Cyber-Physical Systems

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What are Cyber-Physical Systems?

- Robots, mechanical appliances, cars, ….

- What about automatic stock trading programs?

- Any programmable device? A massage chair? Microwave oven?

- What about Java-Script, Java, Python and other Web-languages?

- Where do sensor networks fit in? Their data may affect/control behavior.

It's the Software, Stupid!

- Bugs

- Updates

  - Source? Integrity? Communication path(s). Confirmations?

- (Strong) authentication of parties

  - Who/What can control? Configure? Receive data?

- Scaling up configuration

  - The 200 device house

Machine Learning and Artificial Intelligence

- The artificial idiot

  - Learns the wrong things

    - Chatbot story and Thermostat that tries to be helpful

  - Configures the neighbors devices into your house system

- Ephemeral or Episodic Access

  - Fire Department, Police Department ,Emergency Medical Response

Access Control and Security

- Residents vs Guests

  Differentiating among residents and among guests

  What happens after guests leave?

- Parents vs Kids

- Shop floor operations vs Administrative staff and visitors

Long Term Considerations

- Digital picture frames

  - Storage corruption (data and executables) and Power supply failure

- Custom (entertainment, lighting) systems

  - Bugs/reprogramming and Wi-Fi or other protocol dependencies

- Programmable light switches

  - Battery format dependency and Programming user interface (blech)

Major considerations

- Reliability and Ease of use

- Safety (https://arxiv.org/pdf/1606.06565v2.pdf)

- Security

- Privacy

- Autonomy (Your house should not stop working just because Internet access is down)

- Interoperability (of ensembles)