Engineering Safety-Critical Cyber-Physical-Human (CPH) Systems

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Challenge:
Many standard methods for automating control systems (in cars, planes, etc.) take the human out of the loop, resulting in a loss of situation awareness, skill decline, an inability to jump into the control loop when needed.

Solution:
Repurpose control automation to create novel interface designs visualizing envelopes of safe operation, keeping the human in the loop. Humans and automation cooperate as partners, compensating for each others’ strengths and weaknesses.

Scientific Impact:
Approach should generalize to CPH systems where safety envelopes can be quantified, control laws or best practices are known and system state can be visualized in the context of these envelopes: Humans and automation share responsibility for safe system operation.

Broader Impact:
Aviation (airplanes), highways (intelligent vehicles), medicine (robotic surgery), and other Cyber-Physical-Human Systems.