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# Smart Rehabilitation: Leveraging Technology for Enhanced Geriatric Care

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Geriatric rehabilitation involves a collaborative procedure between a medical professional and patients with the goal of preserving or regaining optimal function in multiple domains of life. New methods for assisting geriatric rehabilitation are provided by Internet of Things (IoT)-based technologies.

Such technologies may facilitate easy and real-time data communication between healthcare providers to support the delivery of care, in addition to providing tools for measuring and monitoring health issues. The elderly population may benefit significantly from Internet of Things (IoT) technologies that guarantee efficient and equitable rehabilitation. Example of IoT are Bio stamp and Ambient sensor devices.

**BIO STAMP:**

Bio stamp is a thinner than a Band-Aid. The sensors monitor temperature, movements, heart rate, and all these vital signs which are be transmitted wirelessly to an application.

The micro-controller efficiently processes signals from the 3-axis accelerometer and gyroscope, sampling the sensor data for storage in flash memory or wireless transmission via Bluetooth.

Users can establish wireless Bio Stamp device's operating parameters such as sampling rate, measurement type and measurement range prior to data collection by using a customized mobile application. Additionally, this intelligent mobile device makes it easier for data from the Bio stamp sensors to be transferred to a cloud server for further evaluation.

The Bio Stamp might upload its data to a nearby smartphone for analysis through near field communication (NFC), a wireless technology that allows devices to communicate data. Ideally, the patch can be linked with a thin-film battery from a commercial provider, or a phone with an NFC chip can be waved over the patch to enable continuous data transmission between the patient and the clinician.


Image URL:https://images.app.goo.gl/t6rmUDbCSQTEQL7r8

**Uses of this device :**

1)Health Monitoring: By continuously tracking vital signs like body temperature, heart rate, and hydration levels, these gadgets can aid in the early detection of health problems. 2)Fall detection: By integrating accelerometers and gyroscopes, bio stamps can identify falls a typical risk for the elderly and send immediately signals for prompt assistance. 3)Medication Management: They can help patients in line to treatment plans by keeping track of drug levels in the body and reminding them when to take their medication as prescribed.

4)Chronic Disease Management: Bio stamps can give medical professionals access to real-time data on ailments like COPD, diabetes, or hypertension, facilitating better management of chronic illnesses.

5)Comfort and Convenience: Bio stamps are lightweight, non-invasive, and do not limit movement, which makes them more comfortable for senior users than typical monitoring systems, which can be heavy or painful.

6)Remote Healthcare: Bio stamps can provide data to medical practitioners via the internet negating the need for recurrent hospital visits as telemedicine becomes more common.

This advanced technology guarantees ongoing monitoring of health in a convenient and discrete manner which may significantly enhance their quality of life for elderly patients.

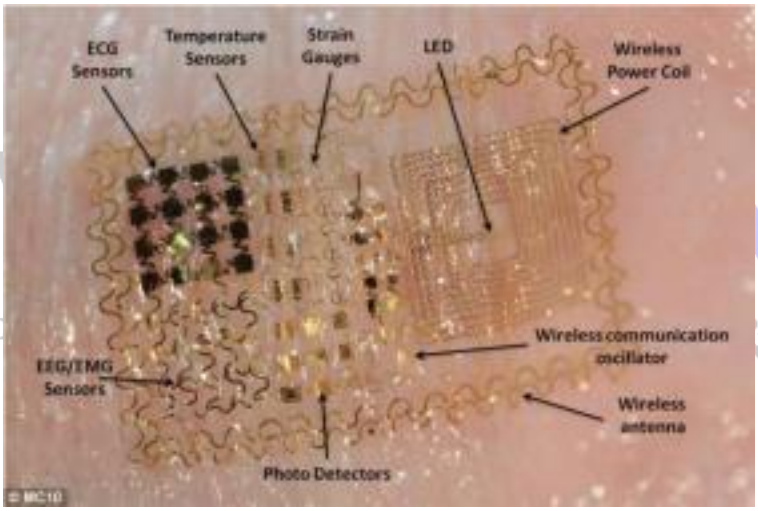


Image URL : https://cargocollective.com/futurehealth/biostamp

**AMBIENT (IN-HOME) SENSORS:**

In the past, a concept known as "ambient intelligence" has served as the basis for the research and development of a variety of assistive technologies. This paradigm aims to empower individuals by creating digital environments that are perceptive, flexible, and human-centered. Ambient aided technologies are those that utilize ambient intelligence to support assisted living.

