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Summary

The issues faced last week were solved and proceeded with the car build. Our SLAM algorithm was developed based on ORB SLAM2.

What FarmVroong completed this week:

- ORB SLAM2 code review

Reviewing the codes of ORB SLAM2 and editing it for our SLAM algorithm is done in the week. We added the codes processing the GPS data and changed certain parts. In this week, the camera tracking part was changed.

We tested ORB-SLAM2 code and checked that it runs well in Ubuntu 18.04.

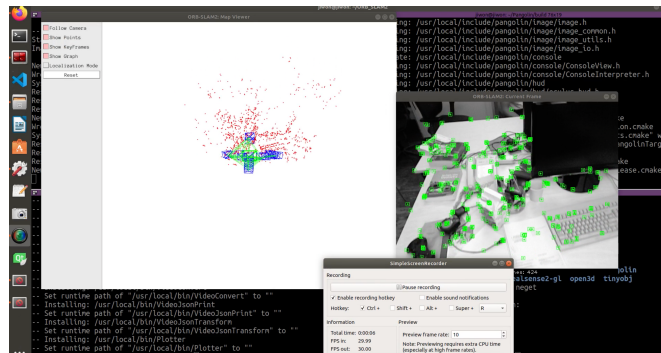


Figure 1. ORB-SLAM2 Simulation

- Car building

- ◆ Circuit test

We connected the jetson nano GPIO pins with motors. We have to control 3 motors : 2 dc-motors for wheels, 1 servo motor for steering.

Number of Jetson nano GPIO pin is quite enough to control those 3 motors, but for more efficient controlling, we decided to use PCA9685 GPIO extension module.

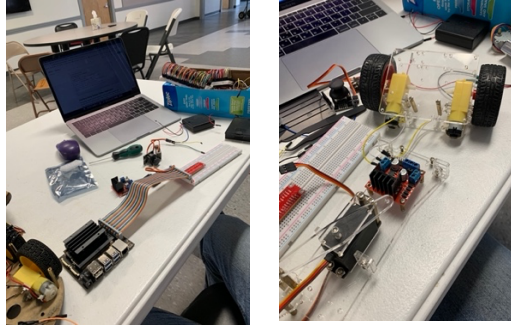


Figure 2. (a) Connect between Jetson GPIO pin and motor

◆ 3D print

The frame for mounting a motor to the car is printed using a 3D printer, Creality CR-10 S5. The printout made last week had errors in the design such as the location of holes and the angle of the shape. The errors were corrected, redesigned, and printed.

Things to do by next week

- Change the local mapping and loop closing part of the ORB SLAM2 source code.
- Reflash Jetson nano
- Simulate ORB-SLAM2 code with Intel Realsense

Problems or challenges:

- Jetson Nano died

The critical error happened when dealing with Jetson nano. It constantly stopped working. At last, when we shut down the computer, it didn't reboot.

At first, we thought that it a problem of power source. It requires 5V, 2A, 10W of power. We used adequate power source (adapter) but the power loss might happen because we connected several devices through its USB port.

We decided to change to power source so we tried 1) power supply 2) 24V battery with step-down converter 3) 12V battery with step-down converter.

We carefully tested them with voltage meter. But the time goes by, we found out that the power source might not be the reason Je

So, the second reason can be a storage problem. Jetson has 16GB of hard disk, and we used almost all of them. It could be a problem. Jetson died.

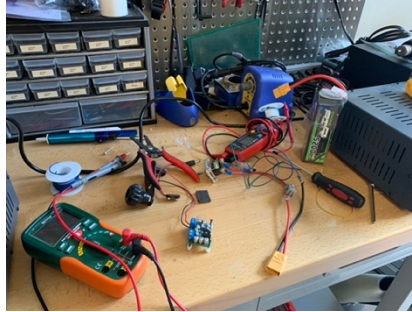


Fig. 3. Testing multiple batteries to reboot Jetson nano successfully

- 3D print stuck to the bed

When the printer finishes working, the output stuck to the bed and could not be removed. Therefore, we searched for related documents and separated the printouts from the bed.

According to a document, there are the following removal methods. [2]

- Use a Flat Blade
- Replace build platform
- Create a Temperature Difference
- Floss It Off
- Run It Under Cool Water
- Add a Solvent

Referring to the above methods, the bed was heated and removed using isopropyl alcohol as a solvent.

After experiencing these problems, for the second printout, we tried to tape the bed using blue painter's tape. Even though adjusting the level of the extruder and the bed, the tape attached to the bed was scratched and peeled off by the extruder. It often occurred when the extruder moved in the vertical direction of the tape at the overlapped part of the tape.

As a result, the tape was removed, and the second output was carried out.

References

[1] R. Mur-Artal and J. D. Tardos, "Orb-slam2: An open-source slam system for monocular, stereo, and RGB-D cameras," *IEEE Transactions on Robotics*, vol. 33, no. 5, pp. 1255–1262, 2017.

[2] "How to Remove 3D Prints from the Bed: 9 Safe Ways," *All3DP*, May 27, 2022. <https://all3dp.com/2/how-to-remove-3d-print-from-bed-3d-print-stuck-to-bed/> (accessed Jun. 11, 2022).