

# Robotics Basic Intro

- Everybody has access?
- Any questions?

# A few Jargon terms for robotics

- Sensor
  - Reads some aspect of the environment and turns that into digital form
- Actuator
  - Robot component that moves robot parts
- Effector
  - Robot component that allows the robot to affect/manipulate the world
- So give me an example of the difference between the last two

# Actuator vs Effector

- An example of an Actuator vs Effector
  - Actuator: motor
  - Effector: wheel
- Or Charlie Brinson's snake
  - <https://www.youtube.com/watch?v=UZk6bdwudDg>
    - Actuator: hydraulics
    - Effector: snake segment.
- Modern Snake
  - <https://www.youtube.com/watch?v=uaKALB5brmY>

# Give me more

- Give me another example of a robot
  - With actuators and effectors

# At least one control unit required

- Robots also need a controller
  - Robot controller
  - Micro controller
- Controllers are usually single board computers
  - Including the processor and I/O
  - Generally I/O has hardware to prevent current spikes from hitting rest of board
  - How many of you have released the magic blue smoke?
    - In comp206? On your own?

# Robots: Evaluate in Context

- When evaluating a robot,
  - Most roboticists look to three things
    - The Robot
    - The Task
    - The Environment
- The Hughes&Hughes book (Robot Programming: A Guide to Controlling Autonomous Robots) calls this
  - Robot skeleton and scenario (lumping task and env)

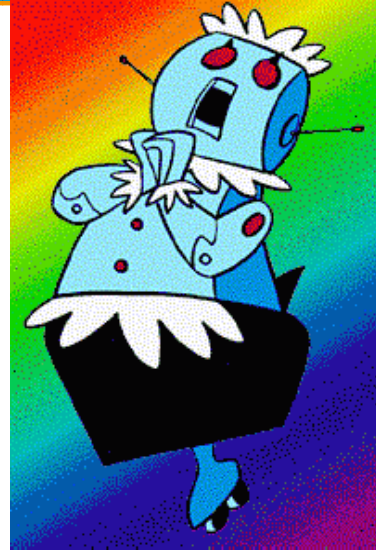
# Robots in Context

- So robot, task and environment
  - Lets look
  - Tell me about a robot that is out there
    - Either in your life or in the news
  - And lets look at the other two



# Intelligence vs. “Common Sense”

- According to the prognosticators
  - We should have had general purpose servant robots by turn of century.
  - Most of you were born after that.
- Why don't we?
  - Industrial robots build or help build most of our goods.
  - Roombas and starship are available.



# Lenat's "Mow your baby problem"

- General purpose servants were to
  - Mow your lawn
  - Mind your baby
- What could possibly go wrong!??!

# Lenat's "Mow your baby problem"

- General purpose servants were to
  - Mow your lawn
  - Mind your baby
- Robots, even intelligent ones have no "common sense"
  - Would just as soon "mind your lawn and mow your baby"
- So current robots in general public use small enough to be relatively harmless.
- Ref Soft robot research

# “Intelligent” Robots

- Intelligence in the AI sense
  - Often doing something that traditionally only people/humans have been able to do.
- Agent-Task-Environment.
  - Intelligence: performing a task in an environment as well as a person might.
  - Some claim never an all-purpose intelligent robot.
    - I disagree. Not anywhere close yet though.

# Once upon a Time

- Once Upon a time,
  - Robotics researchers proposed that robots should do only the 3ds: “dirty dull or dangerous” jobs
  - Once – must be a good 15 years ago.
  - Today there is a realization that robots are coming
    - With it big, disruptive changes

# Once upon a Time

- People made things at home and sold them:



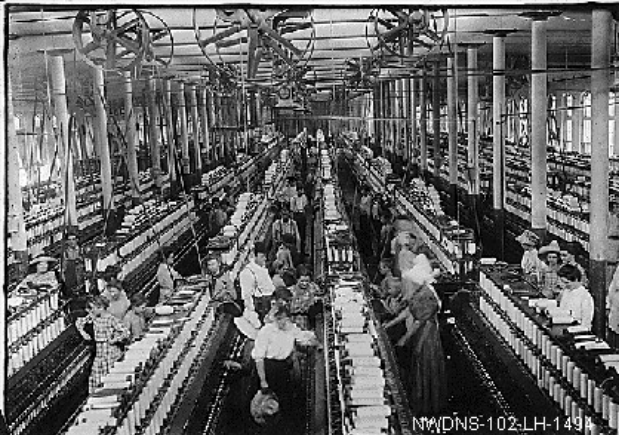
A WINTER EVENING IN THE BAVARIAN TYROL.

