

# Extending Human Capabilities with Robots and the Internet

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# What I've been doing



# Topics

- What is Robotics
- Technologies
  - Microcontrollers
  - Networking
  - The Cloud
    - Storage
    - Computing
    - Crowd sourcing
- Questions

# What is Robotics?

- Do things you couldn't otherwise do
- A design spec:
  - “It should just work”
- Robotics is how we do that
  - Make the world more like data

# Great Promises



# Microcontrollers

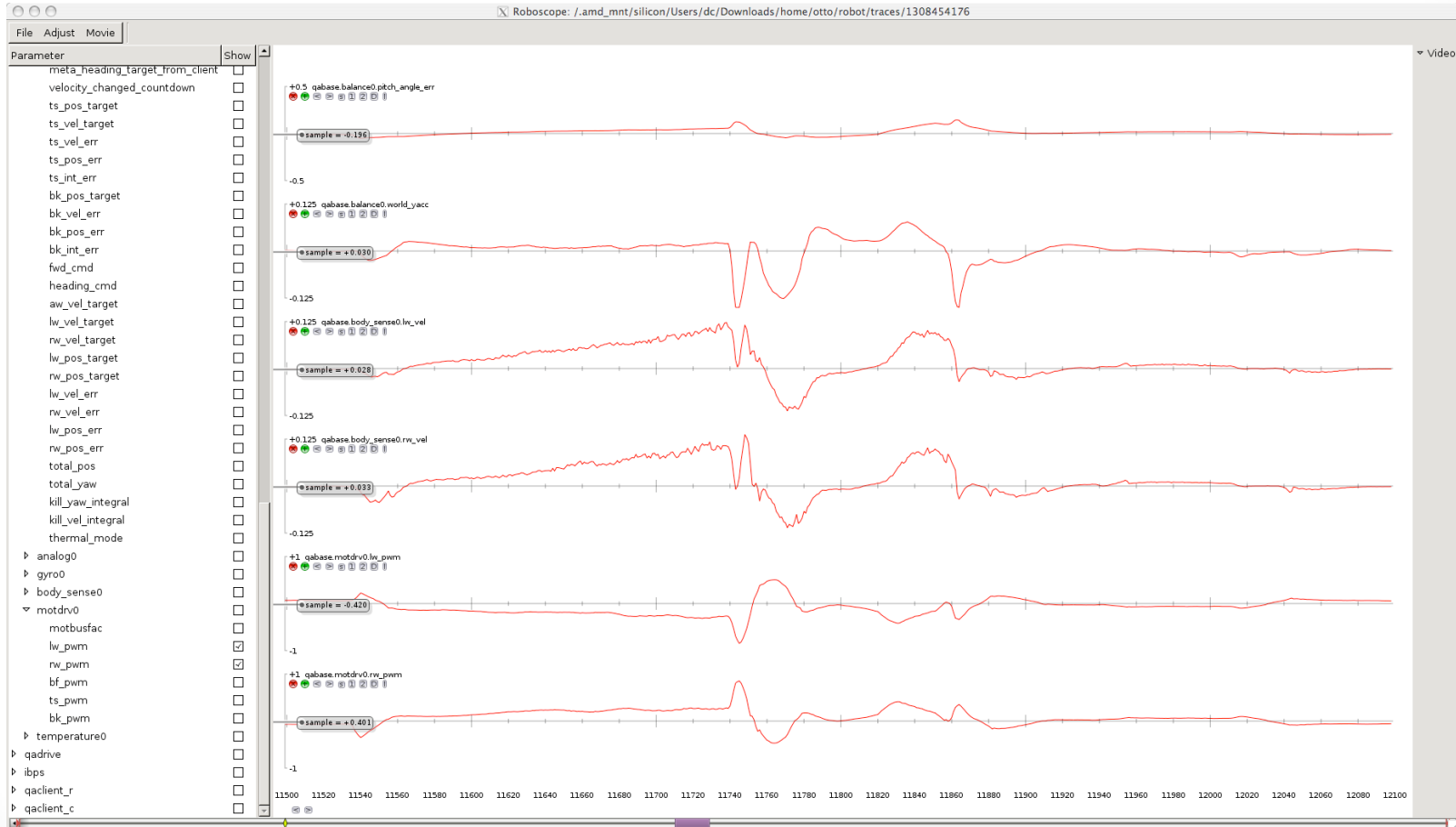
“Control systems are difference  
between ‘that's a neat toy’ and ‘how on  
Earth does it do that?’”

