Welcome to Artificial Intelligence for Robotics, also called "Programming a Robotic Car"!

Don't forget to check out [wiki](https://www.udacity.com/wiki/cs373) for course notes, additional explanations, examples and extra materials!

**Note:** Much of the content in this lesson assumes you have a good map first. Without it, the techniques here either won't work or won't work very well. There is also another version of localization called SLAM, or Simultaneous Localization and Mapping, that does not need a good map prior to beginning.

**Clarification Regarding Entropy**

The video mentions that entropy will decrease after the motion update step and that entropy will increase after measurement step. What is meant is that that entropy will decrease after the measurement update (sense) step and that entropy will increase after the movement step (move).

In general, entropy represents the amount of uncertainty in a system. Since the measurement update step decreases uncertainty, entropy will decrease. The movement step increases uncertainty, so entropy will increase after this step.

Let's look at our current example where the robot could be at one of five different positions. The maximum uncertainty occurs when all positions have equal probabilities [0.2, 0.2, 0.2, 0.2, 0.2][0.2,0.2,0.2,0.2,0.2]

Following the formula Entropy = \Sigma (-p \times log(p))*Entropy*=Σ(−*p*×*log*(*p*)), we get -5 \times (.2)\times log(0.2) = 0.699−5×(.2)×*log*(0.2)=0.699.

Taking a measurement will decrease uncertainty and entropy. Let's say after taking a measurement, the probabilities become [0.05, 0.05, 0.05, 0.8, 0.05][0.05,0.05,0.05,0.8,0.05]. Now we have a more certain guess as to where the robot is located and our entropy has decreased to 0.338.