Cambot

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Robots & SLAM

Autonomous machines need localization and mapping algorithms (SLAM)

Improving SLAM algorithms is an area of active research

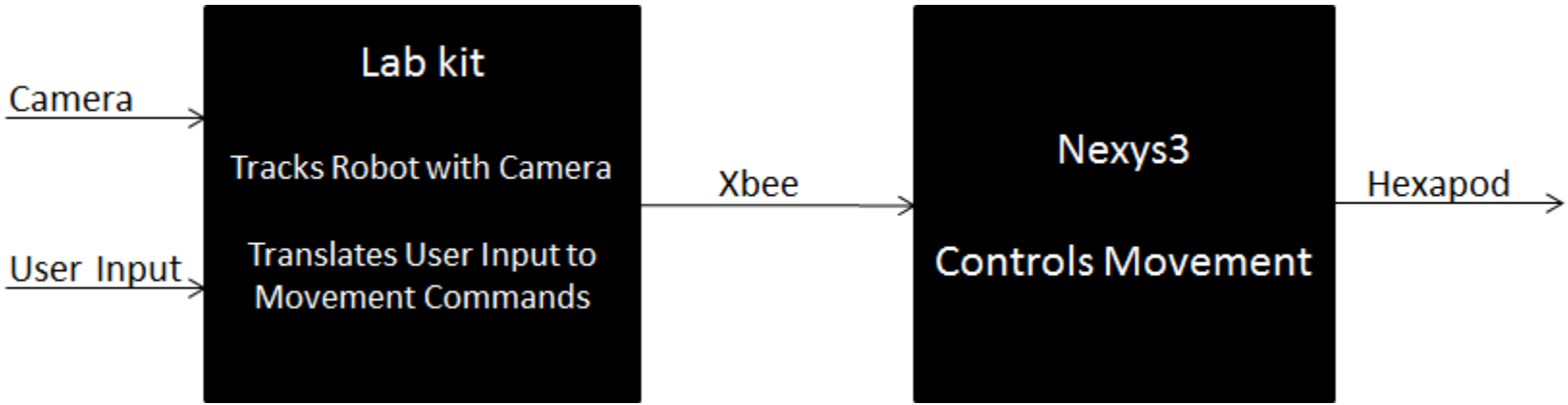
The high-speed data and signal processing of FPGAs makes them well suited for this task.

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



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