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A phone is not just a phone

Student projects explore innovative cellphone uses in developing world

David Chandler, MIT News Office
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A cellphone is not just for calling, texting and taking pictures anymore. Several startup business ventures spawned by MIT students, sometimes as class projects and sometimes as independent work, are exploring new ways to harness the increasingly ubiquitous devices. They are using phones to help people, especially in developing nations, to raise their incomes, learn to read, get where they're going and even diagnose their ailments.

Some of these projects will be field-tested this summer as student groups fan out around the world to fine-tune and improve their concepts and launch new businesses. Many were developed as entries for MIT's IDEAS or $100K business competitions, or as part of the MIT Media Lab's NextLab program to develop cellphone applications geared toward the developing world.

NextLab is based on trying to answer the question "can you make a cellphone change the world?" says its instructor Jhonatan Rotberg, director of the Media Lab's Next Billion Network - a group, of which NextLab is a part, formed to examine potential applications for the next one billion people expected to become cellphone users over the next three years. With cellphones now in the hands of four billion people worldwide, he says, "we're at the threshold of something important in history."

The program is now being adapted to the Internet, which he says will allow it to be managed more efficiently and be scaled up so that it can be offered at universities in countries like China, India, Thailand, and the Philippines.

Other cellphone applications for people in low-income countries are being developed by fellows at MIT's Legatum Center, whose director Iqbal Quadir was the founder of Bangladesh's Grameen-Phone, a company that by introducing a low-cost cellphone service to Bangladesh starting in 1997 provided an early example of the power of mobile technologies to advance prosperity in the developing world.

"Since mobile phones are dispersed throughout the developing world, they now constitute a platform atop which other services - mobile banking, mobile health, etc. - are now possible," said Michael F. Maltese, the center's managing director.

From health to wealth

Improving the delivery of health care in rural areas has been one major focus of these research efforts. Patients in a remote village, for example, now may have to spend a whole day or more traveling to the nearest clinic in order to be tested, diagnosed and receive treatment or a prescription drug for their health problems. But a new open-source software system developed by students who formed a nonprofit company called Moca could provide a faster way.

Using a menu of questions downloaded to a cellphone - and, if necessary, a picture taken with the phone's built in camera - a patient can transmit enough information to a doctor or nurse in a remote location to get a preliminary diagnosis, and to find out whether the condition warrants a trip to the clinic or not. "In developing countries, 80 percent of all physicians are in urban areas," while most of the people live in the countryside, says Moca team member Richard Lu, an MIT graduate student in biomedical informatics.

The Moca team won the People's Choice award at the NextLab competition in May. Several team members, including EECS senior Katherine Kuan, supported by a Public Service Center grant, will carry out field tests in the Philippines this summer. But they're not the only ones using phones for medical diagnosis. While the Moca team has focused its efforts on developing the diagnostic software for the phones, another startup company called Click Diagnostics has been focusing on ways to get such software effectively deployed in the developing world. Company co-founder Ting Shih, a fellow at the MIT Sloan School of Management, will be testing the systems this summer in South Africa, Ghana, Uganda, Kenya and Botswana.

Shih explains that as a for-profit business, her group aims to empower local entrepreneurs to set up their own diagnostic services as sustainable local businesses. Click Diagnostics, which won the Development Track award in last year's MIT $100K competition, aims to form partnerships with medical associations, mobile phone companies, and NGOs, she says.

While Moca and Click Diagnostics aim to improve people's health, some new cellphone ventures also aim to build users' wealth. One such plan is a project called Zaca, which initially aims to empower farmers in the poor, rural Mexican state of Zacatecas.

Farmers there have been doing so poorly that many have already emigrated to the United States (it is estimated that up to 1 million Zacatecans now live in the U.S., compared to about 1.3 million still in the state). The Zaca team hopes to alleviate the situation by giving the farmers more information, allowing them

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to make deals through their cellphones to sell their crops directly instead of having to deal through middlemen, and giving them details of crop prices and growing practices that can help them make better decisions about what to plant each year.

