Near Earth to develop system to increase bioenergy crop yields through aerial phenotyping of sorghum

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PITTSBURGH—The Advanced Research Projects Agency-Energy (ARPA-E) has selected the team of Near Earth Autonomy Inc. (Near Earth), Clemson University, Carnegie Mellon University, and the Donald Danforth Plant Science Center to create a system that will accelerate plant breeding compared to traditional methods, with the goal of creating a new, sustainable bioenergy source. The team’s project is titled Bioenergy Organism Observation, Science & Technology (BOOST).

The award, made under the ARPA-E Transportation Energy Resources from Renewable Agriculture (TERRA) program, will focus on selection of sorghum genotypes that optimize its use for bioenergy. Sorghum can dramatically increase the viability of bioenergy because it is a productive and hardy crop with limited need for irrigation or fertilization and can be grown in wide swaths of the U.S. not used for food production. The production area targeted, however, has a unique set of challenges that must be addressed to maximize sorghum’s potential. Since previous approaches to breeding sorghum have focused predominantly on grain and animal feed varieties, a new systems-oriented vision and scientific understanding are required for a new crop, in a new region, for a new use. The BOOST team will deploy ground and aerial robotic platforms into the field to collect data and feed new breeding analytics. A specific goal is now clear—the production of 20 tons of dry biomass per acre, roughly four times the current yield, a level that would signal commercial potential.

Within the consortium led by Clemson University’s Prof. Stephen Kresovich, Near Earth will develop an aerial phenotyping platform capable of collecting relevant crop data multiple times per day during the entire growing season. The platform will carry lidar and visible, thermal, and hyperspectral cameras to efficiently and rigorously collect data that will be used to identify, validate, and deploy traits that are responsible for improving yield gain and composition. This development will be led by Dr. Sanjiv Singh, Near Earth’s Chief Scientist, and Mr. Paul Bartlett, Senior Robotics Engineer.

Near Earth (http://nearearth.aero) is a privately held, spin-off from Carnegie Mellon University. The company develops comprehensive solutions for manufacturers and users of low-flying aircraft that need to operate in all weather conditions, and in hostile unprepared environments. Near Earth bridges the gap between aerospace and robotics with complete systems that improve safety, efficiency, and performance and expands the types of missions where aircraft are used, enabling manned and unmanned operations. Currently, the company leads key efforts in perception, motion planning, and human-machine interfaces as applied to cutting edge programs developing next generation capabilities for aviation.