Robotinho

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Abstract

What is Robotinho?

The reason we created Robotinho is because we love soccer and also have a passion for a superstar named Ronaldinho whose last name end in -inho. We took one semester to build Robotinho on TurtleBot 2 and our software package was developed on Robot Operating System (ROS) system. We implemented three main functions for Robotinho,

1. Speech recognition, we created a voice lexicon for pocketsphinx to recognize our voice commands and convert them into text for Robertinho doing different drills. The performance of the recognition is around 70%, which is decent. One possible improvement is to add more training data for variant English accents.
2. Robotinho's score skill. We wrote a program to have Robotinho be able to do three soccer drill techniques, diamond, circle and weave. The first step is to make it do the right movement. Then we had it move while dribbling the ball. We did many tests to find a right speed for it to move as fast as possible without losing the control of the ball.
3. Goal. We programmed Robotinho able to dribble, shoot, and score goal based on the voice commands. After goal, it will dance and play music for celebration.

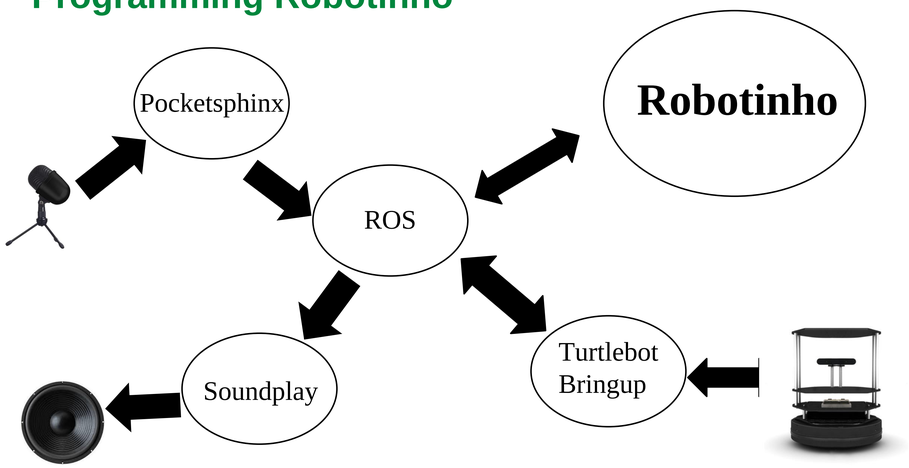
Introduction to Robotinho and Us

Why Robotinho?

Robotinho's name is inspired by many great players from the past and present, such as Ronaldinho, Paulinho, Coutinho and Fernandinho. We had aspirations for Robotinho to be recognized by NYCFC[1]. Thus we used the NYCFC theme and wore our NYCFC jerseys even Robotinho.

1. https://twitter.com/NYCFC/status/1071117344435511298?s=19

Programming Robotinho



Creating and Implementing Voice Input

In order to start having Robotinho to understand language we had to first use the ROS system to implement code to connect a microphone through the computer to the robot. Then we had to use the Sphynx open source speech recognition language generator to turn our list of commands into something the program could understand (pictured on the right). After that we just had to implement code so that when Robotinho hears one of the commands he would perform the action linked with that command.

robotinho.dic

```
1 CIRCLE  S ER K AO L
2 DIAMOND D AY M AH N D
3 DRIBBLE D R IH B AH L
4 DRILL   D R IH L
5 FORWARD F AO R W ER D
6 LEFT    L EH F T
7 PENALTY P EH N AH L T IY
8 RESUME  R IH Z UW M
9 RESUME(2)       R IY Z UW M
10 RESUME(3)      R EH Z AH M EY
11 RIGHT   R AY T
12 SCORE   S K AO R
13 START   S T AA R T
14 STOP    S T AA P
15 WEAVE   W IY V
```

Problems and Solutions

Problems:

- Speed through turns
- Speech recognition
- Calculate distance between cones and goal
- Software
- Keeping him connected

Solutions:

We had to decrease the speed around the turns in drills so Robotinho doesn't lose the ball. To fix our speech recognition we had to study how Sphynx broke down the words and we changed our way of saying words. For calculating the distance we took the starting and ending point and calculated the time Robotinho takes to reach its objective. To implement all this we had to learn Linux and ROS commands to keep the robot connected with our laptop.

Functionalities

What can Robotinho do and hear?

Commands

- Start
- Resume
- Dribble Left
- Dribble Right
- Dribble Forward
- Score Penalty
- Stop
- Drills

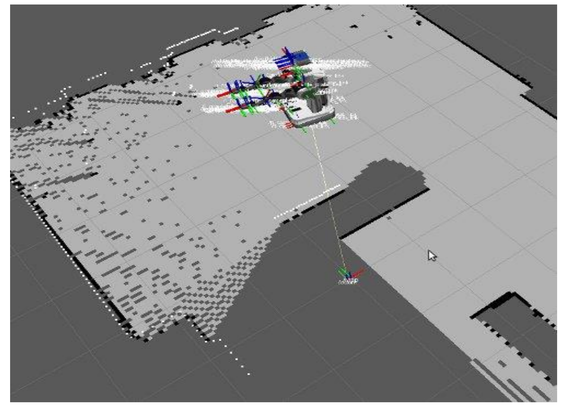
What's Running

- Roscore
- Turtlebot Bringup
- Robitnho Launch
- Robitnho.py
- SoundPlay Node
- Pocketsphinx

Future work

What is Next?

With the voice commands in place, it is now more straightforward to add new functionalities to Robotinho, and we intend to add many more. There are many potential directions to pursue. Priorities will be to add mapping and vision so that Robotinho can see where the goal and the ball is, and it would be easier for him to play soccer more efficiently.



Acknowledgments

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