# Software Solutions: Mechanical Benefits

- Stable on 2 wheels
  - Lower mechanical complexity
  - Energy efficiency
  - Speed
  - Agility

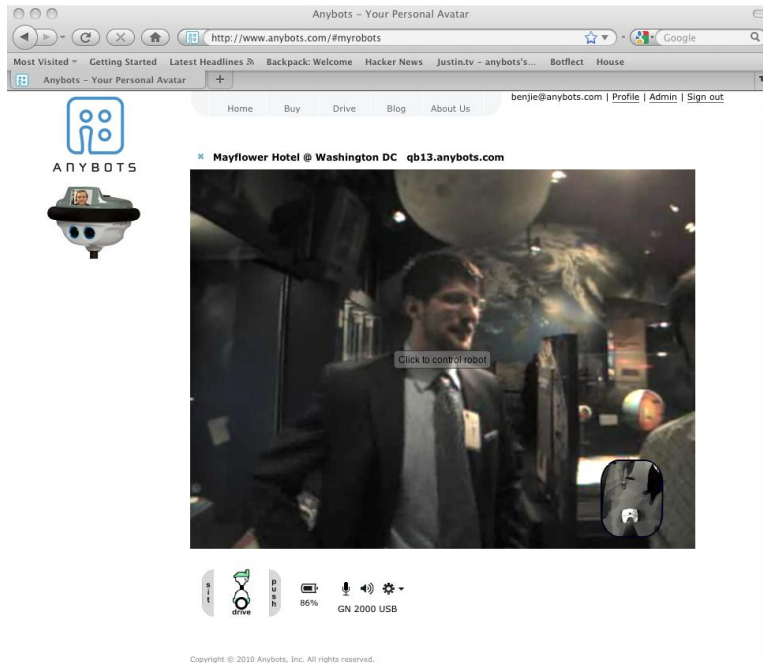


# Turning the world into Data





# Networking



- Flexibility
- Wireless broadband
- Support
- Human in the loop

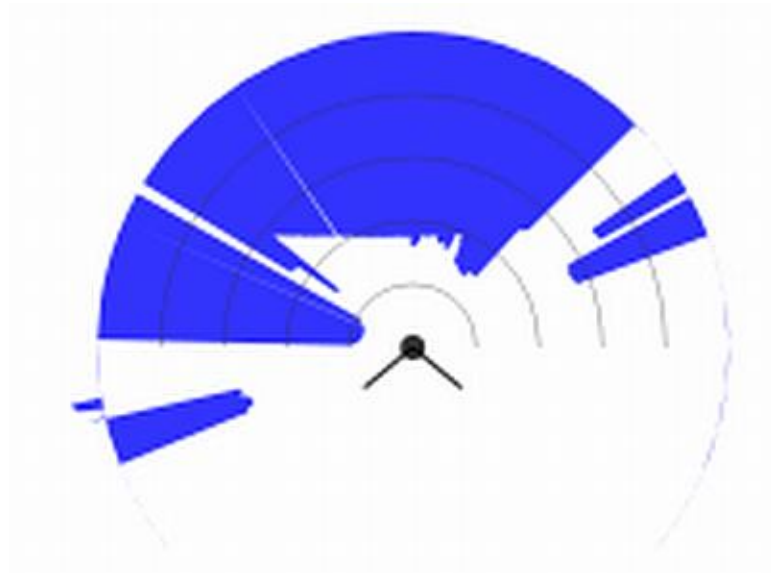
# Incremental Autonomy

- Automate what's easy now
  - Do the rest as you go
- Character of the network
  - Bandwidth
  - Delay



# Autonomy on QB

- Balance
- 2 second navigation
- Future:
  - Building navigation
  - Docking
  - Tasks?



# Distributed System

On board:

