

# IEEE Spectrum

## **2022 IEEE Spectrum Technology in the Service of Society Award**

SunCulture, Kenya, Africa, for its [solar-powered irrigation system](#).

SunCulture is a climate-smart agriculture company for smallholder farmers. SunCulture designs, manufactures, finances, and services IoT-enabled solar energy systems and irrigation equipment, and is the market leader in solar water pumping solutions for smallholder farmers in Africa. SunCulture's mission is to bring affordable, renewable energy to smallholder farmers in emerging markets to improve productivity and income, enhance resilience, and reduce greenhouse gas emissions. SunCulture's products are designed to lift smallholder farmers up the productivity ladder. Solar irrigation can increase farmer's household disposable incomes by 117%. By no longer relying on rain fed agriculture, SunCulture customers can increase their yields and number of harvests, transition to higher value crops, mitigate the risk of a failed crop due to lack of rain, increase the land they have under production, increase their livestock output (milk, eggs etc), and save time. SunCulture systems also allow farming households to gain access to clean energy power for domestic use. To increase the affordability of its products, SunCulture lends to its customers through its Pay-As-You-Grow installment plan offering. Underpinned by the income generating nature of the systems, SunCulture is pioneering the financing of smallholder farmers, who've been historically ignored by the formal financing sector, and is building custom credit models and processes to enhance these capabilities. From a macro perspective, SunCulture's products improve and protect the productivity of smallholder farmers, contributing to a food secure, climate resilient, and economically empowered future for Africa and the rest of the world.

**Scope:** The *IEEE Spectrum* Technology in the Service of Society Award is presented to the company voted by *IEEE Spectrum* editors as the technology having the greatest potential to provide the most overall benefit to humankind.

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## **2022 IEEE Spectrum Emerging Technology Award**

NASA Jet Propulsion Laboratory, Pasadena, Calif. for its [Mars drone helicopter](#), [Ingenuity](#).

On April 19, 2021, the Mars helicopter, Ingenuity, became the first aircraft to make a powered, controlled flight on a planet in our solar system other than Earth. As of this writing, the drone has made 21 flights on the Red Planet, far exceeding NASA's initial expectations that the rotorcraft could accomplish up to five flights during the Martian spring. Ranging in duration from 39 seconds to nearly three minutes, the flights have allowed mission planners to survey the terrain around the mission's rover, Perseverance, to better plan the rover's excursions. The drone manages to fly in the thin Martian atmosphere by means of contra-rotating coaxial rotors, 1.2 meters (4 feet) in diameter, which spin at more than 2400 rpm. The drone's solar-charged lithium-ion batteries have a capacity of about 40 watt-hours. Its autonomous flight is controlled by two dedicated microcontrollers and a Qualcomm Snapdragon 801 processor running the Linux operating system. In the wake of Ingenuity's success, NASA mission planners are considering much larger rotorcraft drones for future missions, for which the Ingenuity flights have provided invaluable design data. Engineers are now working on a Mars Science Helicopter that would weigh 30 kg, have a range of 10 kilometers, and carry a suite of science instruments weighing as much as 5 kg.

**Scope:** The *IEEE Spectrum* Emerging Technology Award is presented to the company voted by *IEEE Spectrum* editors as the emerging technology having the greatest potential to achieve financial success in broad commercial application.