Collaborative Sensing, Learning, and Control in Human-Machine Systems

ACC Workshop

Boston, MA

July 5, 2016

A Lesson from Aerospace History: Spam in a Can? [Sheridan, 2002, p. 154, paraphrasing]

- Draper proclaimed at the outset of the Apollo program that…

The astronauts are to be passive passengers

All the essential control activities will be performed by the automation.
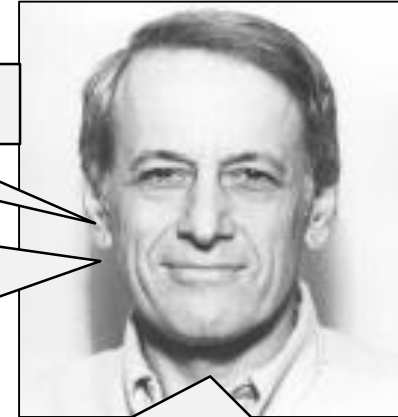
C.S. Draper with Werner von Braun in front of the Apollo Guidance Computer

Tom Sheridan,
human factors consultant to the Apollo Program,
Professor Emeritus of at MIT

It turned out he was wrong.

Many routine sensing, pattern recognition and control functions had to be performed by the astronauts, …

… and in several instances they countermanded the automation and saved the mission.

Fast Forward to the Future

- Autonomous robotics, control & AI/ machine learning permeating multiple domains and forging new human-machine partnerships

But, there's still a long way to go...

- Humans and their machines are far from perfect

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Britain's drone air force decimated by pilot error: Twelve crashes in combat zone reduce capacity to just 14 - at a cost of £30million

- A Ministry of Defence report into the growing crisis has called for immediate changes to the selection and training of drone pilots
- The alarming loss rate has raised concerns about British forces' capability to wage a successful war against the Taliban

By ROBERT VERKAIK

PUBLISHED: 17:00 EST, 15 December 2012 | UPDATED: 17:00 EST, 15 December 2012

What happens when Tesla's AutoPilot goes wrong: owners post swerving videos

Tesla is very clear about the fact that the driver is responsible for the car at all times and should be actively in control, despite the AutoPilot system: it will be the driver's fault, not Tesla's if the car ends up in a road traffic collision.

Tesla driver killed while using autopilot was watching Harry Potter, witness says

Driver in first known fatal self-driving car crash was also driving so fast that 'he went so fast through my trailer I didn't see him', the truck driver involved said

This workshop

- How can autonomous machines exploit human knowledge, insights and capabilities to solve challenging problems in planning/control, sensing/perception, and learning/adaptation?

    -Where and when can humans/machines "fill in the gaps" for each other?

    -What roles/problems are (in)appropriate for humans and machines?

    -Do humans really help or hinder autonomy?

    -Is autonomy "ready for prime time"? On the streets? In the air?

    -How to certify/guarantee (learning) autonomy?

    …

    -Disciplines: robotics and control, AI/learning, human factors…

Schedule for Today: Morning

- Opening remarks
- Invited talks

(coffee break at 10:40 am -11 am)

- Lunch from 12:30 – 1:45

Nick Roy
(MIT)

Amy Pritchett
(GA Tech)

Will Curtis
(AFRL)

Irene Gregory
(NASA Langley)

Schedule for Today: Afternoon

- Invited talk: View from Industry (Amit Surana)

- Expert panel discussion: "soapbox talks"

Emily Doucette (AFRL), Mike Furlong (NASA Ames), Mark Burstein (SIFT), Luca Bertucelli (UTRC)

(coffee break at 3:30 -3:50 pm)

- Horizon Talks (Shah, Solovey, Chowdhary)

- Closing discussion/wrap-up (5:20-5:30)

Amit Surana
(UTRC)

Julie Shah
(MIT)

Erin Solovey
(Drexel)

Girish Chowdhary
(UIUC)