



CLEMSON FOOTBALL, 1C CHAD MORRIS TEXAS BOUND?



LIFESTYLE, 1D Fashion musts for men

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FINAL EDITION

Clemson students engineer 'driverless' vehicles

Local manufacturer commissions challenge to produce low-cost versions

By Robbie Ward
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Paint-sized machinery took over a Clemson University hallway, performing for anxious college students who stared like proud parents.

Navigating a winding track of magnetic strips and duct tape, the unmanned vehicles auditioned for future jobs inside a factory floor.

A semester-long class of 13 mechanical engineering majors comprised three teams, each responsible for producing a made-from-scratch motorized vehicle. Two had metal exteriors, another had a wood cover. This hallway presentation among a small group of engineering faculty and students marked the public debut for both student creators and the machines themselves.

Each vehicle wore sensors to detect and avoid collisions with people, other equipment and other dangers found in a factory environment. Versions of these foot-long or so vehicles already exist in industrial manufacturing areas throughout the country. Most attached with lofty \$10,000 or so price tags.

The challenge for the students: Find a way to produce a vehicle with similar quality as existing machinery but at a fraction of the cost, \$1,000. A local manufacturing company commissioned the work. The business remained anonymous to the public but provided prototype specifications to the class, a capstone-level course intended to showcase years of learning in undergraduate engineering.

Paul Black of Easley watched as his creation, built with three other students, completed multiple laps around the makeshift track. He stepped away



Clemson mechanical engineering students make adjustments to their "driverless" vehicle during a test run on campus.

from a few nearby discussions to return the vehicle to the track after it wandered elsewhere.

Even with a few kinks in the current versions, the wandering machines seemed remarkable for a student group to deliver from concept stage to functioning device in less than three months.

"It just started to come together in the last few weeks," Black said. "It's extremely rewarding to see it get moving."

Devices described by the industry as automated guided vehicles represent a victory lap for the engineering

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"(The driverless vehicle built for a class) just started to come together in the last few weeks. It's extremely rewarding to see it get moving."

CLEMSON MECHANICAL ENGINEERING STUDENT
PAUL BLACK

Child support settlement remains unsigned

SC only state without computerized enforcement

By Tim Smith
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COLUMBIA — More than two months after the state and Hewlett Packard agreed to settle a long-running dispute that has kept a computerized child support enforcement system from being completed, no papers have been signed.

State Sen. Tom Alexander, a Wallhalla Republican who chairs a budget panel that oversees the state Department of Social Services, said he has been told that talks between the two sides have made progress and is hoping for a final agreement "sooner rather than later."

"It's my understanding that they are continuing to make progress," Alexander told *The Greenville News*. "I don't know to what extent and how close but I think they are feeling sooner rather than later, or at least that's the sense that I'm getting from them."

The problem-plagued child support enforcement computer system has already cost the state tens of millions of dollars in federal penalties and legal fees.

South Carolina remains the only state that hasn't implemented an automated child support enforcement system as required by a 1988 federal law.

DSS officials told lawmakers in their quarterly report for the period ending Sept. 30 that the state and HP reached an agreement "in principle" Sept. 22 and it would take several weeks to work out the details and sign the documents. Neither side offered any details at the time.

A spokeswoman for DSS said there was nothing new to report on negotiations.

The continuing mediation talks come as DSS is seeking millions of dollars next year for added caseworkers to address high caseloads and worker turnover. The price tag DSS mentioned to senators earlier this year for the added workers — \$10 million — is the same as the annual penalties the federal government has assessed some years in

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#yeahTHATgreenville stands out as marketing tool

Group honors campaign with 'WOMMY' award

By Robbie Ward
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Greenville, South Carolina residents believe their city has special and unique qualities, just like residents the other Greenvilles scattered throughout the United States.

Only this Greenville has earned the

reputation and respect as THAT Greenville.

Legions of Greenville, South Carolina evangelists have spread online praise through social media. More than 50,000 posts on Instagram have included the hashtag #yeahTHATgreenville, not counting many thousands more on Twitter, Facebook and Pinterest.

Enlisting Greenville visitors, residents and other fans to use #yeahTHATgreenville convinced the Word of Mouth Marketing Association to honor the online marketing campaign's en-

gagement with a WOMMY, the trade organization's version of a GRAMMY award.

"What I really like, it wasn't some kind of contrived sweepstakes," said Suzanne Fanning, president of the Word of Mouth Marketing Association, taking a break from her Black Friday shopping. "It wasn't something that was going to come up and then go away."

The Greenville campaign placed first among industry judges, beating out Mercedes-Benz USA's effort to convince the public tweets could fuel the

luxury cars. Award presentations happened at the annual WOMMY Awards earlier this month in Hollywood, California.

Fanning compared "Yeah, THAT Greenville" to the 1985 Texas Department of Transportation anti-litter campaign Don't Mess with Texas. The latter campaign morphed into a Texas pride campaign and remains widely recognized throughout the country.

Thirty years from now, the word of

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TD Convention Center

VEHICLES

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students, each expected to graduate in December. Years of study should soon pay off. Bureau of Labor Statistics show the median salary for a mechanical engineer in 2012 was \$80,580.

But that's not now, when the undergraduates must maintain focus on mechanical devices with a few quirks. Beyond engineering concepts and skills taught in the classroom, the students needed patience and critical thinking prowess to remedy the glitches, hiccups and setbacks they designed into the automated vehicles.

The engineering majors used other flavors of engineering, such as electrical, computer and sys-

tems that many had never formally studied. They made quick study of techniques needed for the project.

More than a typical final project or exam, this business-funded challenge added real-world consequences. These job-seekers have reputations to establish.

One of the driverless vehicles remained sidelined during the demonstration thanks to a wiring malfunction. Students responsible for the sidelined vehicle said they learned from their mistakes, how to work together, how to remain calm and use a rational skill set developed from rigorous studies.

"There's an expectation to have an operating product at the end," said Ethan Williams of Rock Hill, part-owner of the disabled machine.

The teams have two

weeks to tinker with their mechanical creations until presenting the prototype to the leaders with the sponsoring business. Expectations call for a fully functioning, driverless vehicle ready for duty with few needed adjustments.

Ethan Kung, Clemson assistant professor of mechanical engineering, is teaching the capstone class for the first time this semester, his first as a tenure-track professor. He said the teams of students will finish the class with experience they'll use in professional roles, many impacting public safety or success of private business.

"The ability to troubleshoot is something universal that applies to almost every field," he said. "It's impressive to see how far they've come in a semester."

Some of the students

will leave Clemson University with a bachelor's degree and a few job leads but nothing concrete. Others have employers waiting on graduation day. Baxter Healthcare, a medical products and bioscience services company, has already hired one of the students, Addison Ridgeway of Greenwood.

Ridgeway said working with classmates on the driverless vehicle project built essential skills beyond the scope of traditional engineering classes. He said plans to start work as a critical systems engineer valuing teamwork and communication as necessary to achieve many goals.

"You can have an idea in your head, but unless it's well communicated it's not useful at all," Ridgeway said, standing near his team's mechanical prototype.