

Personal healthcare

Bridging lifestyle, healthcare and technology



Healthcare today is still generally reactive, focused on disease treatment, and centered around hospitals and other places for medical care. When there is no direct need to consult a doctor, most people are not linked to diagnostic and therapeutic systems. However, people are increasingly aware of their health as a very important value, and the willingness to take a proactive role in personal healthcare is growing. Moreover, the increasing demand for healthcare forces medical centers to look for options with higher efficiency and lower costs, and to focus more on prevention. Passive recipients of healthcare are being transformed into active participants. However, apart from recourse to professional medical diagnostic systems, there is still no accepted way to objectively assess your personal health status.



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People should not have to wait to see a physician or visit a hospital before getting an update on their current health status. Supported by appropriate technology tools, providing reliable information on their condition, people can be empowered to take timely action themselves. By being connected to a medical care center, immediate help is available in case of real emergency. This is what personal healthcare is about: turning uncertainty regarding your current health status into timely knowledge, moving from an indecisive state into action and treatment, becoming proactive instead of reactive.

There are other important drivers for realizing this personal-healthcare vision: with an ageing population, the demand on healthcare providers is increasing, so efficiency and cost reduction become crucial aspects. More needs to be done in less time and with fewer people, so that patients can be discharged from hospital sooner. With advanced technology, remote monitoring is a promising option for cost-effective health management: the patient can stay at home, but is constantly 'connected' to the hospital. Moreover, a shift is taking place towards personalization and preventative healthcare:

the enormous progress in the mapping of the human genome allows individuals to learn at an early stage what diseases they are at risk from, and to take timely steps to prevent them occurring, with the assistance of personal-healthcare technologies. Finally, the digitalization of healthcare increasingly provides the networked infrastructure that is needed to support individual-centric care.

Personal-healthcare applications and technologies

The personal-healthcare domain encompasses a large variety of application scenarios and associated technologies: from relatively simple, stand-alone devices, improving your well-being by giving personal feedback based on direct physiological measurements, to complex post-discharge health-monitoring systems, guarding your

measurements and communication of the results to the patient or, in an emergency, to the physician are the key elements in all these scenarios.

The starting point is to gain knowledge of a person's actual health status by continuous monitoring of vital signs. Different types of sensors are needed that measure specific physiological signals: for example, weight management, which is on the preventative side, uses relatively 'soft' parameters, while critical diabetes management requires continuous, accurate glucose level monitoring. Sensors need to be close to the body, but unobtrusive, for example as part of clothing: in some cases, it may even be feasible to embed devices into the body itself using implants.

Secondly, dedicated signal processing

“Intelligent, personalized healthcare technology will improve the quality of people's lives and the effectiveness of medical care.”

Eric Thelen, Philips Research Aachen.

health continuously via a direct link to an institute for medical care. Monitoring of physiological signals, interpretation of

algorithms are required to analyze the sensor input in the right, highly personalized context, leading to a diagnosis. A history of

recorded personal medical data is used to signal abnormalities and provide early-stage warnings.

Furthermore, well-designed user interfaces are vital to communicate a diagnosis unambiguously to the user, leaving no room for misinterpretation. The basis for this interactive design is the real-life, intricate interaction between physicians and their patients, closing the loop towards action, for example therapy or a motivation to adapt behavior.

Different types of network technology are needed to ensure optimal connectivity, for example personal-area or even body-area networks. In most cases, personal-healthcare devices will be connected to a professional medical care center to enable continuous monitoring services and provide immediate help in case of emergency. A strong, highly reliable network will be required to connect all points of personalized care and to ensure that vital data, images and other medical information are properly stored and easily accessible, any time, any place.

Personal healthcare and Philips

Philips has strong capabilities in the areas of healthcare, lifestyle and technology. Through a highly user-centric approach we aim to develop products and services that really enrich people's lives. Philips Medical Systems already has a strong position worldwide in professional medical systems. Recently, a new business unit called Consumer Health and Wellness has been established as part of Philips Domestic Appliances and Personal Care, which will focus on healthcare outside the medical profession. This gives Philips a

unique position to enter the personal-healthcare domain, focusing on products and services that improve or preserve the health of individual people both inside and outside institutional points-of-care (hospitals, physicians' offices). More and more technology will be available in the preventative stage, increasingly empowering people to take care of their personal health and well-being: personal healthcare will enable proactive monitoring, more accurate, personalized diagnoses, and, most importantly, a healthier population that lives longer.

