SMART HEALTH

MULTI-PARAMETER SENSING WITH IMEC’S HEALTH PATCH TECHNOLOGY

Assessment of vital signs or other physiological parameters are often done as a spot-check at the hospital. Yet those unique points in time can be deceptive about our general condition. Long-term monitoring is more reliable, especially under everyday conditions. Continuous health monitoring can help improving diagnostics, preventing hospital readmission or managing a chronic disease. Such long-term monitoring requires a device that’s versatile and reliable, user-friendly and low-cost.

We present two solutions that meet these demands. The first solution is a wearable investigational device useful for a large number of different studies in the clinic. It can be used in an early stage to understand the role of wearables in diagnostics, treatment assistance and disease management. The second solution is a wearable patch solution which shows imec’s vision of a cost-effective and convenient-to-wear single-use patch solution.

LONG-TERM MONITORING SOLUTIONS

Both devices can be used for over 7 days of continuous data acquisition while locally collecting data or transferring through a wireless Bluetooth link. Also, both are based on imec’s family of MUSEIC chips to achieve this, demonstrating the wide applicability of these chips.

The first device is a versatile wearable intended for clinical research. The investigational device can capture multiple channels of ECG, bio-impedance, temperature, multi-wavelength, multi-channel photoplethysmograph, body sounds and 6D motion. A single MUSEIC v2 chip guarantees perfect synchronicity between all sensed modalities. This allows for acquisition of truly unique multi-parameter datasets.
The second device shows the integration of MUSEIC v3 in a single-use patch form factor. It is the first of its kind, combining ECG, bio-impedance and photoplethysmograph into a single and convenient patch. Heart rate, respiration rate and oxygen saturation in the blood (SpO2) are derived from the signals in the system. MUSEIC v3 is a highly integrated solution, which allows for a cost-effective single-chip solution, integrating all sensing circuits as well as processing, Bluetooth wireless communication, local storage and encryption.

ALL-IN-ONE SYSTEM-ON-CHIPS

While the investigational device is excellently suited as a starting point for clinical data collection, the health patch is a versatile and disposable device that can be designed to address the needs of a specific application. It is built around an all-in-one chip from the MUSEIC family that measures all the vital health signs. The collected information is preprocessed on-chip. That significantly reduces the amount of data which is then transmitted to a mobile phone, base station or the cloud through the integrated Bluetooth LE radio connection. The transfer is 100 percent secure thanks to dedicated on-chip hardware for encryption and authentication.

Thanks to the use of printed electronics, dry electrodes and silicone-based skin adhesives, imec’s health patch is comfortable to wear and doesn’t irritate the skin. Because of the low-power system-on-chip design approach of MUSEIC v3, an unprecedented battery life is achieved on standard batteries. It’s also fully disposable, because of its low-cost design and non-toxic battery. That makes this health patch an ideal solution for ambulatory long-term monitoring. Think about the benefits for chronic patients or people recovering from surgery: they can be checked continuously at home without having to come to the hospital every day. Making their lives easier and their treatments more effective.

LOOKING FOR: USERS AND CUSTOMERS

Do you have a product idea that could involve our health patch technology? Tell us about it! We can help you get clinical data fast and effective. Our investigational device is a quick and easy tool to get started with data gathering of patients. It allows for early-on risk assessment, for example in clinical trial trajectories. Using this first-line information, we can then tailor-make a disposable health patch for your specific application.