

MRSD Project

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Team G / Robographer

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Individual progress

Replace servo motors on pan-tilt unit with Rohit

Calibrating new servo motors on the new pan-tilt unit

Since the pan angle motor is designed upside-down compared to the former pan angle motor. In normal case, fixing direction problem by changing the code is not a big issue, but since we got some distortion between transferring pixel values in Intraface to motor angle values, we need to rewrite the transferring part again to make the new tracking system on the pan-tilt unit work. Right now the coding part is almost done, somehow the connecting problem between Intraface and Arduino happens again. Sida and I will try to figure it out before the next PR.

Install and learning how to use Eigen Library

Eigen Library is a C++ library for linear algebra, it's versatile, fast and has good compiler support. Many people have used the Eigen Library for 3D motion planning. Expression templates allow to intelligently remove temporaries and enable lazy evaluation, and fully optimized when the matrices sizes are fixed. Eigen Library would be an appropriate choice if we want to enhance the computational speed.

Trying to implement the algorithm for flocking

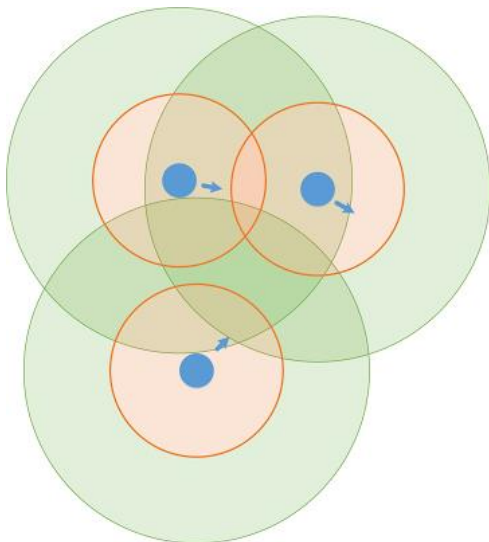


Figure1: the idea of flocking, picture from last year team, ROBRON

The whole idea of flocking is keeping the turtlebots in the safe distance with each other and moving to the target collaboratively. At the very first intend, we tried to

use the traditional way to implement the flocking algorithm: using two matrices, one is the matrix between two turtlebots and the other is the world frame, we also need a transfer matrix to help us transfer between two different frames. This is exactly the same idea used by the last year team, to use this idea, we need to know the relative position of two different turtlebots, that why they need four April tag on one turtlebot. But now, with the global camera, we are able to use only one frame and get the absolute coordinate of each turtlebot. There's one April Tag with different id on each turtlebot. The main function would switching through every turtlebot by recognizing their id numbers. In each loop, the turtlebot with the id we are finding will be check if it's too close or too far to its nearest neighbor turtlebots. So we could keep the three turtlebots together in any time.

For now our flocking function is about 50% accomplished because it hasn't been through the testing and debugging stage. Therefore we don't know if the whole function is completed or required any major change.

Challenges

Malfunction of global camera

One of the global camera couldn't focusing and calibrating with other global cameras. Therefore we cannot test flocking function on turtlebots

Limitation of pan-tilt units

The new pan-tilt unit's pan angle motor is not appropriately install, therefore around 30 degree in front of the motor cannot be reached. Rohit will reinstall it before next PR.

Teamwork

Jimit and I search and learn the algorithm of flocking.

Gauri, Jimit and Sida worked together to write a piece of code for comparison for smiling percentage of the same person on three laptops and solved the one person in frame problem by using April Tag. Now Intraface will only recognize the person with April Tag. They also create a rapp on rocon for photo-clicking.

Because once the target person smile, both computer could reach 99%, two photos would be took in the same time.

Rohit design and build the new pan-tilt unit fabrication part to reduce the vibration problem of the elevation part of turtlebots. The new design is lighter and more

stable.

Future Plan

1. Gauri, Jimit and Sida will create rapp for navigation and flocking function on rocon and integrate all the rapp on three laptops
2. Sida will try to integrate roi, rocon and pan-tilt subsystems.
3. Jimit, Gauri and I will finish the flocking algorithm using global cameras.
4. Rohit and I will make sure the new pan-tilt controlling system work.
5. Rohit will calibrate the cameras and build the third pan-tilt unit by 3d printer.