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Driven To Succeed: Utah Students Build Electric Cars And Gear Up For College

By ASHLEY ROHDE • APR 25, 2019

Some of the team examines their car.

During this first installment of the UPR original series Driven to Succeed, we follow seven college freshman designing and building a solar-powered electric car using a charging system that allows the driver to power the car in motion.

“The car’s going to be driving over a coil on the the batteries and potentially, hopefully, the car will be able to drive forever, until we stop," said Anna Delaney, a freshman at Utah State University in Logan where she studies computer science.

She is part of a small group of college freshman working to construct a unique car - an electric car that can be charged by the road. More specifically, charging coils that are built into the road. The students are working with the Sustainable Electrified Transportation Center (https://select.usu.edu/) at Utah State University to build a demonstration vehicle, which they will showcase at the Utah Greenpower race this month in the west deserts of Utah.

The team is made up of students from GEAR UP (https://www.edpartnerships.org/about-gear-up), a federal program that is designed to encourage and prepare middle school and high school students to go to college. This group of curious car makers was part of the first class that participated in Gear Up, and now they’re in college.

“For the graduates in 2011 in our participating schools, only 16.1% of them had enrolled in college in the next year,” said Jim Dorward, director of GEAR UP Utah (https://utahstars.usu.edu/).

Dorward has been involved with the mentoring project from the beginning and says there is strong evidence that students who participate in the program all four years are more likely to attend college and ultimately, graduate. He says the college enrollment rates for seniors who participated in the program and graduated in 2018 is proof that the program works.

“For our senior class last year 62% of them enrolled in college this year," he said. "Another 20% went on missions and there’s a very high proportion of students who go on missions that come back and enroll in college.”

Dorward is referring to religious missionaries for the Church of Jesus Christ of Latter-Day Saints.

“So, we’re actually pretty optimistic that upwards of 80% of the students that we’ve been serving are going to be enrolling in college in the next couple of years,” he said.

That's nearly five times more students enrolling in college this year at GEAR UP schools, compared to classes from before the program was initiated.

The program partnered with Greenpower USA (https://www.greenpowerusa.net/) to introduce middle school and high school students to careers in science, technology, engineering and mathematics - also known by the acronym STEM.

Several of the students on the college-aged team, including Anna, the student we met earlier, participated in the car-kit construction and race when they were in high school.

"So, we already had a car mostly built, so we only had to do a few things on it and then we got to race it around every class hour on our track outside," Anna said. "So at the competition, I was the main driver on it. We ended up getting second place overall, but our chain half-way through broke and we couldn't fix it in the middle of the race which was really sad."

Funded by the U.S. Department of Education, GEAR UP grants are awarded for a particular cohort, made up of students in the same grade at schools across Utah. The grant follows the students through their freshman year of college. Dorward and his team apply for grants every year for incoming seventh-grade cohorts. Right now, there are seven cohorts, managed by teams of mentors who work with the students and their families.

Melia Balls is the program coordinator for the first cohort of GEAR UP students in the state, grant one USU STARS! (https://utahstars.usu.edu/) It was her idea to have students participate in the Greenpower movement.

"There's Greenpower China, Greenpower USA, Greenpower Britain," she said. "Our Greenpower program that we run here in Utah started with GEAR UP schools, however, it's grown so big that the governor's office of energy development has caught onto it."

In addition to GEAR UPp schools, Utah's governor's office is sponsoring Greenpower cars for other schools who want to participate. The cars come as kits. They seat one small person and they look like a vintage- style go-cart, maybe something you'd expect to see in an old episode of The Little Rascals. Each team works together to modify their car to make it as energy efficient as possible.

Balls describes the rules:

"Basically, the rules are you put it together, you can change or modify anything you like except the battery or the motor.

"They want to go as fast as they can, however, it's more endurance. The winner of the race is the team that gets the most laps in the 90-minute period. The teams design their cars so that they're not going full throttle at the beginning because that draws too much on the battery," she said.

