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Leddar Vu8 Object Detection Report

Abstract

The Leddar Vu8 is an 8 channel LiDAR device that can accurately estimate the distance between a target and itself. The total span of these 8 channels is a 48˚angle that can help create the contour of an object in front of it. In this report, we discuss the effectiveness of the sensor by interfacing it with a Raspberry Pi at different ranges that are applicable in UAV applications.

Short Range Testing

The Leddar Vu8 returns a distance estimation for each of its 8 segments. As a result, less detail can be interpreted from the resulting point cloud of a reading but it provides a decent way to indicate if an object is in the way. We conducted an experiment where the Leddar was positioned sideways. Depending on the angle, the multiple rays of the Leddar should reveal some of the geometry of the drone setup and the table.

Figure 1: Image of the setup used to evaluate accuracy of the Leddar sensor. The electronic measuring tape was pointed at the box under the drone

Figure 2: Annotated side view of the drone where the Leddar was pointed towards

The readings from the electronic measurers indicates that the drone is about 1.299 meters away from the base of the laser so this distance may be shorter by about 14 centimeters according to the manufacturer[1]. This means that the distance from the box placed on the table to the leddar sensor is closer to 1.16m away. The echoes from the 8 segments of the Leddar were from lowest angle value to highest 0.9291, 0.9475, 0.9402, 1.189, 1.244, 0.9476, 1.33, 1.143. It is likely that the 8th, lowest channel in angle elevation was the one pointing to the box/side of the wall. This result seems likely yet more data is needed to be conclusive on the ability to extract geometry from this device. If it is the case that the box is the object pointed, this is what the channels on the Leddar are pointing to.

[1] *Stanley STHT77425 TLM30 pocket laser distance measurer, 30'*. Amazon.ca: Tools & Home Improvement. (n.d.). https://www.amazon.ca/Stanley-STHT77425-Pocket-Distance-Measurer/dp/B074WTM8PH

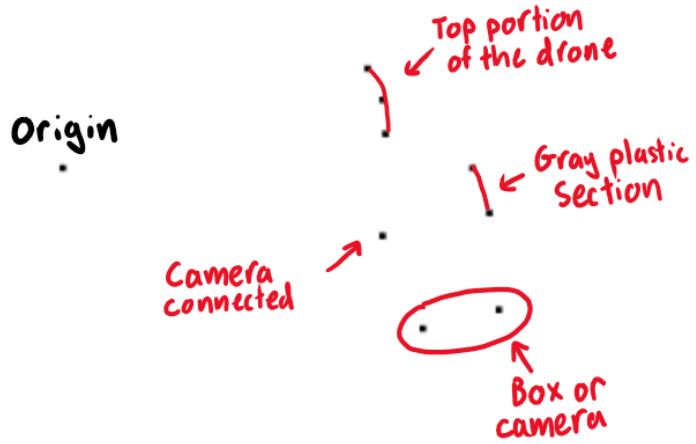

Figure 3: Annotated version of the visualization software of the drone data points

Mid Range Testing

The experiments for the mid range data testing is to verify when the Leddar would return an infinite distance when no objects are in the range of the sensor or pointing at the sky and when the sensor would send back decimal values. To test the Leddar's capabilities, the sensor was pointed outdoors towards a house and the angle of the sensor was increased until it reached the sky where we expect the sensor to return an infinite value.

Figure 4: Leddar pointed outdors where the angle increases with time. After a few seconds, the received distance goes to infinity and the origin point is removed

From this image, we can notice that the origin point (single circle centered at the far left) and the reflections of far the ground and wall. As we increase the distance, we can notice that the echoes start to exit the render and eventually, the origin point disappears which indicates that the sensor is sending an infinite distance to the raspberry pi.

Conclusion

In conclusion, the Leddar sensor seems to measure points accurately and could distinguish objects in its way with the use of the infinite distance system that is implemented. Moreover, the sensor could use a height/altitude detector to find out if the Leddar is oriented towards the ground and the returned data should be treated as invalid. The sensor is also capable of depicting simple geometries of objects in its way.