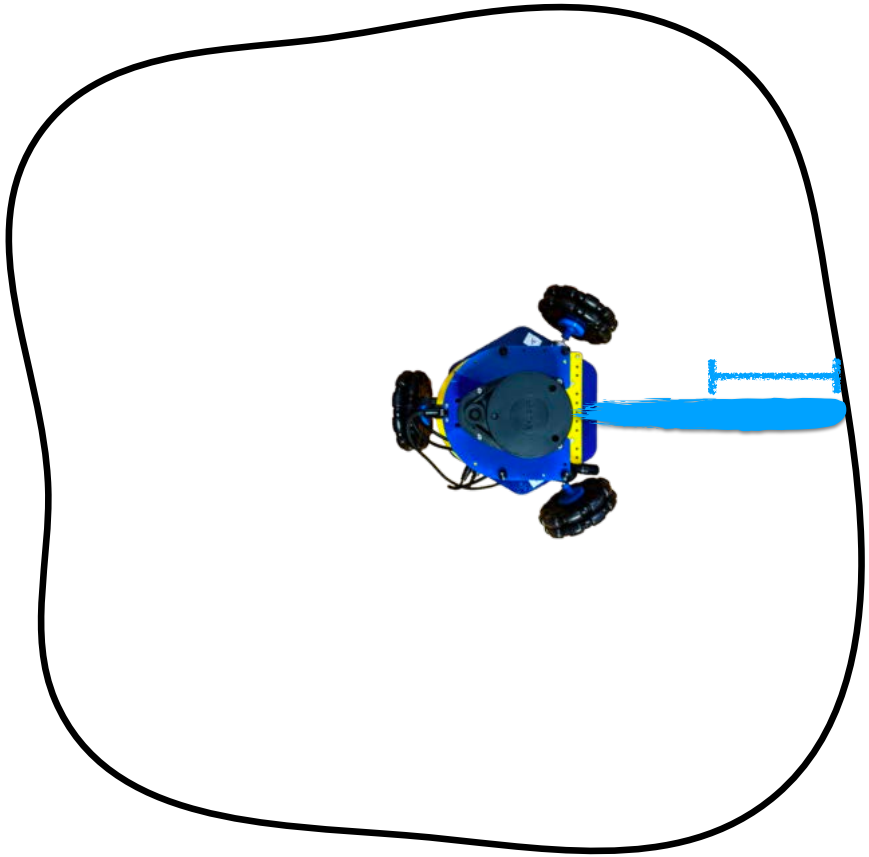
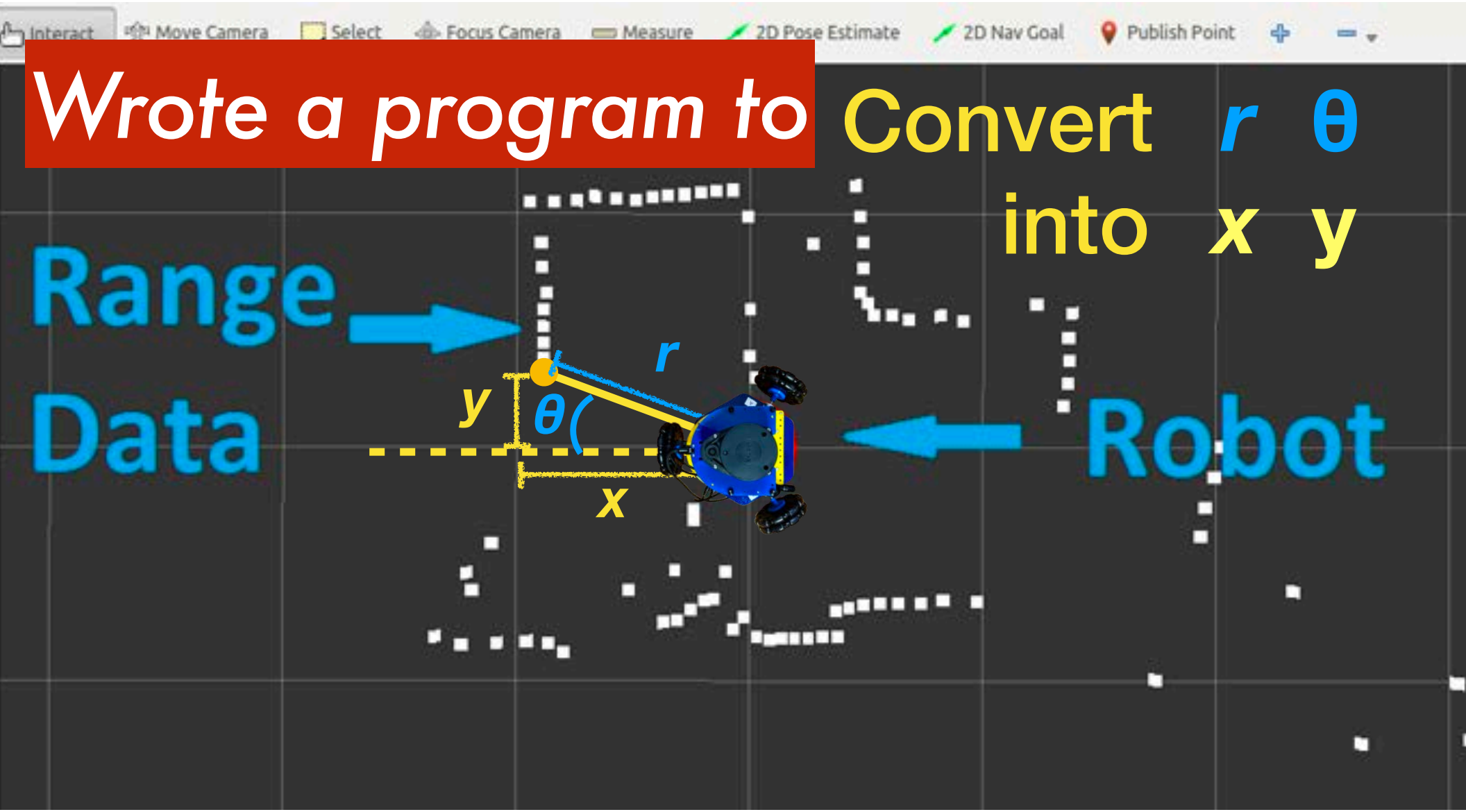
Robotics 102 (Sep 13 2021)

