Cybersecurity in Unmanned Autonomous Systems (UAS)/Robotics: Public Perception of UAVs and Autonomous Vehicles

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RET Robotics Module

This research is supported by Award #1542465:
RET Site: Cyber Security Initiative for Nevada Teachers (CSINT)


» SECURITY «
Robots and Cybersecurity?

Major concerns with robotics and security

Privacy:

Robots are mobile sensing platforms.

What gets done with those data?

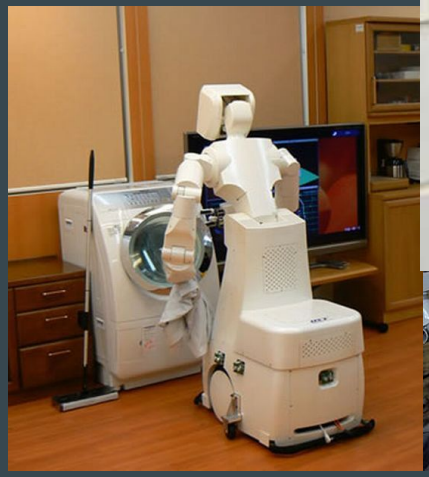
How is that sensing perceived?

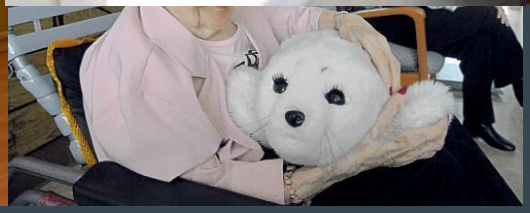
Data Security:

Data are transmitted wirelessly, how to secure data, while also allowing robot to function quickly?

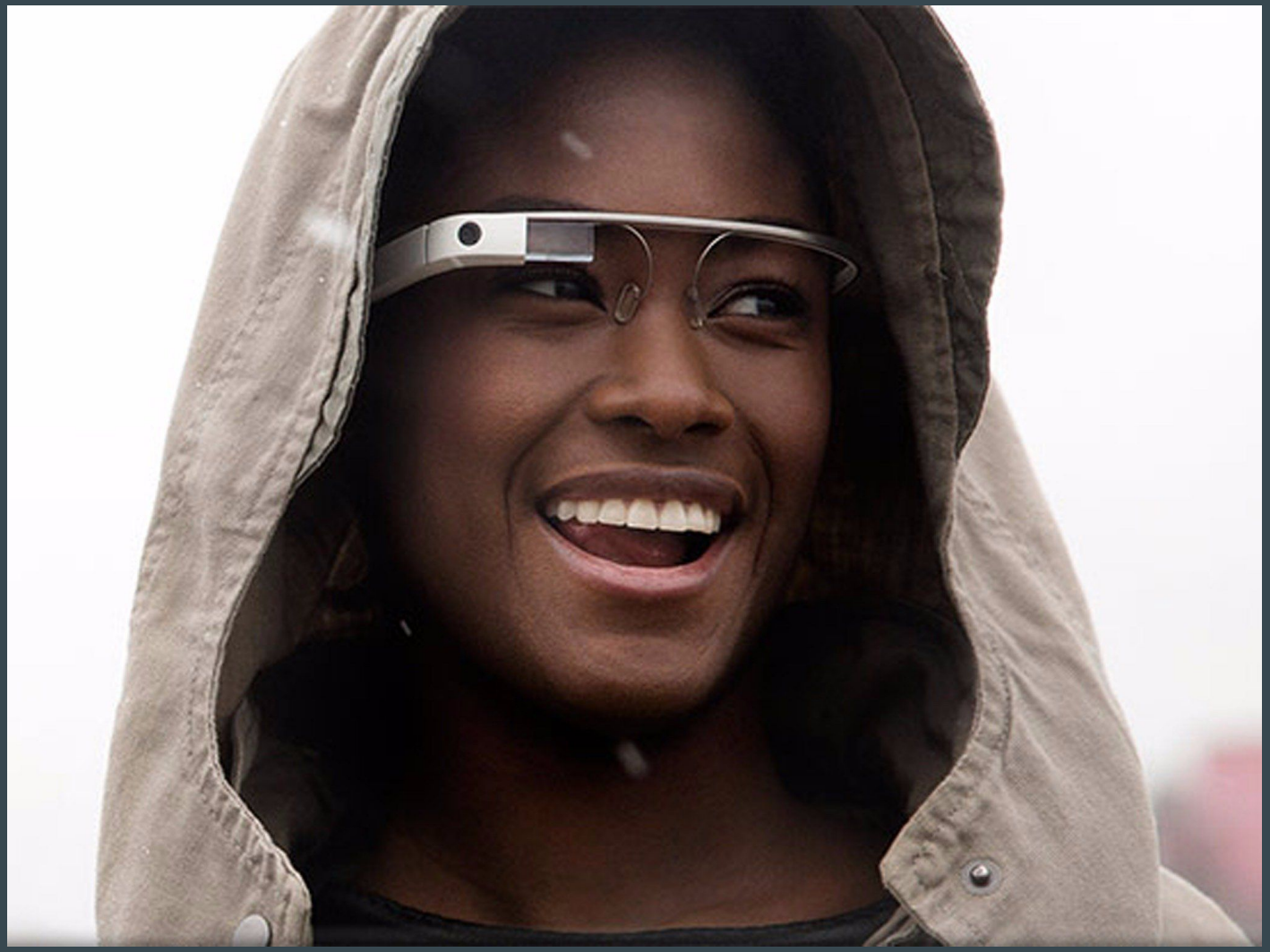
Who is allowed to know information that robot knows, how can it be securely transmitted?

