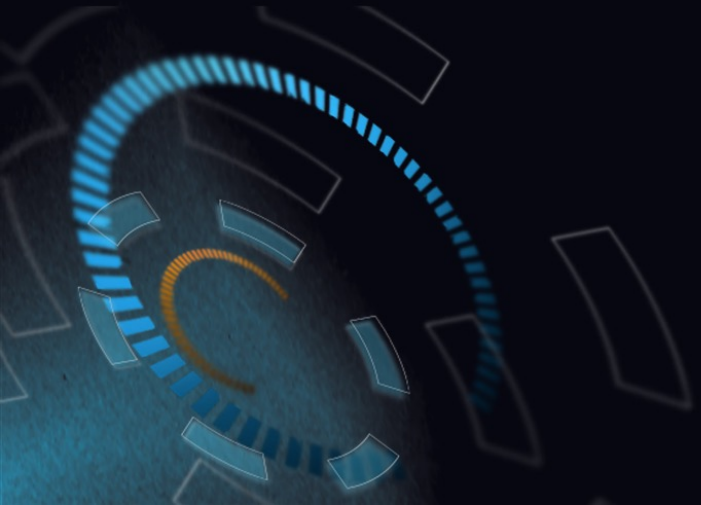
Human CPS

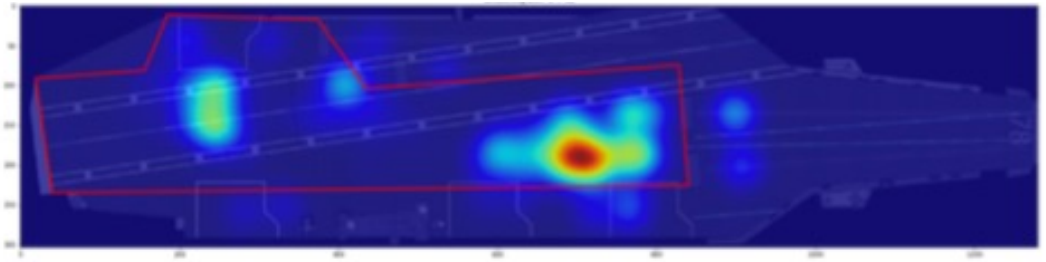


Missy Cummings

Duke University

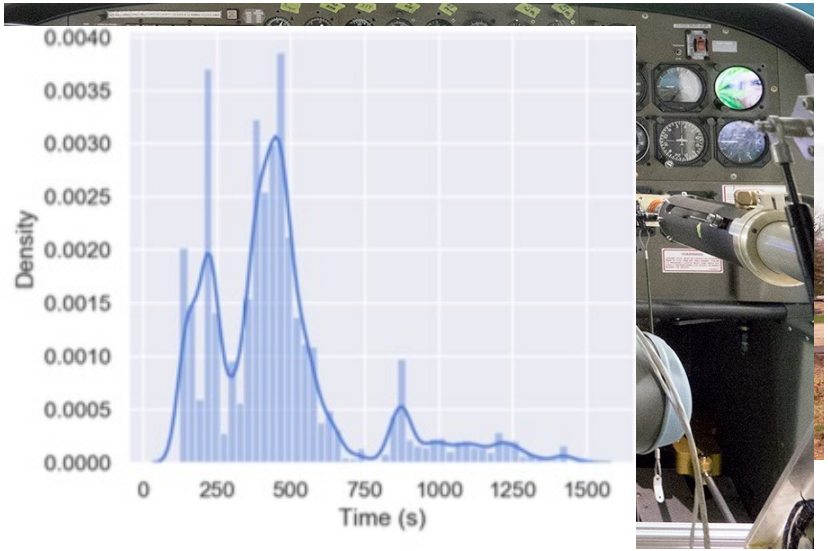
Humans in and around CPS

- How should we balance human and automation/autonomy roles?
  - Both suffer from different forms of brittleness
- How can systems be designed to provide mutual support?
- Can we develop models of safety and risk that are both predictive and diagnostic?



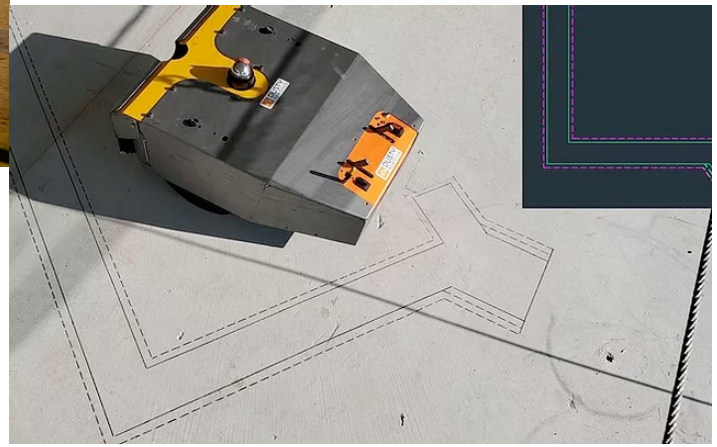


Bottom-up r



3 Research Successes







3 Open Challenges

- Treating humans as subsystems instead of nuisances or oversimplified assumptions
- Cybersecurity – the human element
- Assured autonomy



Next steps?

- Recognition that assured autonomy is a legitimate area of study
  - The role of humans as operators and designers
- Mandated interdisciplinarity in funding
- Education hurdles

	Industry	Government	Academia
Safety	1	4	9
Cybersecurity	2	5	6
System integration	3	8	3
Certification	3	1	15
Software engineering	5	7	6
Testing	6	1	11
Legal and regulatory frameworks	6	15	16
Human-autonomous system interaction	6	1	2
Machine/deep learning	7	11	1
Motion planning	8	9	3
Computer Vision	8	8	3
Perception	12	6	6

Thank You!