Detecting the DOA for Robots with Wireless Antennas

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***Abstract*—Our project is to develop algorithms and protocols for the localization of sensors and mobile robots. The main problem is to find the direction and distance of the robot. We will use Multiple Signal Classification(MUSIC) algorithm to determine the direction of arrival(DOA) of robots, and we will estimate the distance between each of the robots based on the pass loss of our received signal strength. [1] [2]**

I. Introduction

A. Background

There are many robots created to improve quality of our life, so the AI of robots can make a great contribution. What's more, we may want to easily find a specific room location even when we are not familiar with the place. We can navigate our outdoor position with GPS, but it is hard for us to know our indoor position with our smart devices. All of these problems lead to the topic on how to implement the localization of our robots.

B. Related Work

II. Overview

Signal will fade during the transmitting and power will somewhat loss no matter what kind of transmitter you use. As a result, we can estimate the distance between the receiver and transmitter if we know the properties the the wireless signal. Meanwhile, the phase of signal will shift when receiver get a signal, which related to their direction of arrival. In this case, out project decide to use the MUSIC algorithm and path loss to estimate direction and distance between multiple robots.

III. Architecture

IV. Evaluation

V. Conclusion

References

[1] Wikipedia. Charge-coupled device — wikipedia, the free encyclopedia, 2015. [Online; accessed 11-December-2015].
[2] sensorwiki. Temperature sensors, 2011/04/14. [Online; accessed 11-December-2015].