- Project 0 (Pocket Calculator)
- Continuing: Range scan conversion (if not already done)
- In-class Activity: Bang-Bang Control (optional, but encouraged)
- Open Q&A

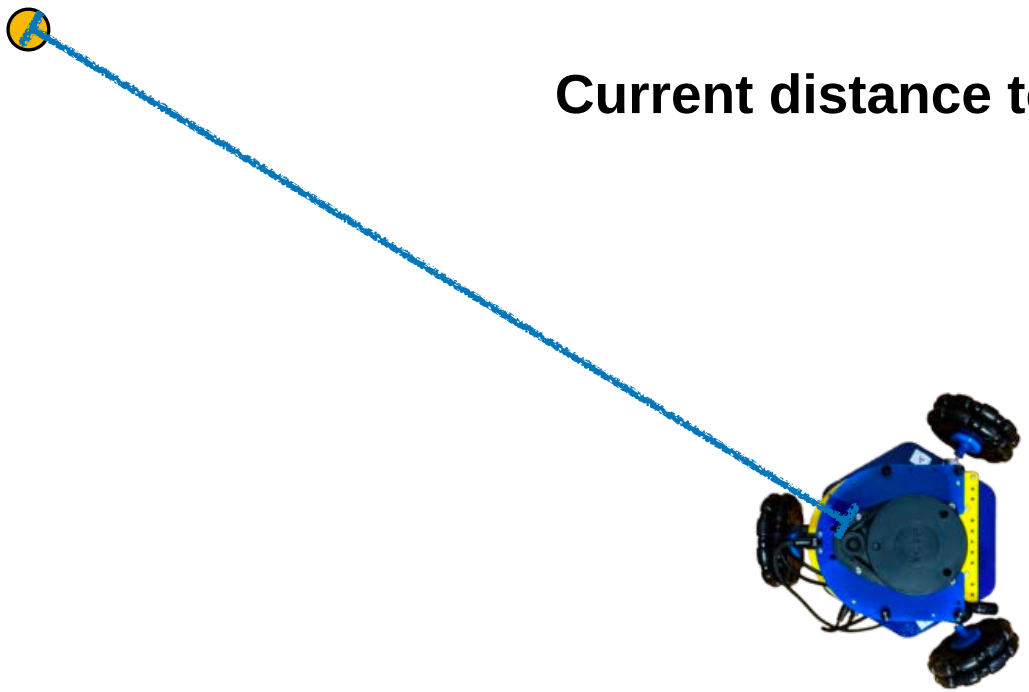


Last class: Convert range into point


Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Wrote a program to
Convert r θ
into x y
Range
Data
Robot
r
y
θ
x

