Progress review #9

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Team G Robographers

Teammates:

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a. Individual Progress

For the ninth progress review, I worked on the following tasks-

  I.   Setting up multi-master ROCON for the Intraface with Sida.
 II.   Setting up and calibrating global RGB cameras in the lab for localization of the turtlebots using April Tags with Sasanka and Jimit.
III.   Testing the integrated Robographer System for a single turtlebot with the new hardware.
 IV.   Updating the website.

I.   Multi-master ROCON for the Intraface

The main goal this time for me was to set up multi-robot ROCON to communicate and compare the smile percentage values from different computers. Sida and I finalized the following algorithm flow to accomplish this. We first decided to achieve this for two master computers.
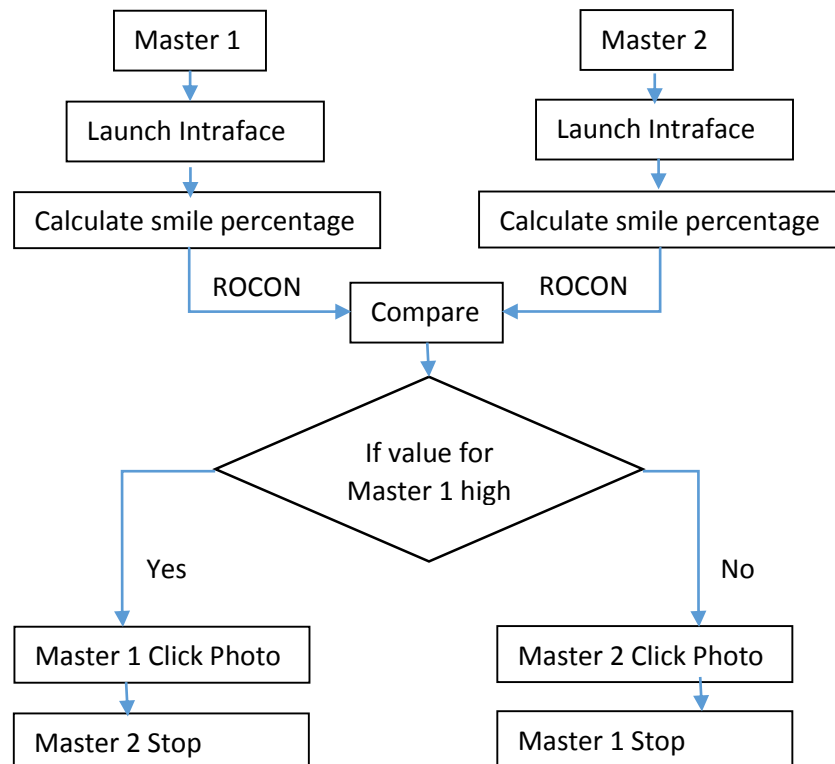

Figure 1 Flow Diagram for multi-master Intraface

But due to lack of knowledge and experience in distributed systems, we faced a lot of problems in implementing this. We first tried to make some minor changes in the existing Chatter_concert tutorial files. We changed the topic being

