

# Robotics and Sensing Research Laboratory

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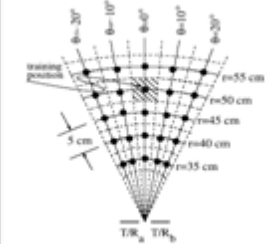
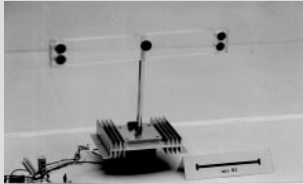


**Research Interests:** intelligent sensing, sensor-based robotics, sensor data fusion and integration, ultrasonic, optical, and inertial sensing, human motion analysis and differentiation

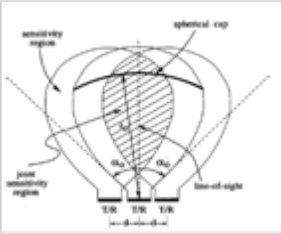
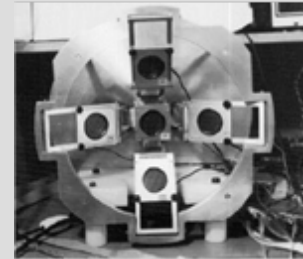
## Ultrasonic Sensing



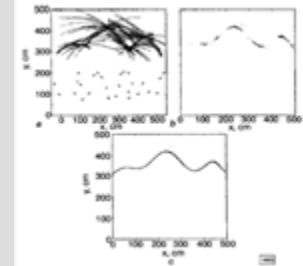
• target differentiation



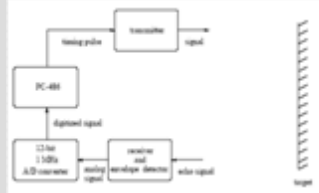
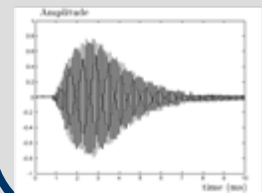
• radius of curvature estimation



• surface profile determination

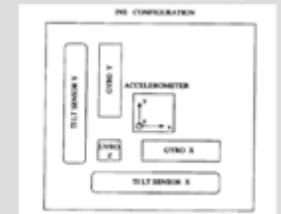
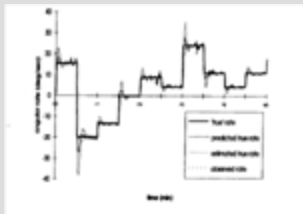


• range estimation



## Inertial Navigation Systems

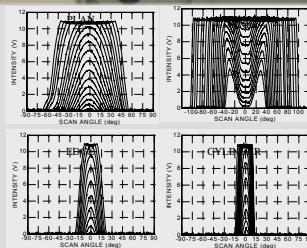
- evaluation of INS
- sensor data fusion and integration
- Kalman filtering



## Infrared Sensing

• target differentiation and localization

• range estimation



## Other Lab Capabilities



## Research Grants

- Fusion of Odometry, Gyroscope, Laser and Sonar Data and its Application to Mobile Robotics (TÜBİTAK grant)
- Target Discrimination for Sonar Sensor Networks for Mobile Robot Applications (NATO-Collaborative Research Grant)
- Intelligent Sensor Systems for Mobile Robots (TÜBİTAK and British Council grants)
- IST-Turkey: New Information Society Technologies for Turkey, Intelligent Systems Group (TÜBİTAK grant, Principal Investigator: Prof. A. B. Özgüler)

## Selected Publications

- B. Barshan, "Directional processing of ultrasonic arc maps and its comparison with existing techniques," International Journal of Robotics Research, 2007.
- B. Barshan, T. Aytac, and R. Çağrı Yüzbaşıoğlu, "Target differentiation with simple infrared sensors using statistical pattern recognition techniques," Pattern Recognition, 2007.
- T. Aytac and B. Barshan, "Differentiation and localization of targets using infrared sensors," Optics Communications, September 2002.
- B. Barshan and D. Başkent, "Morphological surface profile extraction with multiple range sensors," Pattern Recognition, July 2001.
- B. Barshan, B. Ayrulu, and S. W. Utete, "Neural network-based target differentiation using sonar for robotics applications," IEEE Transactions on Robotics and Automation, August 2000.
- B. Barshan and H. F. Durrant-Whyte, "Inertial navigation systems for mobile robots," IEEE Transactions on Robotics and Automation, June 1995.