Robots in our lives





Google Glass



Glasshole


Google Glass Is Banned
On These Premises
No Surveillance
Devices


NO FLY ZONE


MikeKeefeKINTOON.com 5·18·12 caglecartoons.com
DOMESTIC SPYING
IT FOLLOWED ME HOME... CAN WE KEEP IT?

Topics Covered

- Public Perception of Technology
- Survey Design
- Behavior Studies
- Paper Preparation/Publication

Lab Activities

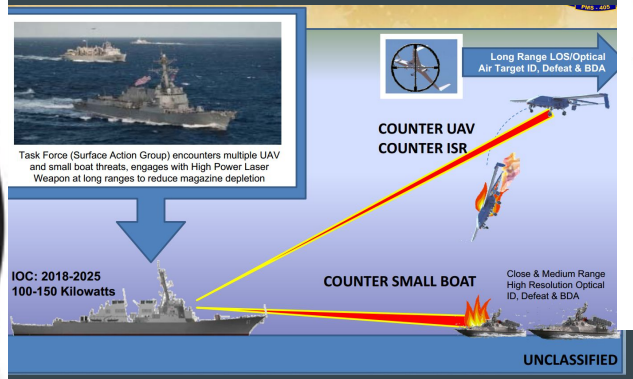
- To help teachers learn about robotics and cybersecurity, they will participate in in-progress lab activities
  - HRI studies
  - UAV piloting (where appropriate)
  - Data analysis
  - Literature review (as part of their module activities)
- Teachers will develop and conduct their own survey study
  - Only lab activity that could conceivably be completed in 4-week period
  - Work will be supported by graduate students/undergraduates experienced in conducting such studies

Experiment Premise

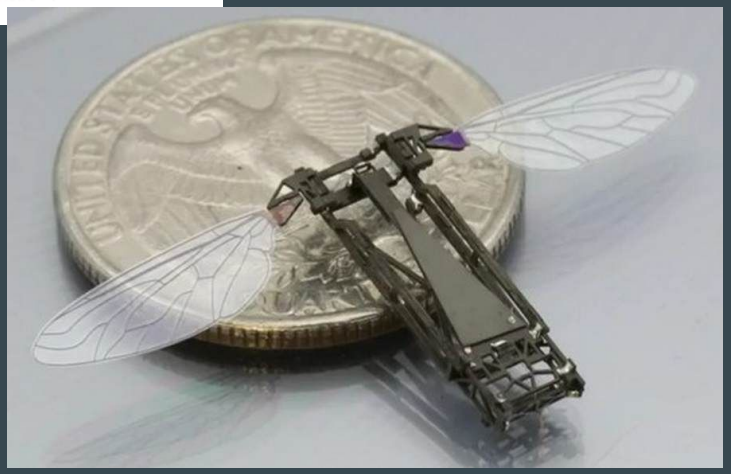
- Public perception of technology is shaped by incomplete and prejudicial information about that technology
  - News reports
  - Personal Biases
  - Exaggerated capabilities of technology

What might affect perceptions?