published and subscribed to intraface/emotions. But this strategy didn't result in any fruitful outputs. So, I decided to create all the required files from the scratch. I created a new concert file that subscribed to the main launch of the integrated Robographer system and published on the intraface/emotions topic the output from the SmilePercentage calculator node. This worked for a single master as shown in figure 2. Then, I tried to change the port numbers for the listener and talker to create a multi-master system. To make it work, I created some supporting files like interface and rapp files. To understand the concept of rapps or ROCON Applications, I went through their basic concepts in their documentation. I also created a launch file to launch the hub from the ROCON folders. After doing all this, I was able to run multi-master on a single computer. But due to multiple issues faced in this process, we could not achieve success in all the steps mentioned in the flow diagram above.
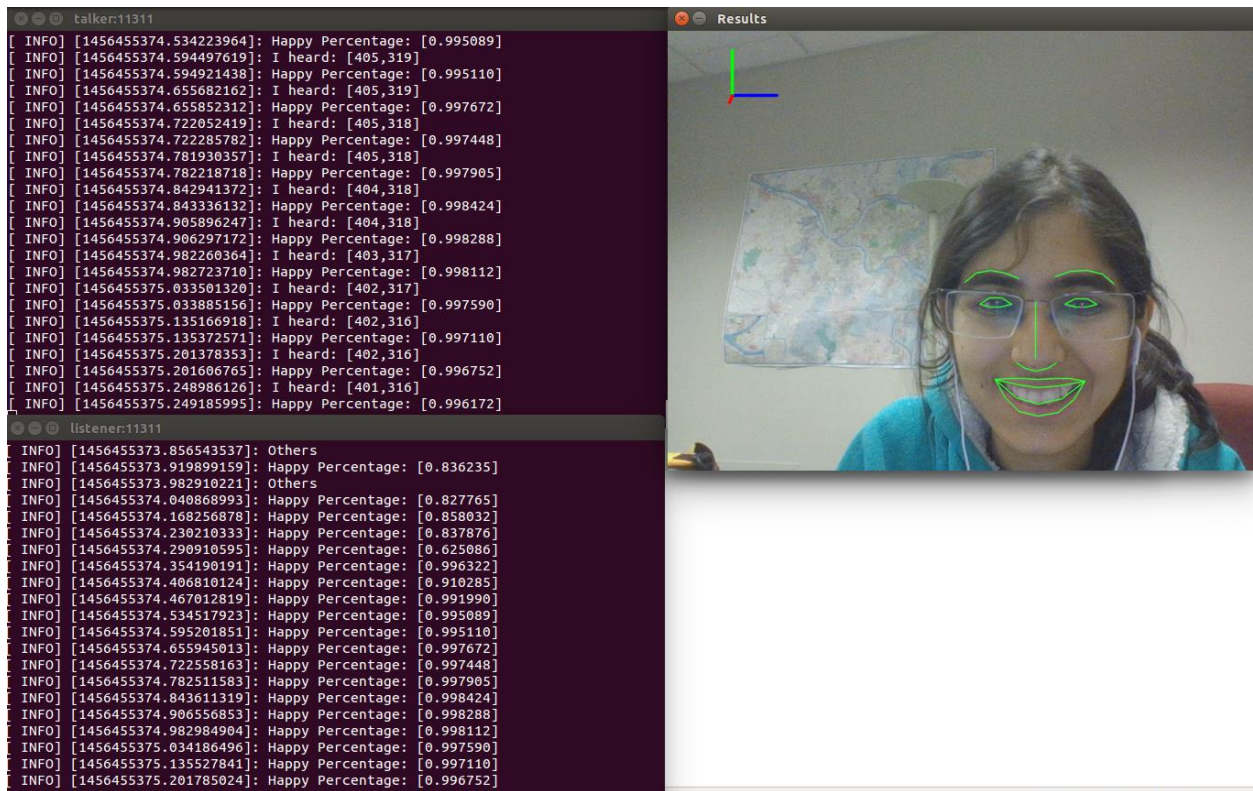

Figure 2 Listener and Talker on a single port

II. Global camera set up for localization

Although, this was one goal which we had kept for the future progress reviews, but since our PhD mentor Sasanka Nagavalli had IROS deadlines and wanted to accomplish this for his projects, Jimit and I worked with him to help him in this. I mainly worked on interfacing the four global cameras with the main PC and then performing intrinsic calibration for each one of them to get the camera

parameters. We tried to get as many sample points for the calibration as we could and then saved the results in different .yaml files. The setup is shown in figure 3.

