

Live Next Week | Advancing Fluorescence Microscopy for Research & Industry | Register for Free

Camera Phones Emerge as a Health Care Tool

Cell phones capture and transmit images for remote evaluation.

ANNE L. FISCHER, SENIOR EDITOR

Telemedicine gives patients access to a doctor no matter where they are. Whether a patient uses monitoring equipment to send information to the doctor's office or an x-ray technician transmits images to a radiologist for examination, telemedicine bridges the distance between the patient and the professional. However, many obstacles have impeded its widespread implementation.

The communications infrastructures required to transmit large images rapidly are not in place everywhere around the globe. Also, some standards, including FDA approval, do not cover some tools and techniques that would make the technology commonplace. However, a simple tool — the camera phone — is being used by doctors, emergency responders, ultrasound technicians and other health care professionals in telemedicine.

Emergency responders are using cell phone cameras to take images of disaster scenes to send them ahead to emergency personnel at the hospital before the injured arrive.

We use cookies to improve user experience and analyze our website traffic as stated in our [Privacy Policy](#). By using this website, you agree to the use of [cookies](#) unless you have disabled them.

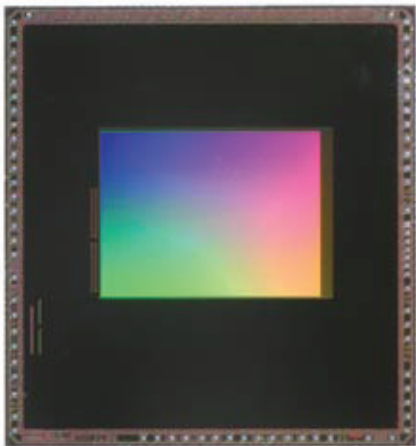
evaluation without costly and bulky imaging devices.

Most consumers own a cell phone today. The “2006 Market Review and Forecast” published by the Telecommunications Industry Association of Arlington, Va., estimates that, in 2005, 66 percent of people in the US and more than 77 percent in Europe owned a cell phone. And camera phone use passed regular cell phones last year, according to a recently released study by market analyst InfoTrends of Weymouth, Mass. The firm forecasts that, by 2010, 87 percent of all mobile phones in use will be camera phones.



High-resolution camera phones

Taking an image with a camera phone is as easy as using any digital camera, and the image can be sent to another camera phone user or to an e-mail address for viewing on a computer or on a handheld device. Not long ago, digital cameras had only 1-megapixel image sensors, but today, cell phones have 3- to 5-megapixel sensors, and 8 megapixels are on the horizon, said Don Lake, emerging technical marketing manager at Micron Technology Inc. of Boise, Idaho. Micron recently introduced a 1/4-in. sensor that enables camera phones to capture images with a resolution of 1600 x 1200 pixels.



This 1/4-in., 2-megapixel image sensor incorporates Mobile Industry Processor Interface standards, simplifying implementation in cell phones. It also has a system-on-chip sensor with a microcontroller that boosts the quality of images, making camera phones as useful as digital cameras in telehealth and other applications.

Today's phones pack imaging and connectivity into very small packages. Motorola Inc.'s new 640 x 480 cameras come with 1-, 2- or 3-megapixel image sensors that include Bluetooth wireless

technology. The 3G V1050 mobile phone, which has a 1.3-megapixel camera, lets the

We use cookies to improve user experience and analyze our website traffic as stated in our [Privacy Policy](#). By using this website, you agree to the use of [cookies](#) unless you have disabled them.

Dr. Michael Blaivas of the Medical College of Georgia in Augusta uses a camera phone to send and receive ultrasound images. He thinks that today's camera phones are adequate but not optimal. He adds that, if you want to transmit across a distance without a satellite link or a T1 line, some sacrifices are worth it, and that the lower resolution is something with which his group can deal.

This ultrasound image shows a patient's heart. The physicians involved with the project were satisfied with the quality of the camera phone image and confident in their ability to make judgments based on it.

Blaivas led a study in 2004 in which ultrasound examinations performed in an emergency department were randomly selected and photographed with an everyday camera phone. The images were sent to experienced emergency ultrasound sonologists, who reviewed them on the screen of a camera phone. They reported that they found little difference in quality, resolution or detail between phone images and images captured from a high-resolution thermal printout and sent to a similar phone. They did report less confidence in their diagnosis when using a camera phone to review images because the measurements in an ultrasound image ordinarily were too small to read. But the person sending the image can verbally provide the measurements while the doctor is looking at the image.



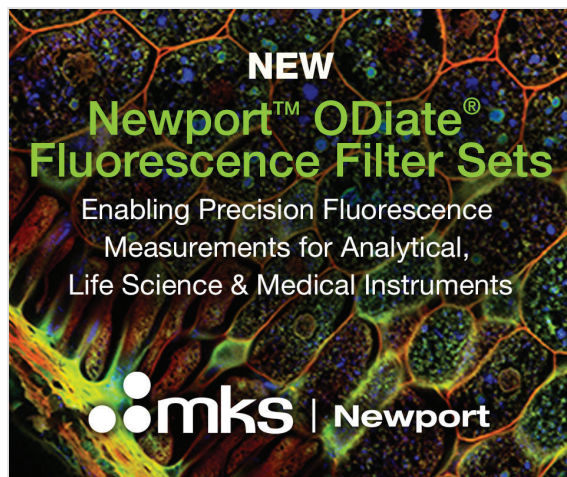
Blaivas has continued to use camera phones — and now video phones — in his work. He sees their use spreading in the medical community. Although they are far from being considered routine, he has found camera phones useful in sending ultrasound images, CT scans, chest x-rays and other images taken in the field. At the site of a car accident, for example, an image can be taken and sent immediately to a doctor for analysis and feedback.

