Indoor Mobile Robot Localization and Mapping

Darrah Beebe
Advisor: Dr. Suruz Miah

Department of Electrical and Computer Engineering
Bradley University
1501 W. Bradley Avenue
Peoria, IL, 61625, USA

June 11, 2020

BRADLEY University

Outline

Introduction

Goal of project is to implement XBee modules to to localize a mobile robot using Cayley-Menger determinant's based on signal strength.

Network Diagram

Diagram of ZigBee network

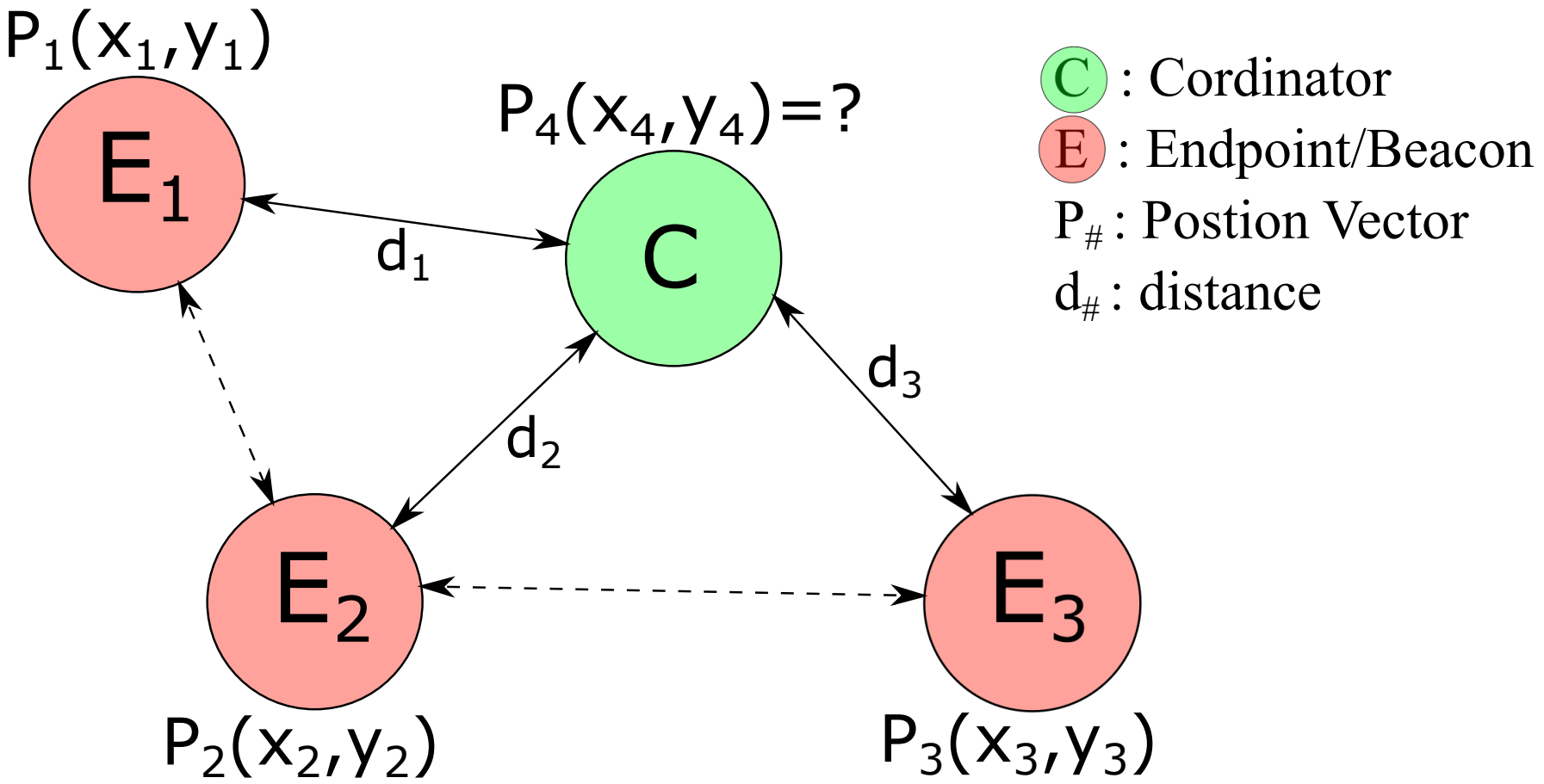

Figure: ZigBee network diagram

DB - Remote AT Command

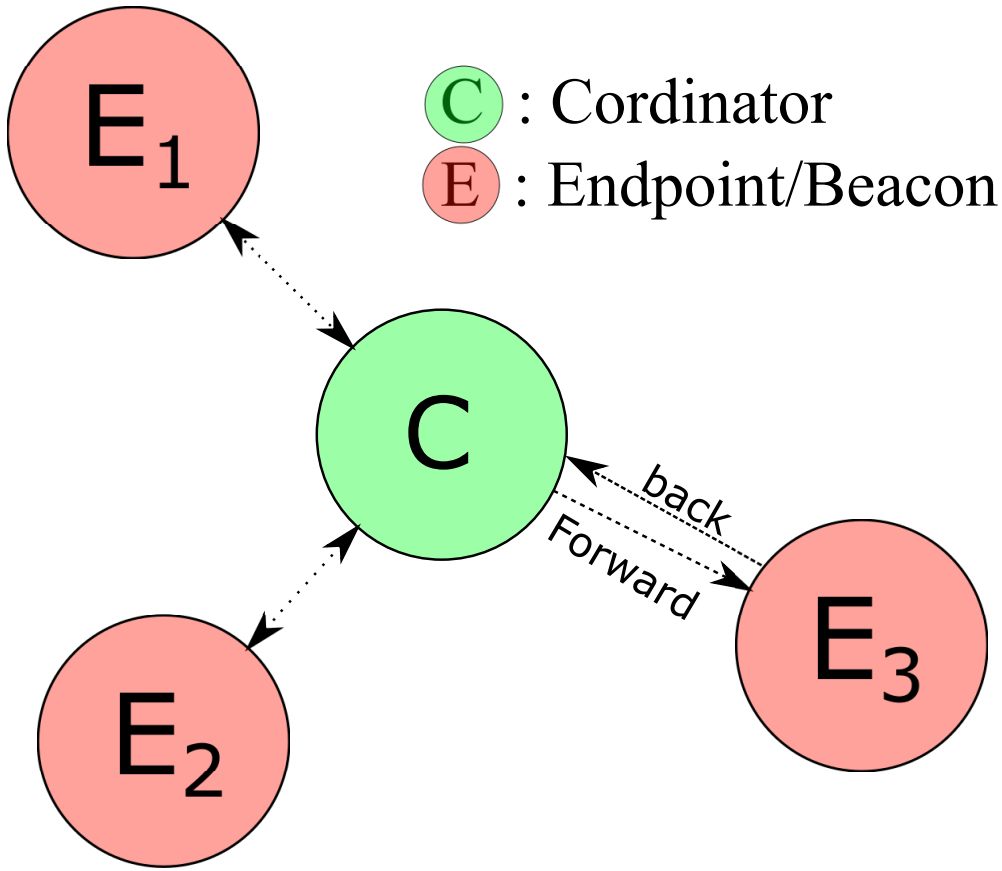

Figure: Getting RSSI with Remote AT Command

Previously Done

- XCTU
- Powershell
- Backbone to XBee (linux c code)

Current Progress

- Calculate Distance - Ongoing?
- Putting together documentation - Ongoing

Current Progress

```
debian@beaglebone:~/localization/Darrah$ ./TestTableProg
| Beacon # |    RSSI     | Distance |
|----------|-------------|----------|
| Beacon 1 | -0x0C dBm | 0.039573m |
| Beacon 2 | -0x24 dBm | 0.627185m |
| Beacon 3 | -0x2D dBm | 1.767649m |
```

Figure: RSSI+Distance(FreeSpace) Output Table

```
debian@beaglebone:~/localization/Darrah$ ./TestTableProg
| Beacon # |    RSSI     | Distance |
|----------|-------------|----------|
| Beacon 1 | -0x0C dBm | 7.079458m |
| Beacon 2 | -0x26 dBm | 0.354813m |
| Beacon 3 | -0x2F dBm | 0.125893m |
```

Figure: RSSI+Distance(Miah) Output Table

BRADLEY University

Future Directions

- Calculate Distance?
- Localization with Cayley-Manger
- Putting together documentation
- Wiki Page