

Clemson University puts innovative infotainment system in concept car thanks to successful application delivered by the Dell Services Engineering Solutions team



- Cloud Computing
- Mobile Computing



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Paul Venhovens, Associate Professor, BMW-Endowed Chair in Automotive Systems Integration and Head of the Deep Orange program, CU-ICAR

Customer Profile

Company:	Clemson University International Center for Automotive Research
Industry:	Education
Country:	United States
Students:	13 of 112 students
Faculty:	1 of 12 faculty members
Web:	www.cuicardeeporange.com

Institutional Need

Clemson University's International Center for Automotive Research's (CU-ICAR) automotive engineering education program needed innovative technology for the infotainment system of its hybrid concept car. Due to the pervasive popularity of smartphones and tablets, the program wanted to base its solution on a tablet phone rather than a built-in system, but it lacked experience developing applications and a user interface.

Solution

CU-ICAR chose Dell™ Streak™, a five-inch mobile Android-based tablet phone, as the platform for its infotainment system and engaged Dell Services Engineering Solutions team to develop an intuitive interface for all the features of the system, including music library with storage in the cloud.



Benefits

- Overnight delivery of user application and interface for tablet phone
- More time for core engineering by leaving the application development work to Dell
- Timeframe met for production of concept car with innovative infotainment system
- Helped prepare students to introduce innovation into automotive engineering careers

Some car manufacturers have such an investment in legacy equipment that it makes adoption of break-away innovations difficult for them to integrate into existing workstreams. That's where the Clemson University Department of Automotive Engineering Program is making a difference. The program is housed in the Clemson University International Center for Automotive Research (CU-ICAR), an advanced technology research campus where university, industry and government organizations engage in a synergistic collaboration. The 250-acre campus is located in Greenville, South Carolina.

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At CU-ICAR, a faculty team of world-class engineers has put together a program in automotive engineering that focuses on the automobile from a systems engineering perspective. The center's motto, "Where innovation always gets the green light," is brilliantly reflected in the two-year Master's Degree program called Deep Orange. Every year, a new group of students gets the green light to build a concept car that encourages reaching for and integrating new and innovative technologies.

"We want our students to understand the process of introducing so-called 'disruptive technologies' into the existing market by offering products to new markets," says Paul Venhovens, associate professor, BMW-Endowed Chair in Automotive Systems Integration and head of the Deep Orange program. "Our first Deep Orange car was designed for Generation Y customers, the Millennials. There's actually a Clemson marketing class collaborating with our students on identifying future trends and future markets and looking at demographics and changes. They feed into our project so that our engineering students can better understand why car companies make certain decisions and don't make others."

Adding a Streak of innovation

The first Deep Orange concept car was built on the body and chassis of a BMW donated to the Center, but it has an all-new interior and is built from scratch under the hood by the students in the program.

Inside the car, instead of building in radio, stereo, phone and navigation systems, the car has an infotainment system built into a five-inch Android-based Dell Streak tablet which sits in a dock in the car's central console. The [Dell Streak](#) makes it possible to play songs from a music library stored in the [cloud](#), as well as interact with the car's navigation system and engine data, which is also stored online. The tablet fits in the driver's pocket when the car is not being used and has all the texting features of a smartphone, which are disabled when the car is in motion as a safety precaution.

"The car of the future is going to be much more of an open architecture where different institutes, different companies and different people will have a larger impact than the car

Technology at Work

Services

Dell™ Services Engineering Solutions
- Applications Development (both custom and non-custom)

Hardware

[Dell Streak™](#) 5-inch Android-based tablet phone

Software

[Microsoft® PowerPoint®](#)

manufacturer alone,” Venhovens explains. “And a tablet like the Dell Streak is a great example. It’s an Android-based, open platform. People can write applications if they have the SDK toolkit. So why not showcase that as a possibility for the future?”

