Applying Tech: Wireless Medicine—Part 1

How are you influencing wireless medicine?

Peter M. Engstrom
Managing Director, STEUTE Meditech Inc.

Foot controls for medical devices have traditionally been connected via a cable. In today's sophisticated ORs, the population of cables has increased dramatically. Each cable represents a tripping hazard and a source of failure, as carts, chairs, and exam tables are dragged over them.

Consequently, we have often been asked if we could get rid of the cable.

To do so, we have pioneered the development of wireless foot controls for use in medical applications. Using worldwide-accepted 2.4 GHz, bidirectional, frequency-hopping technology, we have developed safe, reliable, noise-immune, wireless foot controls for use with both therapeutic and diagnostic equipment.

These foot controls eliminate the tripping hazard and the major source of foot control failure (cable damage). In addition, they offer the added benefits of being easier to clean and store, and offer the user greater flexibility in their location relative to the device they are controlling (e.g., they are no longer tethered to the medical device by a cable).

Wireless hand and foot controls are now available for providing both analog and digital control of devices such as ophthalmic surgery systems, X-ray equipment, ultrasonic systems, surgical microscopes, surgical navigation systems, electrosurgical generators, dental systems, examination tables, bone saws, surgical shavers, and dermatology equipment.

Bill Stumpf
Senior EMC Test Engineer and OATS Site Manager, D.L.S. Electronic Systems Inc.

Wireless technologies have an important role in medical applications, such as asset tracking (RFID), wireless controllers, patient monitoring, two-way radios, and wireless data transfer. It is imperative that manufacturers of these wireless medical devices address the issues and concerns relevant to the safe and effective use of radio frequency (RF) as required by the many medical standards and the hospital environment. As an electromagnetic compatibility and product safety lab offering testing, consulting, and certification of wireless devices, we get manufacturers through regulatory compliance hurdles. In this way, we provide a streamlined process of getting new wireless medical technologies on the market in a timely and cost effective manner. By testing for RF emissions, immunity to interference, and product safety, we are helping to provide assurance that the wireless device will work reliably in the environment for which it is intended, and that it will be safe for the user and patient. As a test lab, we are helping to make these wireless technologies available to the medical industry.

Jeffrey VanZwol
Vice President of Marketing, Micro Power

Micro Power influences wireless medicine from two approaches. First, computers-on-wheels or medical carts are used as mobile bases for wireless laptops or IPads. These carts are mobile workstations that nurses use on their daily routines to collect and log patient information, and transmit it back to a centralized patient database. Micro Power offers a Lithium Iron Phosphate battery that extends run-time to support a full 12-hour shift without recharging. This battery powers AC/DC power converters, notebooks, printers, and even barcode scanners operating on the cart. Additionally, these batteries support long cycle life and weigh about 1/3 of the traditional battery solution—lead acid batteries. Second, Micro Power produces custom batteries integrated with cardiac telemetry devices used for monitoring heart rate and rhythm in the hospital or home care setting. These wearable devices are used to monitor a patient’s cardiac performance level. This data can be transmitted over wireless LAN (hospital setting) or cellular data network (home care

setting). Any vital signs that indicate signs of distress can be acted upon by a centralized nurse or cardiologist. Typically, these batteries are Lithium-polymer batteries, with the key features being light weight and custom dimensions.

Marten L. Smith
Staff Engineer, Medical Products Group, Microchip Technology Inc.

Wireless medicine offers some of the greatest opportunities and most difficult challenges for the next generation of patient care. The “untethering” of patients, in hospitals and at home, is the essential next step in medicine. But, medical device designers are finding themselves “tethered” to the challenges of extending battery life when adding wireless connectivity.

Increasingly, medical device designs are using the IEEE 802.11 Wi-Fi protocol. This protocol has become popular because transceivers are readily available, the economies of scale keep costs down, and an extensive infrastructure is already in place. However, Wi-Fi historically hasn’t been known as a low-power solution. That perception is changing.

Microchip is positively influencing wireless medicine by extending its expertise in extreme low power microcontrollers to IEEE 802.11 Wi-Fi transceivers that are tailored for embedded systems. For example, by utilizing the MRF24WB0MA 802.11 transceiver module and an XLP PIC microcontroller, the life of two AA alkaline-cell batteries can be extended substantially, ranging from several months up to several years for a broad range of medical devices. Examples include digital weight scales, glucose meters, and blood-pressure monitors. As the demand for these types of devices has increased, the untethering of both patients and medical device designers has definitely become more critical.

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