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

May 29, 2020

BRADLEY University

Outline

1. Introduction
2. Project So Far
   - Network Diagram
   - DB - Remote AT Command
   - Previously Done
   - Current Progress
3. Future Directions

BRADLEY University

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

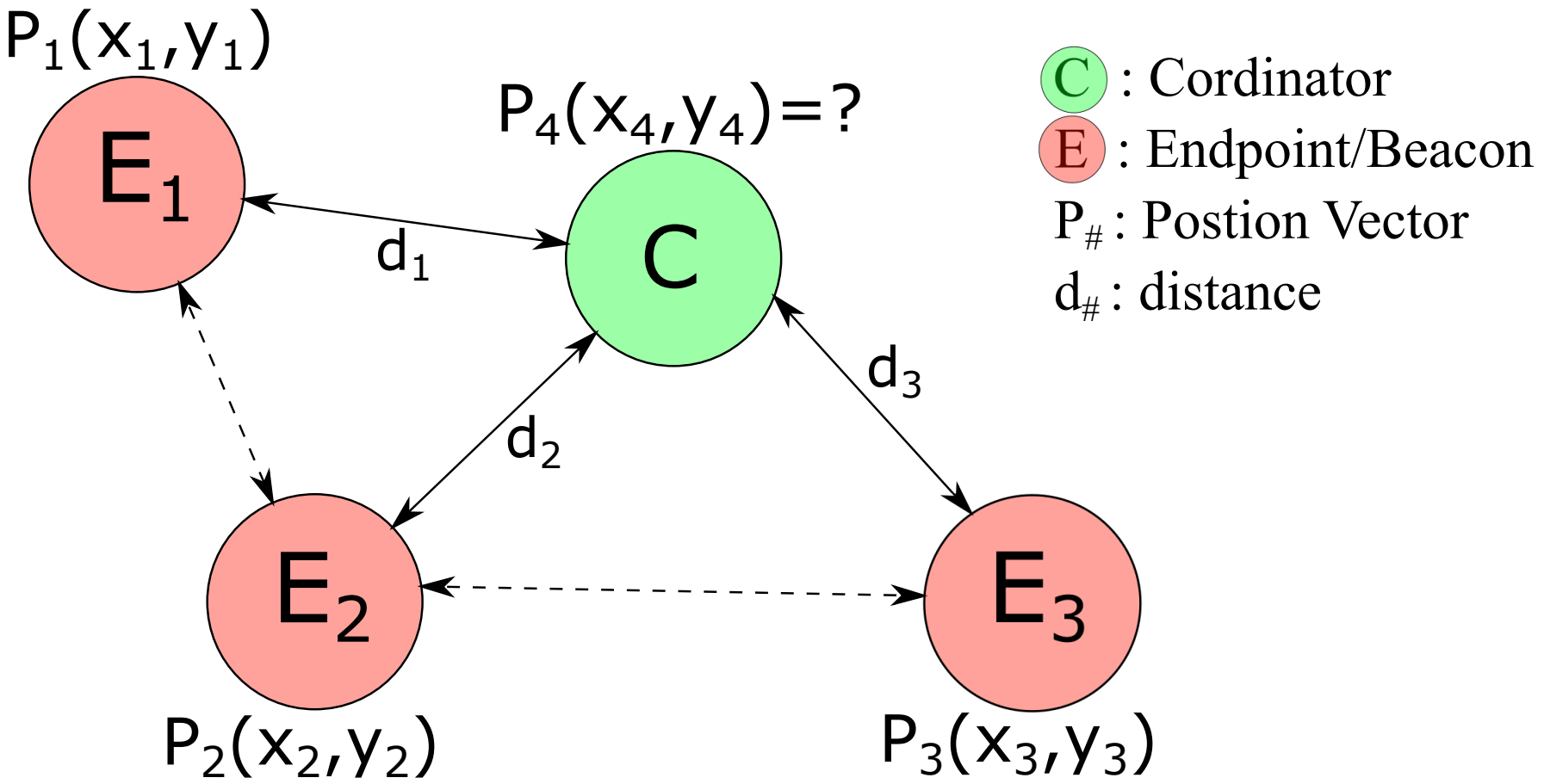


Figure: ZigBee network diagram

DB - Remote AT Command

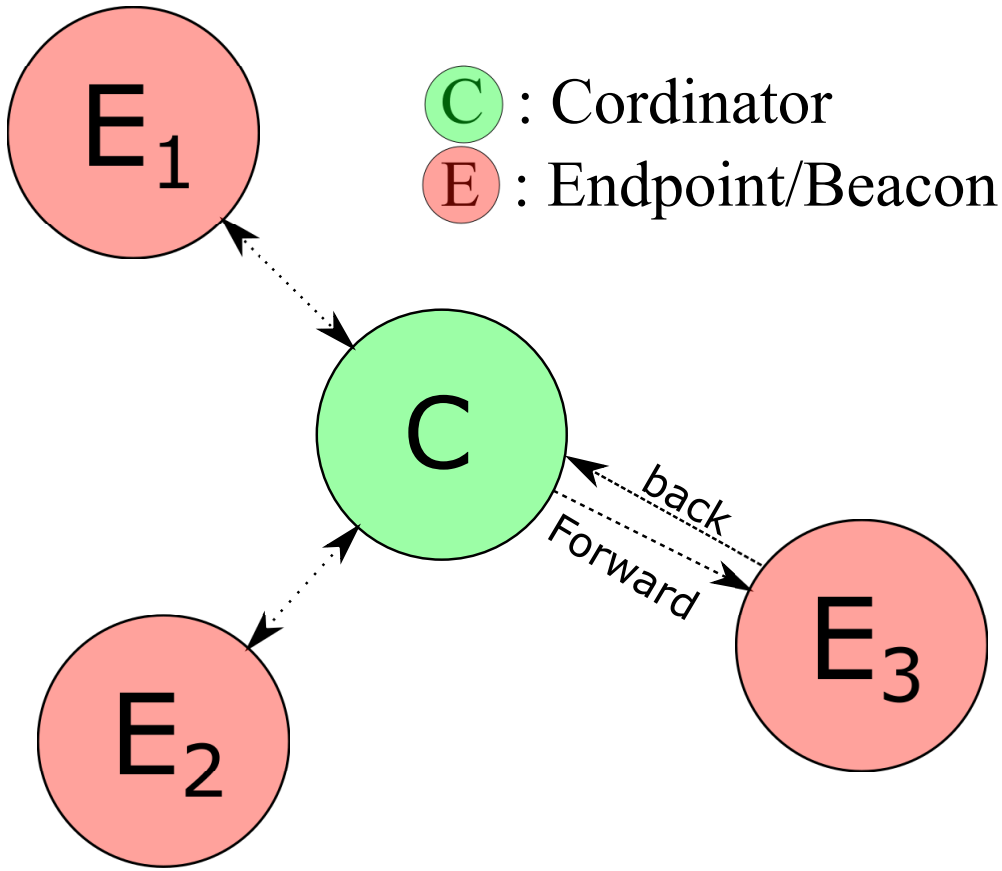
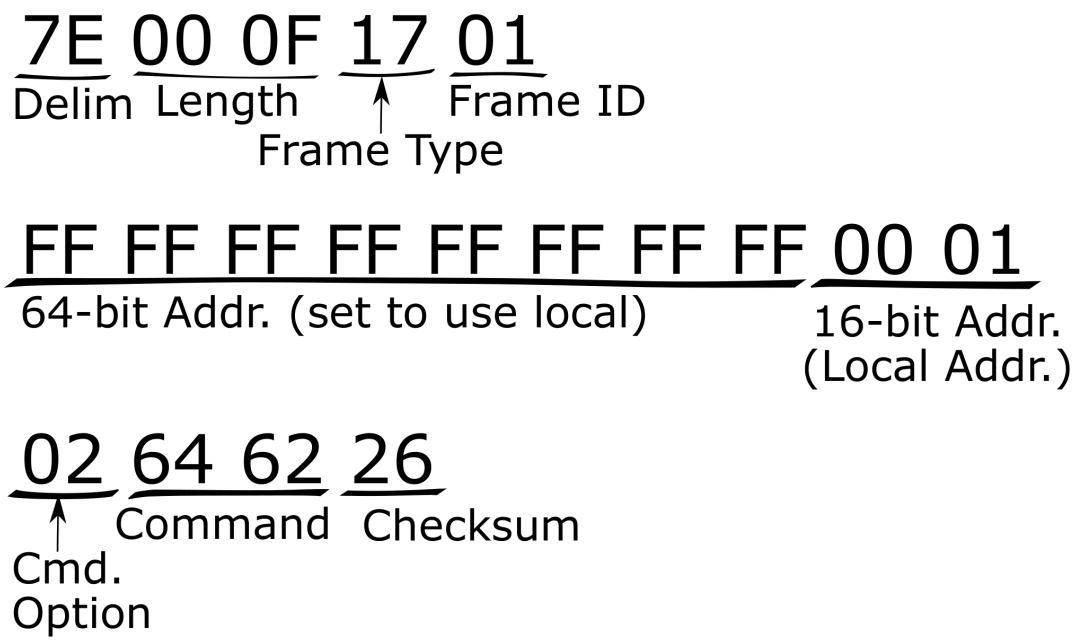


Figure: Getting RSSI with Remote AT Command

DB - Remote AT Command

- Addressing modes
  64-bit MAC Address -or- 16-bit Local Address



Previously Done

- XCTU
- commands
  - AT Command – Working
  - Remote AT Command – Not Working

Current Progress

- XCTU
  - AT Command – Working
  - Remote AT Command – Working
- Powershell
  - Port Connected
  - AT Commands Working
  - Test Script
- Backbone to XBee
  - Port Setup and Connected
  - AT Commands Working
  - Test Script
  - Split out Header

Current Progress

```
debian@beaglebone:~/localization/Darrah$ ./TestProg
| Beacon # |   RSSI    |
|----------|-----------|
| Beacon 1 | 0x1C dBm |
| Beacon 2 | 0x17 dBm |
| Beacon 3 | 0x0D dBm |
```

Figure: RSSI Output Table

- Calculate Distance - Ongoing
  - Research
  - Implementation Attempts
- GitHub Learn/Cleanup - Ongoing

BRADLEY University

Future Directions

- Distance Calculation
- Localization with Cayley-Mander
- GitHub Restructure
- Wiki Page