Now

Move robot close to wall



Current distance to nearest wall

Now

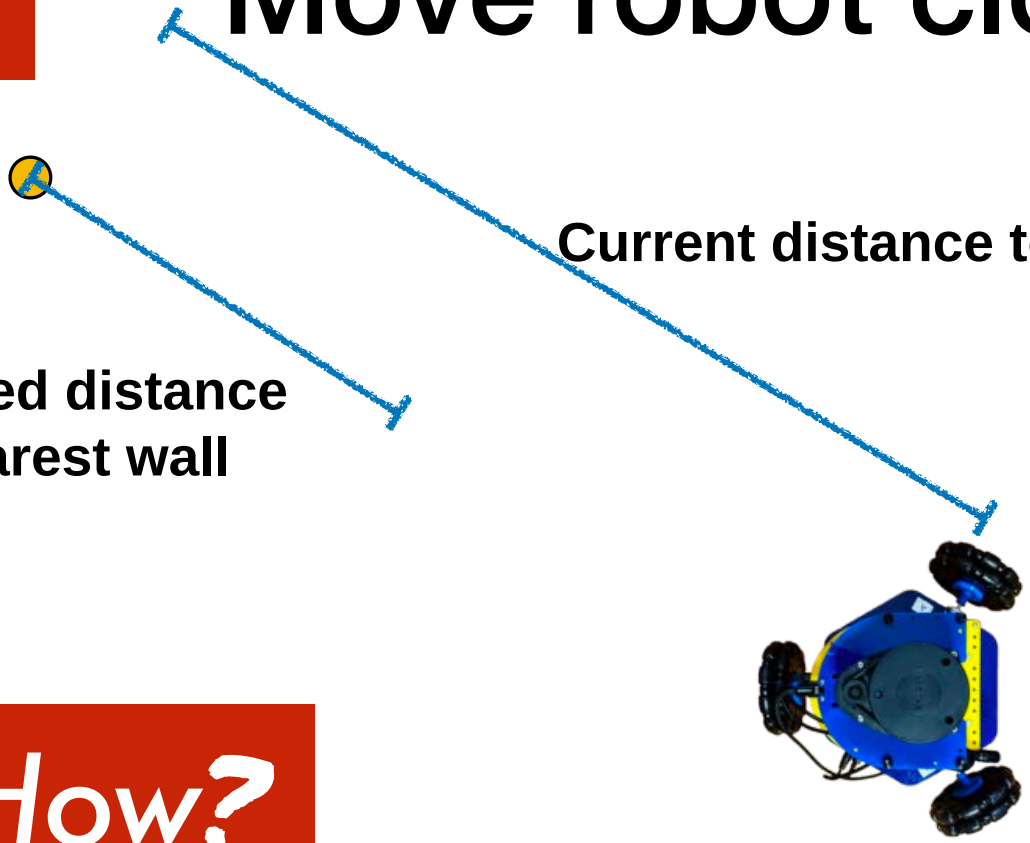
Move robot close to wall

State:
Current distance to nearest wall

Setpoint:
Desired distance to nearest wall

Now

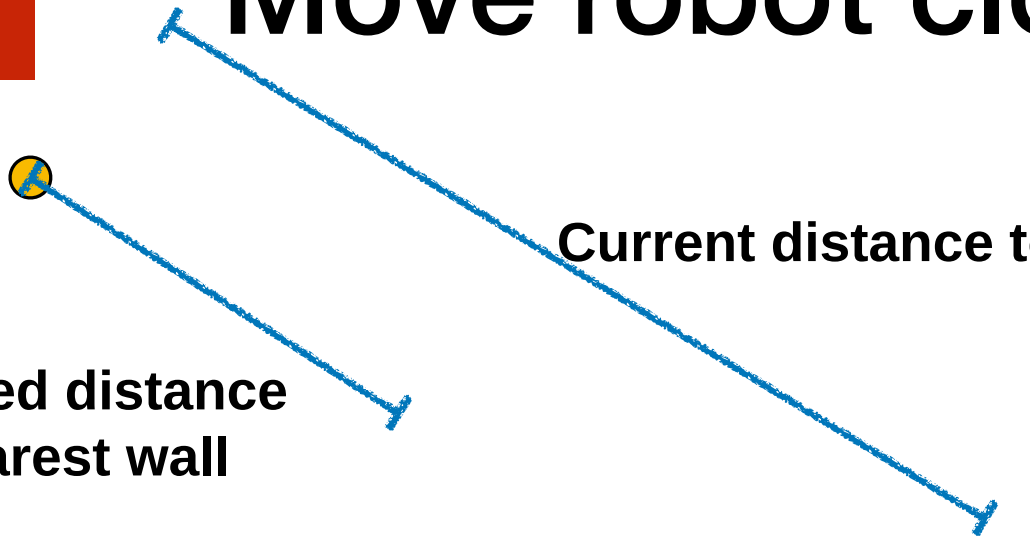
Move robot close to wall



How?

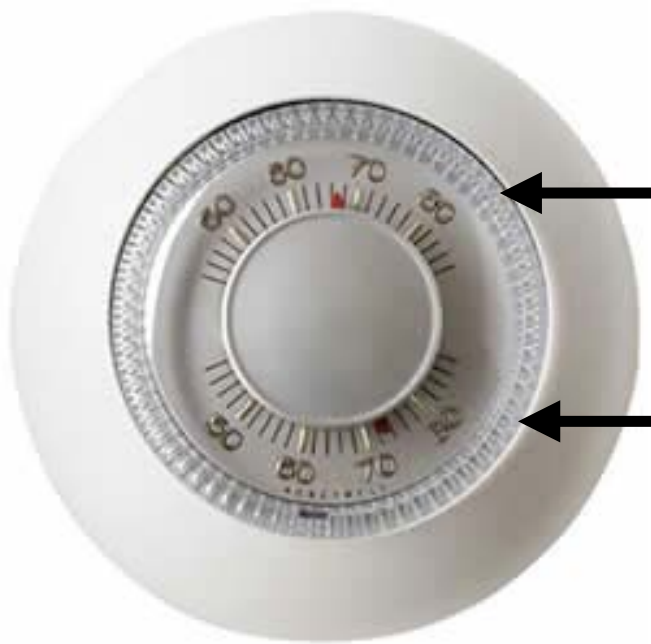
Now

Move robot close to wall



How does a
thermostat work?

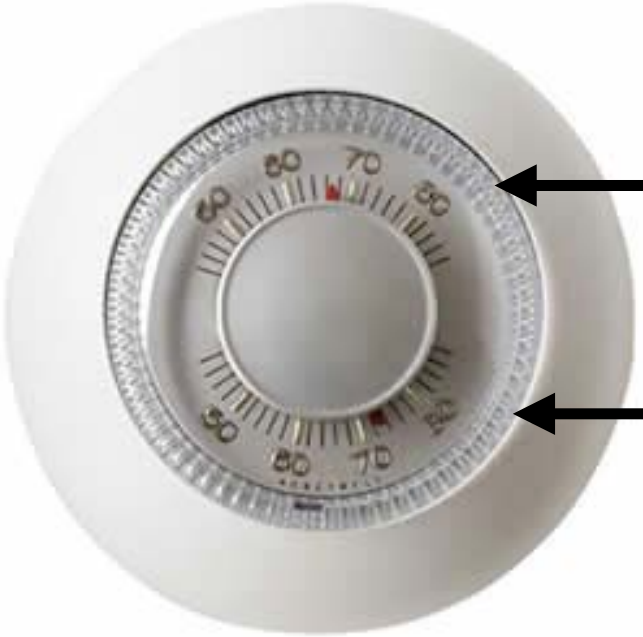
Setpoint Control



Desired temperature (setpoint state)

Current temperature (current state)

Bang-Bang Control



Desired temperature (setpoint state)

Current temperature (current state)

If current state is greater than setpoint, turn on air conditioner

If current state is less than setpoint, turn on heater

If current state is close enough to setpoint, do nothing

Repeat forever

Write a program for Bang-Bang Control

Asks user for 4 numbers:
- **Setpoint state**
- **Initial state**
- **Control magnitude: amount to change state**
- **Allowable margin: as “close enough”**

Main function performs an infinite loop that calls a Bang-Bang control function

At every loop iteration, output the desired state and the current state

If current is greater than setpoint, decrease temperature

If current is less than setpoint, increase temperature

If current is close enough to setpoint, do nothing

Repeat forever

Testing

Try these inputs

Setpoint state: 77.9
Initial state: 72.4
Control magnitude: 0.1
Allowable margin: 0.2

Once working,
show a course staff member your output