

The Robot Doctor

Episode 104: Robot Localization

Common Core Standards:

- Circle Equation:
 - Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.
 - Intersection Points of two Circle Equations
- Roots of quadratic equations

Review:

Robots need to find their position on a map relative to landmarks

1. Identify at least 3 landmarks whose position is known on the map
2. Determine range to the landmark
3. Calculate the intersection point of the range circles

To find the intersection of 3 circles:

1. Use the equation for a circle: $(x-a)^2 + (y-b)^2 = r^2$ for landmarks located at (a,b) and at a range of r
2. Find the radical line by subtracting the two circle equations
3. Substitute back into one of the circle equations to get a quadratic formula in terms of one variable
4. Solve the quadratic equation to find the two value for that single variable
5. Substitute back into the radical line equation to get the two values for the other variable
6. Substitute these two points into the third circle equation to determine which point the robot is at