This is how the race begins. Junior high and high school students start with a car kit and then they innovate and modify and create something new. Hopefully something more energy efficient.

This is the first year college-aged students are allowed to drive the motorway for this annual event - not to compete, but to demonstrate new technology developed at the Sustainable Electrified Transportation Center (https://select.usu.edu/).

“We started with the lead cohort in seventh grade. The students are now in college," Balls said. "So, what we’ve done is we have made a team from students here at Utah State University. They come from various different GEAR UP schools. In order to be on this team, they need to just have been a former GEAR UP student. And we have what we’re calling a *custom class*, and this vehicle that charges power will be in that custom class.”

The Utah State University college team consists of four groups focused on specific tasks. Upper-classmen act as mentors....to help with the mechanical, computer and electrical engineering:

“John Mermigas.”

“Chase Miller.”

“Misael Nava”

This is the electrical engineering team. They will program and install the sensors that will be mounted to the car. John Mermigas is the mentor for this group,

“So, our goal is essentially the managed battery," he said. "So, a lot of the things that we’re putting together are sensors to keep track of speed, how much electricity is in the batteries, state of charge, make sure it doesn’t overheat. And a lot of that information we’re trying to send over to the computer science part of the group - that’s our major role right now.”

“My name is Whitney DeSpain.”

Whitney has teamed up with Anna, who we heard from earlier, to oversee the computer engineering. They are building an app to monitor the car’s functions, in real-time.

“So pretty much there’s going to be some sensors on the car that are collecting data from the battery, like speed data and stuff, and that is going to connect to a little tablet that we’re going to have on the car that will display some of the data for the driver. Then that tablet will be sending data to an on-site computer that we have that will be saving that data and also have a little server so other people can look at that data on-site as the race is going on,” she said.

There are two mechanical engineering groups, first:

“Taylor Olpin.”

“Brittney Dikwa-Nkruma.”

“DJ Combs.”

This group is working on the solar panel used for charging the coils that will be placed on the speedway track during the competition.

DJ explained:

“So, what we’re working on with our group is we’re making a mount for the solar panel that is basically a tripod system that will be sitting on the ground next to the track, basically. Where it’s got like telescopic legs so we can change the angle that the solar panel will be catching the sun. That’ll basically power a battery pack that’s going to power a wireless charging pad that’s going to be sitting on the ground that the car will drive over.”

The second mechanical engineering group is working on the coils mounted on the car.

“Simon Rhoufiry.”

“Kevin Killian.”

“Heidi Daniel.”

Heidi describes their contribution:

“We’re mainly focusing on getting the wireless power transfer coils in place so it can actually charge up as it moves over those coils. So, we’re not doing the electrical side of it, but just the mechanical side of how is this actually going to be mounted to the car? How big is it going to be? And stuff like that. And also, we’ve been working on the battery pack. But we’ve been working on the specifications of the battery pack, hardware for assembling it and mounting it and all that stuff,” she said.

If all goes according to plan, the end result will be a solar-powered electric car that can recharge in motion. And while this car is very much a proof-of-concept for this technology - it could never be driven on an actual road - Whitney says possible applications for the technology are impressive.

“So, the goal is putting these charging coils in roads so while cars are driving over they can charge while they’re driving and also for buses, putting these charging coils at bus stops so buses can charge while they’re on the routes so there’s less downtime in having to plug in and charge electric vehicles.”

The overall idea is to extend the range of electric vehicles, making them more practical for long-distance travel, using technology developed right here in Utah, at the Sustainable Electrified Transportation Center.

Now, the team is assembled and a plan is in place. The next step is to construct a rechargeable electric car. No problem... right? Well, we will find out, as we hear from the group during the second part of our series, *Driven To Succeed* airing next week.

Driven To Succeed programming is brought to you by our members, USU STARS! GEAR UP (https://utahstars.usu.edu/), and Rocky Mountain Power. Supporting student innovation and clean transportation solutions in Utah. Details at rockmountainpower.net (https://www.rockymountainpower.net/index.html) .

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