Innovative Sensing Technologies for Developing Countries

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The recent development in wearable and pervasive sensing technologies have shown promising results in tackling major healthcare challenges, from quantifying post-operative care, providing assistive functions, to assessing efficacy of therapeutic intervention and assisting diagnosis. Numerous devices and platform technologies have been introduced for chronic patient care, elderly care, mental health, wellbeing, sports and other applications. However, majority of the research and developments are focused mainly on tackling healthcare issues in the developed world.

These low-cost technologies have great potential to alleviate the increasing care cost meanwhile improving the quality of care provided to patients and older populations. They can be applied for both developed and developing countries addressing global health problems. For instance, dementia is one of the major health challenges in the UK. The decline in mental capacity could lead to other complications, such as fall, anxiety disorder, malnutrition, dehydration, insomnia and depression, which affect the quality of life and lead to increasing dependency on family members and caregivers. Many technological approaches have been proposed to assist older adults with dementia in developed countries. Many of these technologies can also be extended and applied to help improving the care of patients with dementia in Thailand. In Thailand, there are over 600,000 people with dementia in 2016 and it is expected to raise to over 1.1 million in 2030. These increasing patient population will lead to increasing demands on healthcare services and which will soon exceed what the government and basic health insurances can offer. Patients will have to rely on their family members to provide the needed care. Apart from financial lost, the highly stressful tasks of caregivers can lead to psychological, family relationship and societal problems. Low cost wearable sensors can provide the needed monitoring for patients with dementia and alert caregivers when an incident is detected. It removes the need for constant observation and allows prompt responses to incidents.

Apart from chronic illnesses, such as dementia, which affect both developed and developing countries, Low or Middle-Income Countries (LMICs) often face with very different health problems, such as malnutrition instead of obesity in the western world. Extensive work has been conducted in developing technologies to tackle obesity and overweight in US and Europe, but very limited work has been conducted for tackling malnutrition. Although obesity and malnutrition are very different problems affecting different populations, pervasive monitoring technologies, such as wearable cameras and sensors, mobile applications, etc., developed originally for tackling obesity or overweight can be modified and applied for tackling malnutrition. These wearable technologies could enable accurate dietary intake monitoring and provide the needed quantitative measurements for nutritional analysis. Being able to accurately assess nutritional intake of the targeted population, effective public health interventions can be introduced to improve nutritional health of the population.

The innovative pervasive sensing technologies have often been considered as potential solutions to tackle major healthcare issues in the developed world. Although most of these technologies were originally designed for the developed countries, these low-cost technologies have great potential in addressing intractable health challenges faced by developing countries.

Figure 1. A wearable sensor for dementia care (jointly developed by NECTEC, Thailand and Imperial College London, UK)

Figure 2. ActiveMiles – a mobile app with deep-learning based food recognition for dietary intake assessment

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