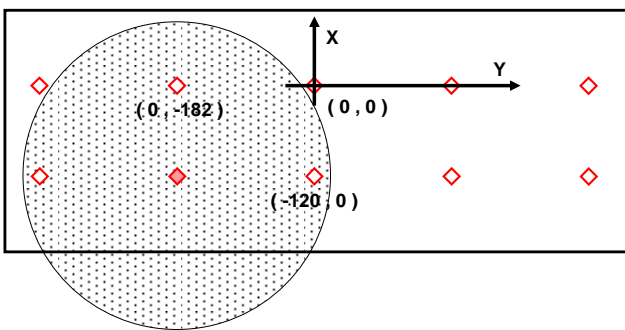


What is the Cricket Indoor Positioning System?

- A system that enables devices to determine their position while indoors.
- Cricket units are programmed as either beacons or clients.
- Beacons are mounted on a ceiling above the mobile clients.
- Cricket units give positions as precise as 2 cm.

Experimental Environment

- The Cricket setup consists of 10 ceiling-mounted beacons.
- Beacon units can detect ultrasonic signals within a 40° cone, which translates to a 205 cm radius.
- To determine orientation, one client is placed on the front of the robot, and one is placed on the back.

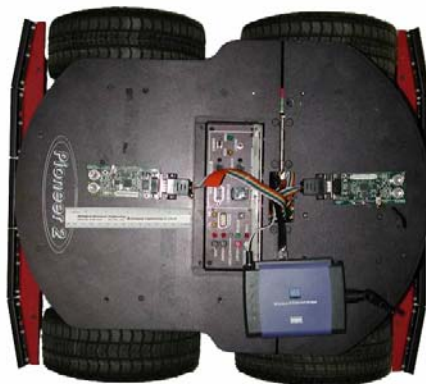


Cricket Technology

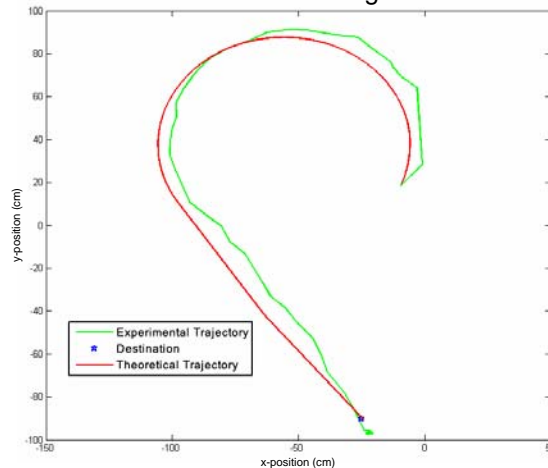
- A master client synchronizes all Cricket units by sending an RF clock pulse.
- Each client has a time slice during this clock pulse to send an ultrasonic signal to beacons in range.
- Beacons in range respond with distance from client over RF.
- Client then determines its position by using distance data from three beacons.

Algorithms and Software

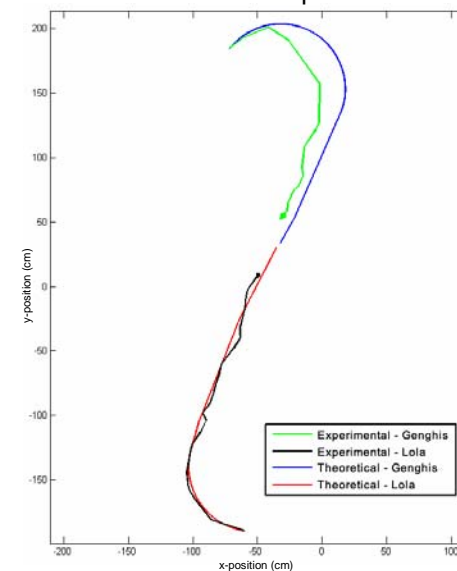
- Cricket units use Bancroft's algorithm for triangulating a client's position using distances from three beacons within range.
- A Kalman Filter is planned to improve position estimates when noise is present.
- Communication between robots is accomplished through CORBA-enabled server/client platform.
- MDLe (motion description language) motion control software is used to specify a robot's task.
- Robot feedback control law is simulated in Matlab for comparison.



Robot is tasked to drive to designated destination.



Robots Genghis and Lola are tasked to rendezvous under a mutual pursuit law.



Practical Applications

- Guidance systems for robotic assistants in the home or workplace.
- Task completion through cooperation with other robots.
- Cricket technology simulates GPS indoors for applications to unmanned aerial and ground vehicles.

