



Hexapod Navigation using LPS

Group members

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Problem Statement

- Design Hexapod bot capable of 2D motion (linear and rotation).
- Setup Wifi Localisation using ZigBees – Obtain location approximate in small area
- Integrate the two systems to obtain Localisation for Hexapod
- Demonstrate motion of Hexapod by taking location input from Localisation setup –
Follow pre-planned path, etc.

Requirements

- Hardware:
 - ZigBee + Arduino : Individual nodes - x5
 - Tiva : Main controller on bot - x1
 - Servo : For leg motion - x18
 - Hexapod frame (laser-cut parts)
 - Battery/DC adapter as required
- Software
 - FreeCAD : DXF File formatting for laser printing of parts
 - XCTU : Zigbee configuration
 - CC Studio : For Tiva programming

Challenges

- Wifi Localisation accuracy: In the research papers we have referred to, error in location value is 10-15%. This may become problematic for small area of 1x1m.
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- Hexapod Power : Hexapod will require 18 servos, which will draw a lot of power. We may face problems if the battery used is not capable enough to meet demands.
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- We need to implement complex trilateration algorithm to determine location from distance data. If implemented on Tiva (bot computing its own location), the performance may not be enough. Else we will have to connect one of the anchor ZigBees with a laptop which will do computation.

Deliverables

- Hexapod Model
- Servo Controller
- Orientation calculator using magnetometer
- Hexapod control structure
- Individual Wifi Nodes
- Profiling results
- Location using trilateration
- Final system

Test Strategies

- Hexapod control structure : Check linear and angular motion accuracy
- Orientation : Verify magnetometer results with actual orientation
- Profiling results : Error in the distance from individual nodes
- Location using trilateration : Error in the location of the bot
- Final system : Check integrated functioning of both the subsystems
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- *P.S : Some of the deliverables have been merged.*
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Timeline