Figure 3 Global Camera Setup

III. Testing the new hardware

This time, we wanted to check the new Chromebook and the HD Camera for its compatibility with the existing software and hardware for a single turtlebot. So, first I installed the Intraface with the renewed license in the Chromebook. Then, I copied all the integrated code in the new machine. Once this was done, I installed all the required ROS packages for the turtlebots and the USB Camera. As soon as I launched the final launch file for a single robot system with the camera feed changed to the new camera, the desired results were obtained as shown in figure 4. These results included rotation of turtlebot until an April tag is detected, autonomous navigation towards the person of interest and stopping at 1 meter distance from him/her and then launching the Intraface node to click a smiling photo. Since, all the new hardware is compatible with the existing one, we will now order two more chromebooks and cameras for the other turtlebots.
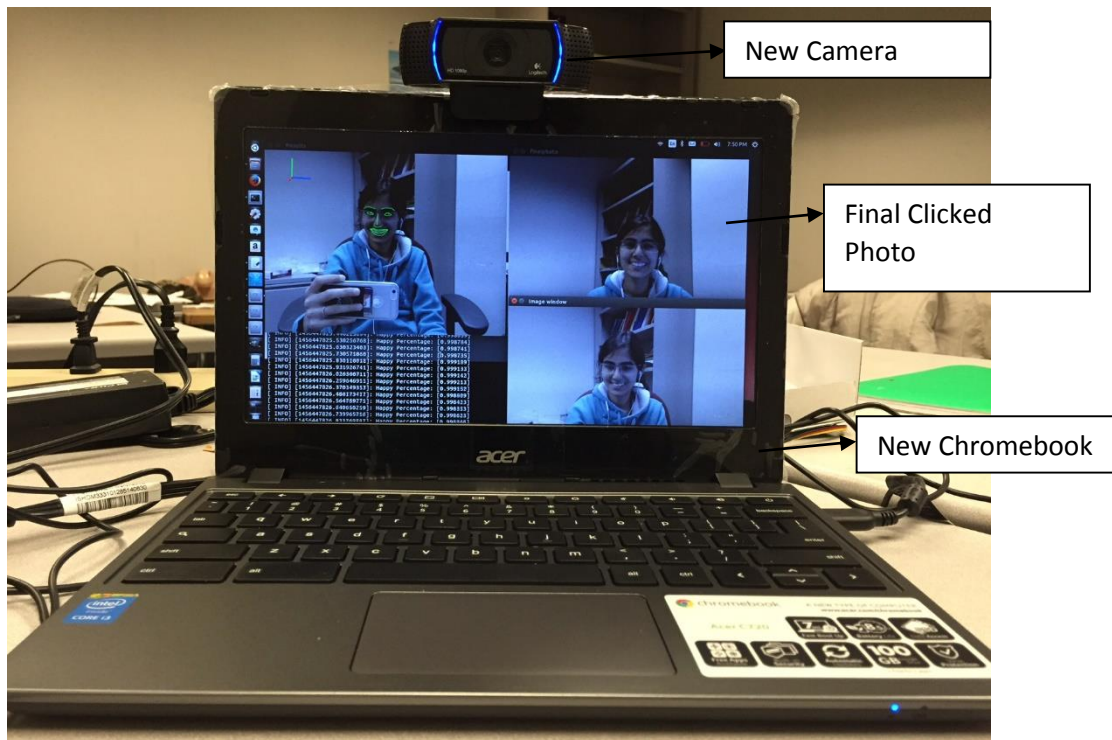
Figure 4 New Hardware Setup

IV. **Updating the team website**

This time, the website didn't require much changes. I uploaded all the recent ILRs and the presentations and made any required changes in the existing webpages. I also updated the link to the FVE Progress Video.

b. **Challenges**

I. The major challenge I faced this time was to set up the multi-master ROCON framework for the Intraface. Due to involvement of different types of messages to be published on different topics, this task was turning out to be very difficult for us. After creating the different rapp files, I could somehow achieve multi-master on a single computer, but still a lot of work is left to be accomplished in this regard.

c. **Team Work**

For this progress review, I worked with Sida to achieve multi-master network for the Intraface. Jimit worked on reconfiguring the Chromebook by installing the correct version of Ubuntu as the previously installed version was not properly installed. He also worked with Sasanka to build the mounts for the global cameras and install them in the lab. Rohit worked on redesigning a better version for the pan-tilt unit. Tiffany created a node for autonomously navigating a single turtlebot in Gazebo.

d. **Future Plans**

For the next Progress Review, I will be working on the following tasks:

I.   Understanding the concepts of ROCON to set up a proper framework according to the project's requirements.

II. Implementing the multi-master ROCON for the Intraface.

III. Run the single integrated system in the Chromebook using a remote computer.

IV. Updating the team website.

As a team, we will work to accomplish the following goals in addition to the above mentioned goals.

I.   Achieving multi-master ROCON set up for both navigation and face detection sub-system.

II. Start working on absolute localization of turtlebots using the global cameras.

e. **References**

1. Turtlebot ROS tutorials

wiki.ros.org

2. ROCON tutorials for ROS Indigo

wiki.ros.org/rocon/indigo/Guide

3. Gateway model tutorials

http://redmine.robotconcert.org/projects/multimaster/wiki/Gateway_Model

4. Sasanka's bitbucket repository

https://bitbucket.org/snagavallis/turtlebot-swarm-scripts/