Title: Perception of 3d Objects With Ultrasonic Sensing For The Control Of a Tethered Aerial Robot

Description:
We have developed a robot that swings from the roof, that can be used to investigate the outside of buildings or the inside of vertical mine shafts. The robot is controlled by an onboard Parallax Basic Stamp to achieve commands communicated wirelessly from a Macintosh Host. Previous projects have involved developing both the robot and the control software. The aim of this project is to solve the problem of measuring the environment around the robot with ultrasonic sensors to obtain data suitable for both controlling the stable flight of the robot and navigating it to locations of interest. To achieve stable flight we believe that we have to perceive the location of the robot relative to 3D objects in its environment. To navigate we believe that we have to perceive the extent of those objects and follow them. A serious difficult that is to be investigated is that objects come in and out of the field of view of the sensors as they move. We believe the solution to this difficulty involves directed sensing: predicting where to sense based on expected motion.

Expected outcome:
A model of perception of 3D objects with ultrasonic sensing suitable for the control of the motion of a swinging robot in 3D space.

Reference:

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