The Challenge

How can we reduce harm to our planet and the future prospects of life on Earth? How can we turn the tide to regenerate Earth’s systems while enabling societies to flourish? The urgent challenge is to supply affordable energy, food, and security for sustained life on Earth – for all living beings – by inventing transformative technologies and adapting human behavior at an unprecedented scale at this critical time in history.

Our planet, Spaceship Earth, has sustained its vast and glorious array of life for over three billion years. In the 20th century, human longevity, prosperity, and development were fueled by growth in energy innovation and access; however, humanity has pushed Earth into “the Great Acceleration,” affecting Earth’s ability to maintain long-lasting stable ecosystems. The scientific warnings over the past decades of catastrophic effects now ring true, and we must take action. We’re experiencing profound impacts such as intense temperature rise, drought, fires, melting glaciers and sea level rise, and devastating flooding, causing human suffering, displacement, economic ruin, and decimated biodiversity. The vital signs of Earth’s systems call out to us, but are we listening?
The Media Lab’s View

We uniquely combine interdisciplinary expertise—from oceans to space, genetics to cities—and develop artificial intelligence, machine learning, supercomputer visualizations, and powerful experiences to change human behavior. We’ll create transformative technologies, experiences, and systems that address the dual challenge of climate change and energy. The goal is for society to work for 100% of humanity and for all living beings, so they can thrive—here on Earth and in worlds beyond.

We are leading work for impact at different scales:

- **Local-to-Regional Scale:** Improving local and regional decision-making to understand and plan for changes in climate while limiting economic, human, and environmental impact. Technology and framework co-developed in response to socioeconomic needs with Global South and indigenous communities based on shared responsibility.

- **Local-to-Global Scale:** Hyper-local solutions to global warming in urban cities by quantifying energy use and implementing the CityScope interactive decision-making platform, which has potential to reduce emissions 10X per person/year; the platform bolsters community learning and builds consensus for future actions and policies based on performance and interventions.

- **Ocean Scale:** Ocean IoT such as battery-free ocean sensing technologies with net-zero power scalable connectivity to track and monitor the vital signs of the ocean.

- **Global Scale:** Fast physics-informed machine learning implementing multiscale neural surrogates to significantly improve climate models and provide new decision-making and policy tools.

- **Interplanetary Scale:** Environmental sensing and connecting at scale via multimodal sensing in challenging environments on Earth, the moon, and Mars—representing data in visceral, novel ways to connect and scale presence and understanding.

And we will ramp up efforts that add new dimensions to our impact:

- **Human Experience:** *Overstory Overture Opera* by Tod Machover, based on Richard Powers’ Pulitzer Prize-winning novel, *The Overstory*, premieres in 2023. Two parallel narratives are unveiled from the human or scientist's perspective and the “world of communicating trees.” The production will leave the audience to consider a new relationship of equality between human and nonhuman, and what humans can and must learn from nature about building synergistic, supportive societies for the world we want to live in.

- **Earth Mission Control and The Climate Pocket:** We aim to develop an Earth Mission Control that curates petabytes of ocean, land, air, and space observation data, produces AI-generated images, and provides an immersive, interactive climate decision theater. To overcome computational complexity, we are reshaping machine learning models into fast copies, or “surrogates,” of climate models that ensure trust and physical consistency. With these tools, we can transform our ability to predict and respond to the dual challenge of climate change and energy demand, access, and affordability. Policymakers and climate leaders can explore the local impacts of climate policies in real time. We will teach and empower Earth Ambassadors—next-generation leaders.

- **Intervention, Carbon Capture, and Extraterrestrial Exploration:** Expanding our ocean IoT sensor networks and collaborations, we envision breakthrough technologies for energy harvesting, underwater cameras, underwater sequencing, and biomonitoring; finding life in ocean worlds; carbon removal; and imagining an opera of the underwater world.

Working with the Media Lab connects you with prototyping ideas and solutions in and for communities.