

# Future phones to use blood and speech to monitor HIV, stress, nutrition

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David Erickson, professor of mechanical and aerospace engineering at Cornell University, will receive a \$3 million National Science Foundation grant over five years to adapt smart phones for health monitoring.

Erickson will head a multidisciplinary team of investigators from Cornell, Cornell NYC Tech, Cornell Weill Medical College, the University of Maryland and the University of California Los Angeles. The program, dubbed PHeNoM for Public Health, Nanotechnology, and Mobility, aims to deploy three systems that can have an immediate impact on personal healthcare: a Stress-Phone for long term stress management, a Nutri-Phone for nutritional awareness and a Hema-Phone for monitoring viral loading in HIV positive patients.

"We believe that the science and technology enabled by the PHeNoM program will ultimately lead to widespread access to the wealth of [health information](#) obtainable from lab-on-chip technology," said Erickson. "This could fundamentally alter the domestic healthcare landscape by enabling earlier stage detection of disease, reducing the cost of public healthcare delivery and allowing individuals to take better control of their own wellbeing."

After deploying the systems, the researchers will study how people use them with an eye to eliminating any roadblocks to adoption. Ultimately, they hope to show that ready access to personal health information can get people to change their behavior.

"Almost everyone is deficient in vitamin D, but most people don't think about it," said Erickson. "If you could use your phone to see how deficient you are, you might be more likely to take a supplement, or get more sun.

"Eventually we hope that the Nutri-Phone will measure a multitude of vitamin and micronutrient deficiencies like A, B12 and iron, as well as D and be deployed in the developing world where nutritional deficiencies are most prevalent," said Erickson.

PHeNoM will build on research Erickson started with the help of a seed grant from Cornell's David R. Atkinson Center for a Sustainable Future. That project produced a smart phone camera accessory and application that measures cholesterol levels in a drop of blood in minutes. The application uses the camera to read paper test strips that turn different colors depending on the amount of cholesterol in the blood. The Nutri-Phone and Hema-Phone will similarly use the smart phone's camera to accurately read test strips, while the Stress-Phone will also use the phone's microphone to measure stress levels in the user's voice.

The award comes from the Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE) program to support "bold projects" in all NSF-supported areas of research.

Provided by Cornell University

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