Joined forces: MyHeart

MyHeart is a European project, led by Philips with a budget of EUR 33 million and 33 project partners from 11 countries, aimed at creating options for smart electronic systems and associated services that empower users to take control over their health status. It is an effort of industrial research institutes, academics and hospitals, covering the whole value chain from textile research, via fashion and electronic design, towards medical and home-based applications.

The project focuses on cardiovascular diseases (CVD), the leading cause of death in the western world. It is commonly accepted, that a healthy and preventive lifestyle as well as early diagnosis can systematically combat the origin of CVD and save millions of life-years. MyHeart explores technologies to support people to adopt a more healthy and active lifestyle in order to reduce risk for developing CVD, and limit the recurrence rate of earlier acute events.

One of the first results of MyHeart is a prototype of a wearable, wireless monitoring system that measures and diagnoses body signals of the wearer to detect abnormal health conditions. The measuring device can e.g. be integrated in wearable garments, such as women's bras.



Scenario building in the MyHeart project



HOMe Stroke Test (HOST)

With HOST, Philips Research is investigating a personal-healthcare system for the home environment, aimed at patients with an increased risk of having a stroke. The idea is to assist users in detecting the symptoms of a stroke and make an early decision to call the ambulance to reduce the extremely critical time-to-treatment. An example of such a symptom is sudden numbness or weakness of the face, arm or leg. The HOST project investigates methods for the early detection of a number of these stroke



symptoms. The interaction between the system and the user is vitally important for the success of the detection methods. In order to ensure the necessary domain-specific competence, this project is done in close cooperation with the stroke-unit of the University of Düsseldorf, providing real-life expertise on stroke detection.

Philips Research has developed a wearable, wireless monitoring system that can warn patients with underlying health problems. The system uses dry-electrode technology that can be built into common items of clothing like bras, shorts or waist belts.

Research projects

Fitness Coach

So, let's be honest: how many times have you started a fitness programme, only to quit because of a lack of motivation, or a training schedule that was too complicated? What if you could start exercising in your own home with a personal coach, stimulating you to persevere, giving you all the information you need on your performance, and telling you what to do next for an optimal result? This is the domain of Fitness Coach, a sports application that monitors specific physiological signals via smart sensors, calculates the training intensity through dedicated algorithms, and helps to regulate the pace of training, based on your own personal data. The interaction between coach and user is based on personalized feedback, improving performance and motivation. Philips Research is working on the required technologies to make this happen: an early demonstrator has been developed and built, and is currently being tested with potential users in HomeLab.



Reference Architecture for Care Everywhere (RACE)

With the RACE project, Philips Research is contributing to the platform-architectural developments that are required to support the wide range of personal-healthcare applications and services envisaged. As a first step, in the domain of professional healthcare, Philips Medical Systems is being supported in their development of a broadband-enabled remote patient management platform, called Motiva: a secure, personalized healthcare communication platform that connects chronic disease patients through their home televisions to their healthcare providers, support groups and family. When integrated with innovations from related Philips personal-healthcare activities (for example, MyHeart) this will allow disease management, emergency response, post-discharge surveillance, safety and security monitoring for patients outside clinical institutions, for example in their own homes. Future developments will include the extension of the reference architecture to incorporate personal wellness as well: the domain of self-care, prevention, and wellness where Philips Consumer Electronics and Philips Domestic Appliances may enter the market.

HeartStart

Sudden cardiac arrest (SCA) often strikes without warning, and the majority of cases occurs in people who have no previous symptoms of heart disease. When SCA strikes, the electrical system of the heart short-circuits, causing the heart to quiver rather than pump in a normal rhythm. Nearly 80 percent of sudden cardiac arrests happen at home. For the best chance of survival, a defibrillator should be used within 5 minutes. Defibrillation, an electric shock to the heart, is an effective method for restoring a normal cardiac rhythm of a

patient suffering SCA. Philips' HeartStart Home Defibrillator is the first of a new generation of defibrillators specifically designed for use in the home by virtually anyone. Clear aural instructions are given by a natural voice on how to use the device, and via a dedicated algorithm the device determines if the patient's heart needs a shock. Philips is the worldwide market leader in portable defibrillators with over 175,000 automated external defibrillators deployed.