

PACKAGING MEDICAL ELECTRONICS PRODUCTS

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Medical electronics is alive and well in the USA, and will probably remain centered here far into the future. The medical electronics field is advancing on many fronts from massive imaging machines to small portable and personal products. Each type of product represents a fascinating challenge for packaging. Electronic imaging, for example, typically relies on large arrays of photosensors that must capture radiation and quickly transfer data to the main system. Considerable advancements have been made in x-ray sensors that have reduced the level of radiation exposure, increased resolution, and now enable faster processing when combined with high-speed processors. CAT (Computed Axial Tomography) has reached a new level of performance where the body can be digitally dissected to divulge the most subtle problems. Many sensors, hundreds or even thousands, can be packaged as flip chips and this permits them to be placed close together in large arrays. Since the x-ray source and detectors are revolving around the patient, there is an interesting interconnecting challenge. One company is working on photonic linkage where a periodic burst of modulated and coded "light" would send the data to the system during each revolution. But x-ray advancements are not limited to big machines. Chances are that your dentist is now using a small electronic imager instead of film so that the x-ray instantly shows up on a monitor using much less radiation per exposure. But if you really want to avoid x-rays in certain procedures, you can swallow a pill camera that is now sold by several companies; the internal images are transferred by wireless (RF).

We are also entering an era that promises amazing biomedical developments at chip-level centered on bio-MEMS. Today, there are many MEMS devices being developed and tested in medical laboratories and clinics. One tiny embedded MEMS sensor can monitor blood pressure at specific body sites and report data through wireless mechanisms and this is especially valuable for certain cardiac conditions. Other devices can inject medication on command and the idea is to combine sensors and drug delivery together to create automatic wearables, or even embedded systems, that will aid those with certain ailments, and allow them to live normal lives.

But there are already a number of new wearable electronic products coming onto the market that are aimed at personal health care. One goal of advancing medical electronics is to move treatment away from the hospital and closer to the home. Cost drops dramatically as health care treatment and intervention move from hospital to clinic, to doctor's office, and finally to the home. The concept is to link the patient to the medical specialist electronically where help can be faster, more efficient, and less costly. We already have personal monitors that allow physicians to check a patient's condition by telephone link or Internet. Life saving medical marvels, including defibrillators, are now available for home use.

One example of an intriguing wearable product with important health-related potentials is the SKeeper™ from Tadiran LifeCare in Israel shown in the figure below. The present model is designed as an emergency communicator for elderly and those with health problems to get them immediate assistance with single-button actuation. The "watch" uses a Siemens MC55 wireless module with built-in speakerphone and can activate cellular voice calls to pre-defined numbers (e.g. a relative or a health professional); calls can also be received from phones to check on well being. Such a product might incorporate personal welfare monitors that could initiate automatic responses. The unit presently can take advantage of location-based services provided by many operators but will have GPS capabilities later this year. GPS could make the auto-monitor idea even more valuable. A monitor sensing that the wearer was experiencing an emergency, could link to a crisis call center to report the problem and location. The convergence of medicine, electronics, sensor chips, and communications, will bring about a new revolution where technology improves our well-being, safety and sense of security.