Smart electronics to turn Millennial heads

The smartphone and cloud technologies were designed for drivers 18 to 26 years old who are as passionate about innovations in electronics as they are about green technologies. “If you have a vehicle with dedicated infotainment built in, like a traditional navigation system and stereo system, the technology is probably already old when you buy the vehicle, and it’s definitely going to be old two years from now,” says Venhovens. “Since most of us already have a smartphone or a tablet, why not integrate that? It’s already carrying our lives on it. So why not bring our lives into the car and continue with it, but in a different way. We have to be careful that we don’t provide all the features and possibilities of a device like that in a vehicle where the primary task is actually driving a car and not playing on a smartphone or a tablet.”

Needing an intuitive interface

The Dell Services Engineering Solutions team provides engineering and consulting services to a host of Fortune 500 clients, and is comprised of experts in the fields of mechanical, electrical, aerospace, manufacturing, industrial engineering and embedded software engineering.

CU-ICAR chose Dell Services Engineering Solutions when they were still evaluating different devices. “We lacked the experience in developing applications, and we liked the Dell Engineering Solutions team’s experience in product development,” says Venhovens. “We originally became aware of Dell Engineering Solutions through the BMW Information and

Technology Research Center, which is our neighbor here at the CU-ICAR Campus. They had been working for some time with Dell on developing applications for the Streak tablet, and their people came to us one day and told us about Dell. We hadn’t chosen a partner for the infotainment in the car, and Dell said that our ideas were realizable on their platform, so it seemed like the perfect platform and partnership for our concept car.”

All the functionalities that are built into a car’s infotainment systems are now available in the smartphone. The only challenge was to integrate it into the vehicle so that it does not become a distraction for the driver. “We needed to build an interface that is intuitive for in-vehicle driving,” says Venhovens. “It might be too simplified for at home use, but we needed larger buttons, simplified menus and touchscreens. Just getting Pandora and Slacker running without actually going through five menus and having to press a lot of buttons—that’s what Dell integrated in a very intuitive way.”

Overnight sensation

The Deep Orange team went to Dell with a PowerPoint presentation outlining the ideas they had for putting infotainment in the vehicle using the Dell Streak tablet. “We had all our ideas in a PowerPoint presentation, and the next morning Dell gave us an application that we could actually download and integrate on the Streak,” says Venhovens. “That was the most amazing thing for me, that Dell did it overnight. It took about two weeks to fine-tune the application and interface, but then it was done.

“As it turned out, we needed the extra time that Dell gave us to focus more on the engineering. And if we hadn’t had Dell Engineering, we wouldn’t have been able to put this new idea of infotainment on a tablet in our concept car. It would have been one less innovative feature to showcase.”

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Music from the cloud

Another of Venhovens' disruptive ideas was using cloud-based storage so that music files are not actually stored on the device itself. This bypasses the struggle to keep the music library synchronized with the latest tune when everyone in the family is synchronizing their own devices more or less randomly.

"Why don't we have one source and just stream it straight from the cloud?" Venhovens asks. "There's no hassle backing up. It's always there. It's always accessible wherever I am. I don't even need my computer. I could use somebody else's computer to get access to those files. I could share it with my friends. I could share only certain aspects of it with my friends without actually physically transferring files. What if your smartphone gets stolen and you've lost all your songs, and you have to start over again? We don't want to go there."

Shaking up the market

The Deep Orange concept car was rolled out in downtown Greenville and has been shown at the Special

Equipment Manufacturers' Association (SEMA) show in Las Vegas and at the L.A. Auto Show as well. The Dell name and its credibility have stirred up a lot of interest in the project, says Suzanne Dickerson, director of marketing and business development, CU-ICAR. "In addition to amazing technology, Dell's ability to take a product to market is really exceptional," she says. "And that always helps, especially when you're shaking things up."

Put the power of Dell technical innovation to work for your project

By using the latest hand-held mobility technology, building a custom application interface and storing content in the cloud, Dell delivered futuristic functionality for the Clemson automotive project. We invite you to collaborate with the Dell Services Engineering Solutions team and explore ways that we can partner together to delight your customers with unexpected features and functionality. We may help you come up with just the right solution to earn a competitive edge in an ever-evolving marketplace.



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