Ambient or in-home sensors may provide important information on the context and interactions of a person with their surroundings. A variety of environmental characteristics, including motion, light, temperature, pressure, and humidity, can be monitored with the use of ambient sensors. A range of sensors found in homes, including pressure sensors, webcams, and accelerometer can be used to identify anomalies such as falls and abrupt changes in activity. Additional uses for ambient house sensors include social isolation, stress, and loneliness monitoring.

In the last few years, ambient assisted living (AAL) technologies have become more and more popular, offering creative solutions to the problems associated with an aging population. In addition to supporting people in maintaining and pursuing their current activities, AAL technology has the potential to improve the quality and cost-effectiveness of health and social

services, as well as enable people to continue participating in activities at home and in the community as they age. Despite the lack of a consensus definition for AAL, the phrase

"ambient assisted living" is frequently used in gerontechnological research and development. There are three generations in the development cycle of ambient assisted living.

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| 1st Generation AAL | • Connectable devices<br>• Reacts to an emergency<br>• Needs user to sound alarms, etc. |
| 2nd Generation AAL | • Sensors for the home<br>• May feel intrusive<br>• Automated detection and response to emergencies |
| 3rd Generation AAL | • Wearable devices and home sensor integration<br>• Assistance and tracking for prevention<br>• Less obstructive |

To enable people to live longer stay socially connected and age independently. AAL generally refers to the integration of information and communication technologies (ICT), stand-alone assistive devices, and smart home technologies into a person's everyday living and working environment. Through the integration of actuators, smart interfaces, artificial intelligence, and sensors, AAL creates supporting home environments. Traditional assistive technologies for individuals with disabilities, universal design approaches to accessibility, usability, and acceptability of interactive technologies, and the new ambient intelligence (AI) computing paradigm which offers pervasive, intelligent, and discrete assistance—are the foundations of AAL.



However, AAL technology has the potential to be adaptive to the varied nature of old age. It can anticipate and respond to the changing demands of older persons. Research on the possibilities of such technologies for healthy, frail, or dementia-stricken older persons has been limited to this point in AAL history. Research from the past has mostly overlooked how

AAL technology might improve the daily lives of people with mild cognitive impairment (MCI). As long as daily activities are not hindered, mild cognitive impairment (MCI) is described as a noticeable loss in cognitive ability (e.g., memory, decision making, problem solving, and understanding). Up to 15% of adults over the age of 65 experience it, making it a problem for an important portion of the elderly population.

For individuals with motor cognitive impairment (MCI), successful assistance for independent living and aging in place is especially important because, in the event that it fails, it may keep them from experiencing severe pain and/or the high expenses of specialized care. With no viable pharmaceutical option at this time, AAL is the most appealing choice for offering this kind of support. But attempts to propose treatments are complicated because MCI refers to a variety of illnesses that show differently and are poorly understood.

AAL technologies that are designed to help older persons with cognitive impairments (mostly MCI) with the difficulties they face in their daily lives, as well as AAL technologies that could be more broadly beneficial to that target people.

Leveraging advancements in IoT (Internet of Things), AI, and machine learning, ambient sensor technology are growing more complex and adaptable. Numerous environmental parameters, including temperature, humidity, air quality, light levels, and even sound, can be monitored by these devices.

**Usage of ambient sensors:**

1)Integration with Digital Homes: Ambient sensors are frequently included into the ecosystems of smart homes, enabling automated temperature, lighting, and cooling adjustments based on real-time data.

2)Health Evaluation: To improve health outcomes, certain sensors are made to monitor indoor air quality and can send out alerts about allergens, pollutants, or CO2 levels.

3)The Efficiency of Energy: By evaluating environmental factors and recommending or automating processes based on their findings, these appliances aid in an optimization of energy consumption.

4)Edge information technology: This technique, which is widely used in smart cities and

industrial applications, reduces latency and use of bandwidth by processing information locally on a large scale.

5)User Privacy: Due to the growing emphasis on data privacy, many ambient sensors are made to collect as little personal data as possible while yet offering valuable information. 6)Wearable Technology: As ambient sensors are incorporated into wearable, individuals can now personally monitor the conditions around them and how they affect their health.