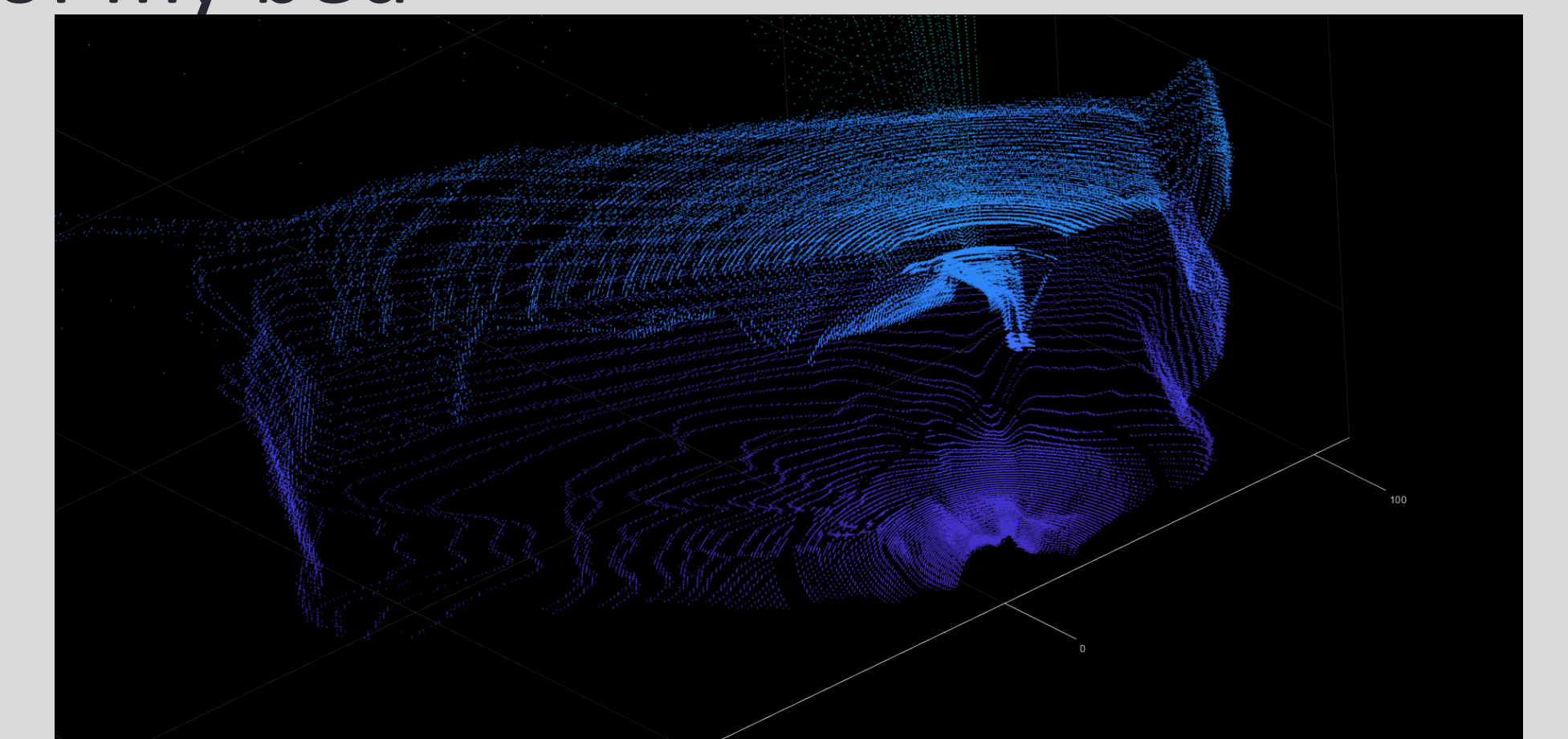
- Side view of the living room from the window (left), top-down view of the couches and “black hole” (right)



- Scan of my bedroom floor



- Scan of my bed



CONCLUSIONS

The scanner produces coherent images. The only drawback is it takes several hours to get images like these, which is due to the I2C protocol the sensor uses to communicate. On a drone, this system could map areas that humans can't reach. The estimated total cost to build this system is: \$109.06.