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Rethinking the Skills Gap

MEET TECH'S RISING STARS

Software engineer Tracy Chou is one of 35 innovators under 35 who are shaping the future of technology. p40

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Safety never used to be much of a concern with machine-learning systems. Any goof made in image labeling or speech recognition might be annoying, but it wouldn't put anybody's life at risk. But autonomous cars, drones, and manufacturing robots have raised the stakes.

Angela Schoellig, who leads the Dynamic Systems Lab at the University of Toronto, has developed learning algorithms that allow robots to learn together and from each other in order to ensure that, for example, a flying robot never crashes into a wall while navigating an unknown place, or that a self-driving vehicle never leaves its lane when driving in a new city. Her work has demonstrably extended the capabilities of today's robots, enabling self-flying and self-driving vehicles to fly or drive along a predefined path despite uncertainties such as wind, changing payloads, or unknown road conditions.

As a PhD student at the Swiss Federal Institute of Technology in Zurich, Schoellig worked with others to develop the Flying Machine Arena, a 10-cubic-meter space for training drones to fly together in an enclosed area. In 2010, she created a performance in which a fleet of UAVs flew synchronously to music. The "dancing quadrocopter" project, as it became known, used algorithms that allowed the drones to adapt their movements to match the music's tempo and character and coordinate to avoid collision, without the need for researchers to manually control their flight paths. Her setup decoupled two essential, usually intertwined components of autonomous systems—perception and action—by placing, at the center of the space, a high-precision overhead motion-capture system that can perfectly locate multiple objects at rates exceeding 200 frames per second. This external system enabled the team to concentrate resources on the vehicle-control algorithms. *—Simon Parkin*