Members of the Zaca team plan to work on the project in Zacatecas this summer, and then hope to expand the service to other parts of Mexico, as well as to other developing countries in Africa and Asia. They also hope to expand beyond farm information to provide similar services for rural fishing, forestry, crafts and other businesses. By using text messages on cellphones, says team member Ehsan Hoque, a graduate student at the Media Lab, the Zaca service provides "a cheap solution that could be used anywhere." The team also includes MIT students Scot Frank, Chizoba Nnaemeka, and Rakesh Zahu, as well as students from Tufts and Harvard.

Farmers may get a better price for their crops using the Zaca system, but most of them are still unable to make use of modern banking systems, since there are usually no banks accessible in these rural communities. Only about 30 percent of people in Mexico have bank accounts, which means they earn no interest on what little money they have, and are unable to write a check to pay their bills. Dinube, another NextLab project, aims to solve that by providing banking services directly through people's cellphones.

The Dinube system, which will be tested in Mexico this summer, doesn't require its users to have bank accounts or debit cards, but enables them to make payments directly through their phones for a small fee. The project won the Venture Execution Award at the NextLab competition this month, and was the runner-up in the Mobile track of this year's MIT $100K competition. The team includes MIT graduate students Adrián Rodriguez, Armando Valdés and Oscar Howell, as well as Sloan Fellow Jonathan Hayes.

One of the Legatum Center fellows, Ravi Inukonda of Sloan, is developing a for-profit model for bringing new mobile services to the estimated 200 million rural cell phone subscribers in India. These added applications include informational services such as updates on water and power shutdowns, current local market rates for produce, and weather forecasts, and allow for transactions between buyers and sellers.

Mobility and literacy

A variety of other applications for cellphones in remote areas are also being developed, including some aimed at improving coordination in areas where transportation both for people and goods is often unpredictable. One such system, called Transport Link, also developed in NextLab, is a way for people who rely on infrequent bus service to get timely updates on when the next bus will come through their area, or to arrange informal transportation with others in the area who have private vehicles.

For commercial transport, a company called Hammock aims to provide a way for shippers to connect with truckers, allowing for a better coordination of resources so that trucks are less likely to travel half-full, and farmers, for example, can get their goods to market without fear of spoilage. Hammock, which includes MIT graduate students Douglas Jardine, Nitin Gulati, and Natalia Maya, won this year's NextLab Technology Innovation Award.

Legatum Fellow Adnan Shahid of the Sloan School hopes to bring his previous experience as director of IT strategy for MobiLink in Pakistan, to the business of recycling cell phones in that country. Worldwide, only 10 percent of cell phones are recycled each year, resulting in wasted natural resources and higher greenhouse gas emissions. The environmental savings could be significant for Pakistan, whose cities consistently rank among the most polluted in the world.

But there's more to life than good health, economic empowerment and mobility. Another project aims squarely at ensuring a better future by improving literacy for impoverished people, especially young people, in developing countries where education is often a luxury that remains out of reach for millions of people.

The project, called Celedu, is starting its work in some rural villages in India, but hopes to expand far beyond that. Its initial offerings include cellphone-based games and quizzes that can teach basic literacy skills. For example, a child in India can play a game of Snakes and Ladders on the phone by answering multiple-choice questions about which words begin with a particular letter in the Hindi alphabet. Each correct answer allows the child's marker to advance through the game board, providing a fun and competitive approach to learning the written language.

"The biggest disease in India is illiteracy," which affects 400 million people there, says team member Rafael de Cardenas of Sloan. A PC-based version of the program, called Tara Akshar, "has already taught 54,000 women in 300 villages," he says, and the cellphone version should be able to reach far more people.

For all the projects, "our overarching goal is scalability," says Rotberg. His hope is that the student teams will be able to develop technological solutions and demonstrate the viability of their business plans, and then "take them to other parts of the world, where entrepreneurs can take it and run with it."

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