

Electronics and Medicine – Perspectives and Promises for A Developing Country

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Distinguished participants,

It is the first time that I have the honor to speak in front of a medical audience and I wish to thank Professor Ionescu-Tîrgoviște for the invitation to present a contribution at this prestigious conference.

Electronics and the management of a medical unit

Here I have chosen to exemplify with RFID (slide 1), mainly because it is a growing technology and it is the field in which I have a direct experience.



An RFID tag and its antenna embedded in a plastic container

- RFID tags: small chips that are able to store data and communicate with a read/write device.
- Passive tags: take their power from the magnetic field of the antenna of the read/write device.
- Active tags: powered by an internal battery (hence longer communication range but also more expensive).

Slide 1 – Radio Frequency IDentification, a growing technology of our time

- Covers everything from patient data to medicine tracking.
- Mobile clients act as memo takers and provide doctors with context sensitive data about patients.
- Reader module enables medical staff to access information rapidly by reading tags on patients' wristbands or on medicine bottles.
- RFID labels are used to authenticate the medical staff to the software systems and to provide controlled access to special rooms.
- Confidentiality: medical personnel need to authenticate themselves on the PCs before they are allowed to access patient data.
- System provides a mechanism to authenticate documents going outside of the medical department.

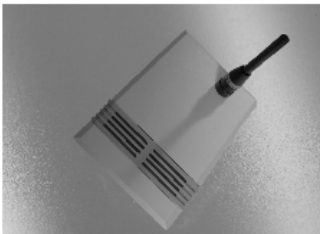

Slide 2 – RFID solution provided by ACG Identification GmbH and n-Tier construct GmbH, On The Move, Identification News, 6 (2), 2004

An example of RFID solution is the one applied in a medical unit of Mainz, Germany. It is said to provide a more secure medical environment due to the reliable identification of patients and medicines, as well as an

increased level of confidentiality by strictly monitoring the access to patient data (slide 2).

Myself I collaborate with Frosch Electronics of Graz, Austria, having contributed so far to the development of two RFID systems. The named company produces systems based on passive and active RFID tags

and is worldwide known for the quality of its solutions (slide 3). Since its strong asset is the development of flexible solutions according to the customer's demand, Frosch Electronics could represent an interesting partner for a medical unit in a developing country.



- Uplink 125kHz based
- Downlink 433 or 867 MHz based
- Read Range up to 12 m
- Active System
- Demo Software
- Plug and Play Solution

The ETS advanced Reader is the key component of one of the most advanced systems to track items reliable up to 12 m recognition distance with the additional feature to trace the position of the transponders in field in a pre-defined area.

Slide 3 – Frosch Electronics's Advanced Reader with application to tracking mentally confused or unstable people in a psychiatric environment.

Taking care of the patient

We are living in a complex world affected by complex maladies. The treatments that are presently applied are often based on complex chemicals whose effects are often intricate, unexpected and not very well understood.

Such an example is provided by heart failure.

One drug scheme that is presently admitted as a treatment for advanced congestive heart failure is based on the association of an inotropic agent (mostly Digoxin), an ACE inhibitor and a diuretic.

Studies evaluated the use of spironolactone as a potassium-sparing diuretic and estimated it as a beneficial addition to the treatment with ACE inhibitors. Subsequently,

several studies have triggered an alarm signal concerning the potential for life threatening effects of this drug combination on certain categories of patients, especially the elderly, the main life threatening condition being manifested in the form of hyperkalemia [1,2].

Likewise, the usage of Digoxin has also been found as presenting risks for toxicity even at levels of physiological concentrations, mainly for the same patients mentioned above as at risk [3].

Faced with these realities, most studies [4] are strict on recommending continuous and mandatory monitoring of patients that are at risk when exposed to treatment of heart failure.

Unfortunately, many medical units of developing countries cannot afford disposing of cardiac monitoring systems placed at each patient's site. Yet these countries are