We use cookies to improve user experience and analyze our website traffic as stated in our [Privacy Policy](#). By using this website, you agree to the use of [cookies](#) unless you have disabled them.



emergency medical responders. This image is from an ultrasound video looking through a victim's bladder during a trauma examination.

Video phones can offer even more capabilities, according to Blaivas. He recognized their potential for telemedicine when he saw a commercial for video camera phones that emphasized how much more you get from moving pictures. "That's the key with ultrasound," he explained. "One still image doesn't capture the entire organ." This led him to believe that video could help in interpreting ultrasound using cellular phones.



sponsor

To test his theory, he took his Sony Ericsson S700 video cell phone to a disaster training course. The camera has a 1.3-megapixel CCD image sensor that can take still photos with resolutions of 1280 x 960, 640 x 480, 320 x 240 and 160 x 120. The screen is a 260k color 240 x 320-pixel LCD. The video camera has an 83 digital zoom.

The group used the video camera in the two-day course, designed to teach first responders how to manage disasters. Emergency workers had brought in 20 disaster

We use cookies to improve user experience and analyze our website traffic as stated in our [Privacy Policy](#). By using this website, you agree to the use of [cookies](#) unless you have disabled them.

video camera phone was only about 2 feet away from the screen, and no special lighting or adjustments were made so that they could simulate what it would be like in a real disaster situation. They brought the ultrasound screen into view on the camera phone, started the video recording when the examination began and shut it off when it ended.

Real-time images

The video images sent to emergency physicians were received in real time on their identical video phones. They chose to use video phones rather than computer screens for receiving the images because, in a real-life situation, the physicians might be in a field hospital and not have e-mail available.

The physicians, who are trained in ultrasound, graded how well they could see landmarks – the key anatomical areas where they look for problems. For example, they looked for the liver next to the right kidney and made sure that blood wasn't collecting there. They determined that the heart was beating and that there was no fluid around it. And they observed the spleen and the left kidney to check for fluid buildup. They also indicated how confident they were in not seeing free fluid in the abdomen and in other critical areas.

The preliminary results show that the video images are sufficient for making informed decisions and recommendations for treatment. Blaivas concluded that "while a picture tells a thousand words, a video tells a whole lot more, and the more, the better."

VIDDAlthough video is superior for viewing moving images such as ultrasound, still cameras are being used effectively in taking static images, such as in wound management and dermatology. In a study conducted last year at University Hospital in Geneva, doctors led by Dr. Ralph Peter Braun used camera phones to photograph leg ulcers. The Nokia 7650 phones took images with a resolution of 640 x 480 pixels.

The images were e-mailed to two doctors for remote evaluation, while a third performed a face-to-face examination. They found good agreement between the remote and personal evaluations, and all physicians were comfortable making a diagnosis based on

We use cookies to improve user experience and analyze our website traffic as stated in our [Privacy Policy](#). By using this website, you agree to the use of [cookies](#) unless you have disabled them.

and just a small area of surrounding skin. They discovered that the close-up photo was of inferior quality but had enough detail to help them make a precise evaluation.

Ronald Merrell, professor of surgery at Virginia Commonwealth University in Richmond, director of the Medical Informatics and Technology Applications Consortium and an editor of the American Telemedicine Association's journal *E-Health*, sees a lot happening with camera phones and telemedicine. He thinks that the devices could really aid wound care for people in remote areas who have skin problems. Such images can help reveal what is happening in epidemic situations and are useful in home health monitoring of wounds.

Use still limited

Camera phones are such simple telemedicine devices that "they should be all over health care," Merrell said. However, some obstacles remain. The low level of radio-frequency interference that cell phones emit makes them unusable in many hospitals. And the stringent standards surrounding the storage of patient information could be a hindrance. This can be circumvented by removing identifying information from images transmitted for analysis.

One obstacle that has been overcome is the incompatibility of communications standards. "There used to be some trouble using cell phones in Europe because they were using the Global System for Mobile communications (GSM) standard, but that's no longer a problem," Merrell said. The GSM standard wasn't widely used in the US, so a US phone couldn't be used overseas. Today the code division multiple access (CDMA) standard has been adopted worldwide and is the fastest-growing wireless technology, according to the Telecommunications Industry Association.

Advancing technology means that the clarity of images captured by a camera phone could soon be as good as digital images. But as to whether the image quality will mean that the camera phone becomes ubiquitous in telehealth is questionable. Merrell said that their proliferation in routine health care is limited not by technology, but by our willingness to try new things.

We use cookies to improve user experience and analyze our website traffic as stated in our [Privacy Policy](#). By using this website, you agree to the use of [cookies](#) unless you have disabled them.

There are **631 suppliers of Sensors & Detectors in the Photonics Marketplace.**



Published: May 2006

We use cookies to improve user experience and analyze our website traffic as stated in our [Privacy Policy](#). By using this website, you agree to the use of **cookies** unless you have disabled them.