Cambot

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Autonomous machines need localization and mapping algorithms (SLAM)

Improving SLAM algorithms is an area of active research

The high-speed data and signal processing of FPGAs makes them well suited for this task.
A Hexapod!
Base Goals

- Hexapod moves and doesn’t crash into things
- Robot can be seen and tracked with camera
- Robot is directly user controlled
- Movement commands are wirelessly transmitted to robot
Implementation - Overview

- **Lab kit**
  - Tracks Robot with Camera
  - Translates User Input to Movement Commands

- **Nexys3**
  - Controls Movement

Data flow:
- Camera
- User Input
- Xbee
- Hexapod
Peripherals

- VGA screen
- NTSC Camera
- Distance Sensors
- Twelve Servo Motors
Labkit FSM

- Modules for NTSC to VGA, image recognition, mapping, user control
- Turns user input and mapping into directions for the hexapod
Hexapod FSM

- Modules for distance sensors, motor control, and xbee communication
- Turns directions from labkit into motion
- Override directions if about to run into object
Xbee

- Easy to use RF Module
- Configure on Computer
- Treat RF communication as UART
Secondary Goals

- Allow users to select a point on the screen
- Map best path to that point
- Additional Requirements:
  - obstacle recognition
  - heuristic algorithms
  - better motor control
Stretch Goals

- Have robot follow a second object
- Additional Requirements
  - More object recognition
  - Improved mapping algorithm
Timeline

**Nov 15** - Implement Xbee interface between fpgas
  - Start work with distance sensors
  - Camera streams in color, start image recognition

**Nov 22** - Build Hexapod Kit
  - Implement motor controls
  - Finish distance sensors
  - Image recognition working, start move to point

**Nov 29** - Implement mapping algorithms
  - Implement object tracking

**Dec 6** - Debug