ARTIFICIAL INTELLIGENCE FACULTY

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machine learning and theoretical computer science

Developing foundations and principled, practical algorithms for important modern learning paradigms. These include interactive learning, distributed learning, multi-task learning, and life-long learning. My research formalizes and explicitly addresses all constraints and important challenges of these new settings, including statistical efficiency, computational efficiency, noise tolerance, limited supervision or interaction, privacy, low communication, and incentives.

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learning theory; algorithmic game theory; mechanism design

My main research interests are in the theoretical foundations of machine learning and of systems that involve the interaction of many self-interested agents. I am also interested in topics that combine both of these including learning about agents by observing the outcomes of their interactions and the theoretical foundations of privacy.

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Computer Music

I am interested in creating computers that listen to music, understand music, and interact with human musicians. Music understanding includes the analysis of low-level features such as pitch and onset times, mid-level information such as chord recognition and tempo, and high-level structure such as repetition, themes, and emotion.

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Knowledge Representation, Natural Language Understanding

My research group is working on knowledge representation and reasoning (the Scone knowledge-base system) and its applications, especially in the area of natural-language understanding. We are also working on common-sense planning, reasoning about actions and events, and modeling the mental states of multiple agents, all built on top of Scone.
My work focuses on machine learning and optimization, with a specific focus on applications in smart energy systems. From an algorithmic standpoint, I am interested in fast optimization algorithms for a number of problems and for general convex programs, large-scale probabilistic modeling, stochastic optimization, and reactive machine learning algorithms. On the application side, the focus is on energy disaggregation, probabilistic forecasting for energy systems, and model predictive control techniques for industrial control in the electrical grid.

My research interests are: computational neuroscience, computational vision, neurophysiology of the primate visual systems, active and adaptive vision, hierarchical coding and inference, mid-level vision, development of infant vision, learning and adaptation, structure of neural codes.
Artificial Intelligence Faculty

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Algorithmic game theory, Computational social choice

I mainly work on problems at the intersection of computer science and economics, combining ideas from multiagent systems, machine learning, optimization, and theoretical computer science, with areas of microeconomic theory such as social choice, fair division, game theory, and mechanism design. I am especially excited about deep theoretical problems that have direct real-world implications.

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Mechanism Design, Game Theory, Auctions.

I am interested in market design; optimization; game theory; mechanism design; electronic commerce; artificial intelligence; multiagent systems; auctions and exchanges; automated negotiation and contracting; equilibrium finding; algorithms for solving games; advertising markets; computational advertising; kidney exchange; prediction markets; market making; voting; coalition formation; safe exchange; normative models of bounded rationality; resource-bounded reasoning; multiagent learning; machine learning.

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CS Education, Autonomous Robots, Computational Neuroscience

I'm currently investigating two questions: how to teach computational thinking to young children using a curriculum based on autonomous robots, and how to teach high level robot programming to CS majors. My children's curriculum is based on a novel understanding of Microsoft's Kodu Game Lab. My undergraduate curriculum uses the new Cozmo robot by Anki.

Manuela Veloso, Professor (ML & CS)
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Autonomous Robots, Planning, Learning, Human-Robot Interaction

I research artificial intelligence and robotics, and founded and directs the CORAL research lab for the study of autonomous agents that Collaborate, Observe, Reason, Act, and Learn. With my students, I have created teams of autonomous robot soccer players, as well as the CoBot mobile robots to function in indoor human environments, interacting with, servicing, and learning from humans. I research the seamless integration of perception, planning, execution, and learning algorithms for autonomous agents.