- Low level
- Real time



Command Center

- User input
- Goals
- Strategy

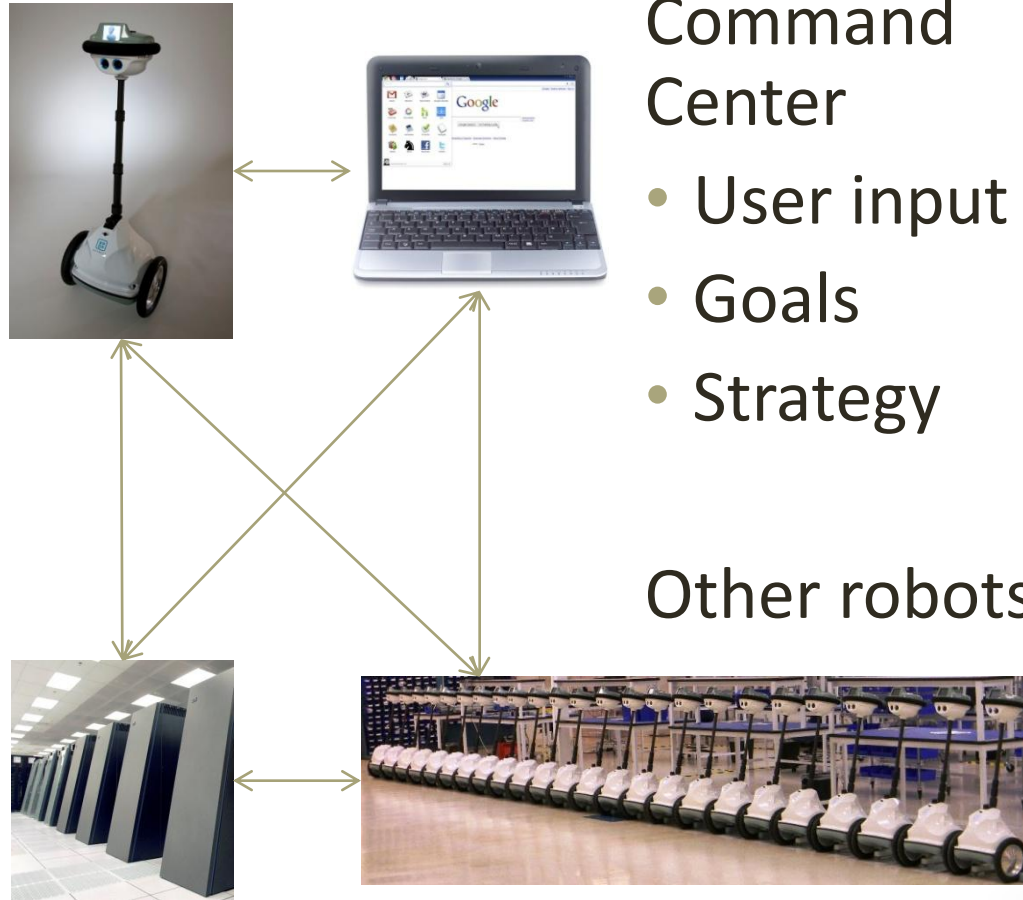


Server

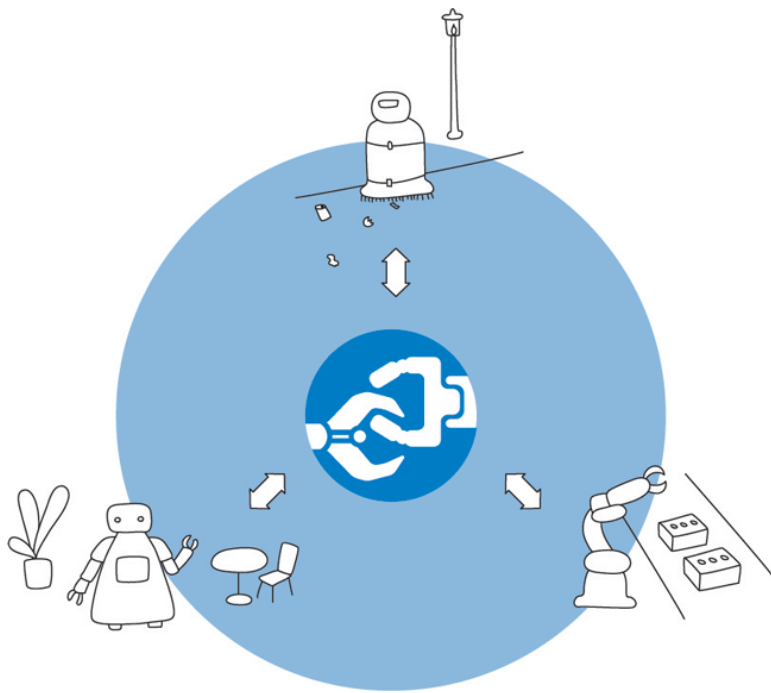
- Memory
- Diagnostics
- Recognition



Other robots



# Cloud



- Doesn't all have to fit in the box
- Unlimited storage
  - Database
  - Learning
- Super computer on robot
- Crowd Sourcing

# Conclusions

- Programmable physical systems
- Record (everything) and learn
- Don't have to automate everything at once
- Use the network to put functions where there are resources
- Make it “just work”