

Speech

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Speech Enables Wake Forest University Students to Go Mobile

By Stephanie Owens

In 1996, Wake Forest University (a private, co-educational, liberal arts university in Winston-Salem, N.C.) was among the first to take the initiative to provide students with better access to personal computers to the next level, providing each student with a ThinkPad laptop. Continuing this initiative, all WFU undergraduates currently receive an IBM ThinkPad and color printer upon enrollment. The computers are upgraded after two years and become student property upon graduation. The residence halls and classrooms are networked, giving students wireless access to the Internet 24/7. In addition to these initia-

tives, Wake Forest is currently participating in a pilot program for mobile computing to test the efficiency and effectiveness of providing pocket PC phones to its college students. These mobile devices come with instant messaging, text messages and several custom-built software programs including speech recognition software provided by IBM. The pilot program concentrates on three functions: mobile messaging, mobile access to information, and control of the device.

Wake Forest began working with IBM in 1995 when the university first started to

put its technology initiative in place with the ThinkPad computers. Since then, Wake Forest has participated in several projects with IBM. Last year, Wake Forest representatives visited the IBM research facilities in Austin, Texas and Boca Raton, Fla. to see what new technologies and ideas they could apply to the mobile computing wireless technology initiative. It was during this visit that the university representatives were introduced to speech technologies. The university foresaw the challenges of data input and output that the small mobile devices would afford and determined speech would be the best way to alleviate them.

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Overview & Goals

Wake Forest's primary goal for using speech was to evaluate the handheld device for a future, campus-wide rollout. The university wanted to explore the way students were already communicating on campus and see if a mobile device could enhance these communications. Wake Forest also wanted to make sure that the students found the device useful and beneficial to daily campus life. More importantly, they wanted make sure the students would want to use the devices. Speech was integrated into the device in order to make access easier and more user-friendly for students, faculty and staff.

While the devices are multimodal, the focus of mobile access to information included two speech-enabled applications: Shuttle-tracker and LaundryView. The Shuttle-tracker enables students to determine where the shuttle is in its campus route and how many minutes it will take it to arrive at a specific locale. The buses have global positioning devices inside them that

use General Packet Radio Service (GPRS) cellular technology to transmit location information from the bus to campus servers to the PC phone. The LaundryView application, which was created by Mac-Gray, also uses voice commands to allow students to check the status of his/her laundry and see how much time is left on the current wash and/or drying cycle as well as to check the availability of machines in the center. Using the Mac-Gray Web application, the LaundryView application delivers speech-enabled monitoring of washers and dryers that is connected to the Internet and receives information from the laundryview.com Web site. The Web application is hosted using IBM WebSphere Application Server™ and is synchronized to the devices using IBM Workplace Client Technology Micro Edition™.

Some of the voice-enabled software applications were developed by four interns working in IBM's Extreme Blue internship program, including a junior from Wake Forest named Thomas Whaples. However, the applications were developed off site, so



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the Wake Forest research and development team had to get them onto the campus network for testing. The team performed integration testing to authenticate the PDAs to the network, to get the software installed, and to get the laundry machines and shuttle connected. They tested each component making sure the server was up and running, and that they were able to query shuttle and laundry devices. Wake Forest then had its staff call in to the applications to assess the operability before giving it to students.

During implementation, Wake Forest had a smooth ride integrating speech into the devices and programs; however, the university did run across a few bumps that were not related to the speech system. When Wake Forest initially began adapting the applications, it had to determine what type of equipment to install, how to install it, and how to coordinate it with the existing devices. For example, the shuttles required a

GPS unit which uses the cellular network to call out to a server and deliver a little piece of info that looked like its location. The software on the server, IBM's WebSphere, took that information and rendered a Web page for it. The software on the PDA was voice-enabled in order to convert the text information into speech to deliver the information to the student. The handheld also allowed students to access the programs using voice commands - their voice input went to the server, the server responded with text and then software on the PDA rendered it in voice to the caller. IBM used an enhancement to XML that was tagged for voice, so there wasn't much to do to the applications to voice-enable them because as long as the browser was voice-enabled it was just like looking at Web page. Wake Forest found that the biggest issue wasn't in the speech application; it was keeping the GPS unit in the shuttle online. It was such a peculiar problem that it took quite a while

to figure out. Turns out that the driver of the shuttle smokes and every time he takes a smoke break, he unplugs the GPS device from the cigarette lighter. Once the team figured this out, they determined that the GPS system needed to be factory or professionally installed, which they plan to take care of this summer while the shuttle is not running. The laundry applications required different equipment as well as a different server from that of the shuttle. Inside the washers and dryers is a circuit board that has a network interface unit, similar to an Ethernet, so that the circuit board can track the status of the machines - off, on and run-time. Through the campus network, the machines periodically send information back to a server owned by Mac-Gray, who speech-enabled their Web site so that when the information was pulled to the Wake Forest browser it could be rendered into speech.



