PAL Ultrasonic Robotic Buddy

Michael Cecere
May 2008

- PAL will be my remote control truck, a Traxxas Stampede, being controlled by a microcontroller to locate the hand-held control unit in 2 dimensions, and maintain a specified, programmable distance from that control unit.

- Operational Flow for angular location lockin

    1. Remote sends out US burst at 40KHz. either a single pulse or multi-pulses to assist in identification/echo elimination.
        1. each pulse consists of approx. 10 40KHz oscillations.
    2. Remote starts listening on the analog channel for the artificial echo from the Control unit
        1. a sequence of, say, 3 pulses are sent from the Control in order to distinguish from an echo.
        2. each pulse is approx. 10 oscillations,
        3. each pulse is separated from each other by approx. 1.25mS.
        4. signal is identified by identifying three pulses.
        5. average amplitude of pulses is calculated
        6. time position of pulses is calculated
        7. distance is calculated
    3. Remote sensor angle is changed
    4. resultant amplitudes are compared
    5. Remote sensor angle is changed according to angle difference
    6. if nothing is changing, stop scanning and wait for signal amplitude to change by x%

Distance Maintenance Interrupt

1. if (Dist_Remote > Dist_Goal) move Forward
2. if (Dist_Remote < Dist_Goal) move Reverse

Angular Maintenance Interrupt

1. if (Angle_Sensor_Remote > Angle_Max_Lock) // move towards right
    1. if Forward then turn Right // in proportion to difference in angle
    2. if Reverse then turn Left
2. if (Angle_sensor_Remote < Angle_Max_Lock) // move towards the left
    1. if Forward then turn Left
    2. if Reverse then turn Right