- Recognizable equipment on UAV
  - Camera/recording equipment
  - Weaponry
  - Public safety/government identifiers
- Connotations of news coverage regarding UAVs
  - Word choices
  - Danger coverage/Public interest stories
  - Videotaped reactions
- Knowledge of laws related to unmanned flight


Task Force (Surface Action Group) encounters multiple UAV and small boat threats, engages with High Power Laser Weapon at long ranges to reduce magazine depletion
Long Range LOS/Optical Air Target ID, Defeat & BDA
COUNTER UAV
COUNTER ISR
IOC: 2018-2025
100-150 Kilowatts
COUNTER SMALL BOAT
Close & Medium Range High Resolution Optical ID, Defeat & BDA
UNCLASSIFIED


Civil Aviation Authority
You have control
Remember, when you fly an unmanned aircraft (or drone), the responsibility is yours.
Be safe, be legal
www.caa.co.uk/uas
CAP 1202



Module goal: test some of these factors

- Construct “news coverage” or “public disclosures” of UAV activity
- Use survey studies of general public
  - via Mechanical Turk or other distributed survey methods)
  - Ask questions related to perceptions of that particular UAV
  - Perceptions of UAVs in general
  - UAVs in their own life
- Develop recommendations for public disclosure of UAV-related information
- Target for publication in AUVSI

What you might bring back to classroom

- Increased knowledge of experimental method
  - Behavior studies
  - Survey studies
  - Analysis and discussion of results
- Knowledge of robotics and cybersecurity
  - Types
  - Forms
  - Capabilities/Limitations
  - Uses in daily life
- Knowledge of academic research process
  - BS->MS->PhD Pipeline
  - Paper publication timeline

Related Supported Projects

- CHS: Small: Collaborative Research: Spatio-Temporal Situational Awareness in Large-Scale Disasters Using Low-Cost Unmanned Aerial Vehicles, **National Science Foundation** PI: David Feil-Seifer, Co-PI: Amount: $166,666, Jan. 1, 2016 - Dec. 31, 2017, award #IIS-1528137

- PFI:BIC: Enhanced Situational Awareness Using Unmanned Autonomous Systems for Disaster Remediation, **National Science Foundation** PI: Kam Leang, Co-PI: Amount: $800,000, Aug. 1, 2014 - July 31, 2017, award #IIP-1430328

- Improving UAV Vehicle Safety: Algorithms for Computer Vision Based Detect and Avoid and Failure-Resistant Control, **Nevada System of Higher Education** PI: David Feil-Seifer, Co-PI: Kostas Alexis, Amount: $280,000, June 1, 2015 - June 30, 2016

- Robot Problem Solving for Elementary, Middle, and High-School Students: Programming Without Computers, **Nevada Space Grant Consortium (NV-SGC)** PI: David Feil-Seifer, Amount: $4,889, Feb. 1, 2016 - April 30, 2016, award #NNX15AI02H

- UAV-Based Camera Vibration Reduction for Detect and Avoid Tasks, **NASA EPSCoR** PI: David Feil-Seifer, Co-PI: Richard Kelley, Amount: $36,512, Nov. 18, 2015 - Aug. 31, 2016, award #NSHE-15-67

To do when you get in on Tuesday

The Human-Robot Interaction work going on in the RRL involves many experiments involving human participants

Since you will be dealing with human participants, I recommend taking the UNR Research Integrity Office training course:

http://www.unr.edu/research-integrity/training/study-training

Optional Prep