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CSCI 3302 HW 3

1. Ultrasound sensor distance x = (c*deltaT)/2

If deltaT grows then the returned distance is longer, and if deltaT is small then the distance to the object in shorter. The distance to an object is relative to how long it takes the speed of sound to reach an object and repel back to the senor.

2. Unicycle that turns with angular velocity phiDot, and has radius r. Speed v = f(phiDot, r) = r*phiDot
   Use the error propagation law to calculate the resulting variance of your speed estimate.

Derived from equation 8.1 in textbook

$\sigma^2_v = r^2 * \sigma^2_{phiDot}$

3. Probabilistic localization scheme
   a. P(marker|reading) = P(reading|marker)*P(marker)/P(reading)
   b. Reading correct .9 and wrong .1, and marker seen .8 and missed .2
      P(marker3|reading) = .20 * .20 * .90 = 0.036
   c. Could the robot also possibly be underneath marker 4?
      Yes, with very low probability -> (.20)*(.20)*(.20)*(.1)*(1/3) = 0.000267