THE ILLUSTRATED LONDON PICTURE, VOL. 8, 1871, 1872



# And Then....

- The Industrial Revolution came:
  - Fewer workers produced more goods for cheaper cost
    - Lots of jobs lost – instability/disruption
    - Working conditions etc.
    - 4-7 Generations in Western Europe
    - 2 in a lot of places today.



# Luddites

- And so we had the Luddites
  - Who destroyed textile machinery to try to slow/stop industrial revolution.
    - Or perhaps to just express frustration with something destroying their way of life
  - Does that remind you of anything recently?



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  - <https://futurism.com/brutally-assaulting-robots>
  - [https://www.youtube.com/watch?v=X3C\\_rpUTYuk](https://www.youtube.com/watch?v=X3C_rpUTYuk)
  - And of course some old school
    - <https://www.kurzweilai.net/first-attack-on-a-cyborg>
    - <https://www.dezeen.com/2014/03/10/women-attacked-in-san-francisco-for-wear>

# Today

- Amazon
  - Tell me about it
- Fast food
  - Again you tell me
- Others?

# A long long time ago

- In a building on the other side of campus....
  - When we could see this coming, but it wasn't here yet
  - A student asked me if I thought it was ethical to be teaching them robotics

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  - A student asked me if I thought it was ethical to be teaching them robotics
  - My answer: yes – would you rather all the knowledge and all the decisions be in the hands of the wealthy MIT/Stanford/CMU grads?

# Disruption

- We are on the cusp of the biggest disruptive change since the industrial revolution (or maybe World War II for some Mainland European and Asian Countries)
  - Yes it probably already started but now its really on
  - How will we deal with that
  - What will the nation and the world look like in 50 years?
  - We need to answer those questions – and steer the revolution

# For Example

- See news for one example
- And a few others
  - <https://singularityhub.com/2022/08/10/former-spacex-engineers-are-launching-a-startup-where-robots-make-pizzas-in-45-seconds/>
  - <https://nypost.com/2023/01/11/white-castles-robot-flippy-expedites-cooking-process/>
  - <https://www.avnetwork.com/news/order-up-robots-serve-it-up-at-korean-bbq-restaurant>
  - <https://www.npr.org/2022/12/21/1143475374/hotels-labor-worker-shortage-robots-automation>
  - <https://news.cornell.edu/stories/2022/11/autonomous-robots-help-mod>

# We hear about it

- And when we do have a larger robot working with the public– we hear when they go bad
  - From the annoying
    - <https://missionlocal.org/2022/12/pges-autonomous-security-robot-creeps-out-neighbourhood/>
    - <https://oecd.ai/en/incidents/91533>
  - To the dangerous
    - <https://www.sciencedirect.com/science/article/abs/pii/S0003687024001017>
    - `...we identified 77 robot-related accidents from 2015-2022. Of these, 54 involved stationary robots, resulting in 66 injuries, mainly finger amputations and fractures to the head and torso...`
- And of course the older one that changed the expectations of the industry
  - <https://www.npr.org/2019/11/07/777438412/feds-say-self-driving-uber-suv-did-not-recognize-jaywalking-pedestrian-in-fatal->

# A couple of thought exercises

- What is tipping for (in the US)?



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- What is tipping for (in the US)
  - Traditionally for great service Or at least good service
    - Largely due to the salary structure of the US service industry.
  - Do you think we should be "tipping" robots?
  - <https://nypost.com/2023/01/18/tipsy-robot-bar-pushes-back-at-tip-complainer/>
- How good is AI today?

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- How good is AI today?
  - With chatgptX and all the AI systems out there it seems promising right?
- And then reality:
  - <https://www.businessinsider.com/marines-fool-darpa-robot-hiding-in>

# So this semester...

- We'll look at what robots can do
- What they can't yet
- And a importantly, what they can do affordably
- And eventually we'll start thinking about securing these little mobile camera wielding, internet connected, gripper/hand equipped creatures that we're putting in our homes and businesses.