Wake Forest found that the biggest issue wasn't in the speech application; it was keeping the GPS unit in the shuttle online.

(While school is in session)	
7:37 AM	12:31 PM
8:12 AM	1:37 PM
8:47 AM	2:12 PM
9:22 AM	2:47 PM
	3:22 PM
	4:07 PM
	4:43 PM
	5:18 PM

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With these tools and components taken care of and the speech system in place, the university rolled out the devices with access to the speech-enabled applications to two groups in the Fall of 2005. The first group consisted of 57 students participating as part of a class project and one faculty member as well as several staff members. The students and the professor tested the device inside and outside the classroom environment to determine its usefulness and efficiency. The second group was approximately 50 volunteers who signed up to participate in the program. Of the students participating in the pilot program, 10 students live in the campus' Technology Quarters, a house for those with particular interest in technology. The university provided pocket PCs to the classroom participants since their participation was a requirement for the class; however, each volunteer was required to purchase his/her own university-recommended device as part of the pilot. The devices were handed out during the first two weeks of the Fall semester and during this initial two-week period the staff worked very closely with students to train each person on the device before his/her schedules became too busy. After this initial training, all participants were provided voluntary training sessions once per month to refresh or learn more about using the devices and software. Attendance was really high the first month, but by the third session it had dropped to about 12 students.

An assessment of the pilot program was conducted in December of 2005, which included the voice-enabled applications. Wake Forest distributed a survey to the mobile computing pilot program participants at the end of the Fall semester from which it received 73 student responses. University staff members Anne Bishop (director of research and development) and Jay Dominick (assistant vice president for informational systems and CIO) interviewed approximately 20 students to get their opinions on the actual device and on personal preferences for the applications and software, as well as how each student was able to use the handheld device on campus. Feedback from surveys and personal interviews indicated that students found the

applications useful and "cool." The "coolness" factor was especially important to the university because they see it as a way to capture the attention of students and entice them to use the application more frequently. The university is not sure how much the devices were actually used because they didn't roll them out until after the initial training periods. So the number of students actively trained on devices was about 50 percent. However, being able to demonstrate the usefulness of the devices and, therefore, increase the usability of small devices with even smaller screens and key-

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boards was a key benefit of the application that met Wake Forest's goals. With speech, students can see that the handheld devices offer more functionality than just the basics: phone, email and calendar access. The university also sees increased opportunities for visually-impaired students than could previously be offered without speech technologies.

The pilot program's short duration has limited the university's measurements, but

so far it has seen only a couple of drawbacks with speech. For instance, Dominick observed that people seem jaded by speech recognition because of the difficulty of using the technology in the past and the limited success, which he deems a short-term problem because the technologies are rapidly improving. The other drawback that Dominick mentioned was that the handheld devices are still slightly underpowered to run this kind of technology – it takes up a lot of resources in the device. He suggested that the device manufacturers would be forced to scale the handheld's storage capacities as more technologies continued to inundate the device and that within the next few cycles of design and development it would no longer be an issue. Regardless of these issues, Wake Forest plans to expand the program to include more students in the Fall semester of 2006, providing a larger test environment. The laundry application is set to roll out campus-wide. Wake Forest is also looking to add WebSphere to speech-enable its On Campus Directory. The university plans to enable that piece of software on one of its servers with additional speech commands by placing the WebSphere application on the Wake Forest Web site. Anyone with a NetFront browser on his/her handheld will be able to get to the Web portal and interact via voice commands. While it is slated as one of the next projects for Wake Forest, the university does not have a timeline for the roll out. The university doesn't have any further plans in place, but it is in discussions with IBM about the possibility of speech-enabling RSS feeds, other information (i.e. - Web pages) and other news links to create a type of "TTS podcast." The university also plans to use feedback from students to discover other possible areas where speech can be used.

Dominick concluded, "Voice is the right way to interact with these devices. I think in five, six, seven years this technology is going to be executed well enough and natural enough that we will wonder why we haven't done this forever."

Stephanie Owens is the associate editor for Speech Technology Magazine. She can be reached at stephanie@infotoday.com.