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Designing A Wearable Iot Device For Health Monitoring

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Abstract
Supporting both mental and physical health is becoming more and more important for preserving independent living as the demographics of many societies continue to age and the number of people with chronic conditions like diabetes, heart disease, and obesity rises. Technologies that have shown promise include sensing, remote health monitoring, and the ability to identify everyday activities. Personalized medicine is one of the numerous fields where the Internet of Things (IoT) is generating tremendous interest from a technical perspective. In addition, the body area sensor network (BASN) of the Internet of Things model has been used extensively for monitoring health in a holistic manner. For example, ECG monitoring is often used as an important tool for the detection of heart diseases. The main contribution of this study is the integration of the BASN framework into WISE, which allows monitoring of health in real-time. It has a number of wearable sensors, such as heart rate, body temperature, and blood pressure sensors. Additionally, the majority of wearable health monitoring devices that exist on the market today process, display, and relay information through a smartphone, which may interfere with normal use of the device. In order to provide immediate access to real-time information, WISE can be replaced by a lightweight wearable LCD that allows direct data transmission from the BASN to the cloud.
Keywords: Health Monitoring, visualisation, data processing, IOT

INTRODUCTION

The size and composition of the world's population have altered dramatically over the past decades, and these patterns are likely to persist. Almost all aspects of society are influenced by these population changes, but the health and healthcare sectors are especially impacted. Dramatic increases in life expectancy should be welcomed as a chance for individuals to live longer and healthier lives, particularly in developed nations [1]. However, this necessitates major improvements in living circumstances and healthcare services because older elders typically require more medical care than younger people. Additionally, as a normal aspect of aging, chronic illnesses are more common in older persons. At the same time, the cost of providing healthcare is rising quickly in every country. In 2001, for example, China spent more than 50 million Yuan (4.58% of GDP) on healthcare infrastructure; by 2015, this sum had increased to more than 400 million Yuan (6.05% of Total GDP). [9]. When the latest information and communication technologies (ICT) are incorporated into the healthcare system, it is expected that the effectiveness and efficiency of healthcare services for patients with chronic diseases and the elderly will improve. At the same time, several phenomena have appeared, such as ambient assisted living (AAL), ubiquitous healthcare, and the Internet of Things (IoT) in healthcare [2]. Though these names are different from each other, they are all interrelated. For purposes of facilitating autonomous and efficient transfer of data using the Internet, the Internet of Things (IoT) seeks to link physical and digital entities such as cyber sensors, sensors, and smart devices [4]. Thus, it is thought that using IoT in healthcare, especially through connected medical sensors like wearable and implantable devices, will make it possible to provide intelligent, precise, and reasonably priced individualized healthcare services [3].

MATERIALS AND METHODS

Over the past few decades, smartphones and tablets have taken center stage in our daily lives as the primary devices for mobile computing and communication. Due to advancements in various integrated sensors, smart devices now offer upgraded features and technologies that will potentially revolutionize many social and economic spheres within the coming future. They comprise social networking,

environmental sensing, healthcare and fitness, and transport [10]. Latest smart phones feature various types of sensor technologies, which include GPS, microphones, accelerometers, cameras, light sensors, gyroscopes, and digital compasses. Most smartphones include built-in WiFi, 3G, 4G, and 5G capabilities to further ease networking and information sharing with other devices [5][11].

A smartphone or tablet may perform a wide range of tasks, such as processing raw data, presenting the information to users, and transmitting the data to other data centers. Nevertheless, these solutions usually necessitate the continuous operation of programs, which may affect the frequent usage of the mobile device [8]. Recent advancements in cloud computing have made it possible to send sensor data straight to a cloud server, giving authorized users access to the data from any location and at any time using any Internet-enabled device [6].

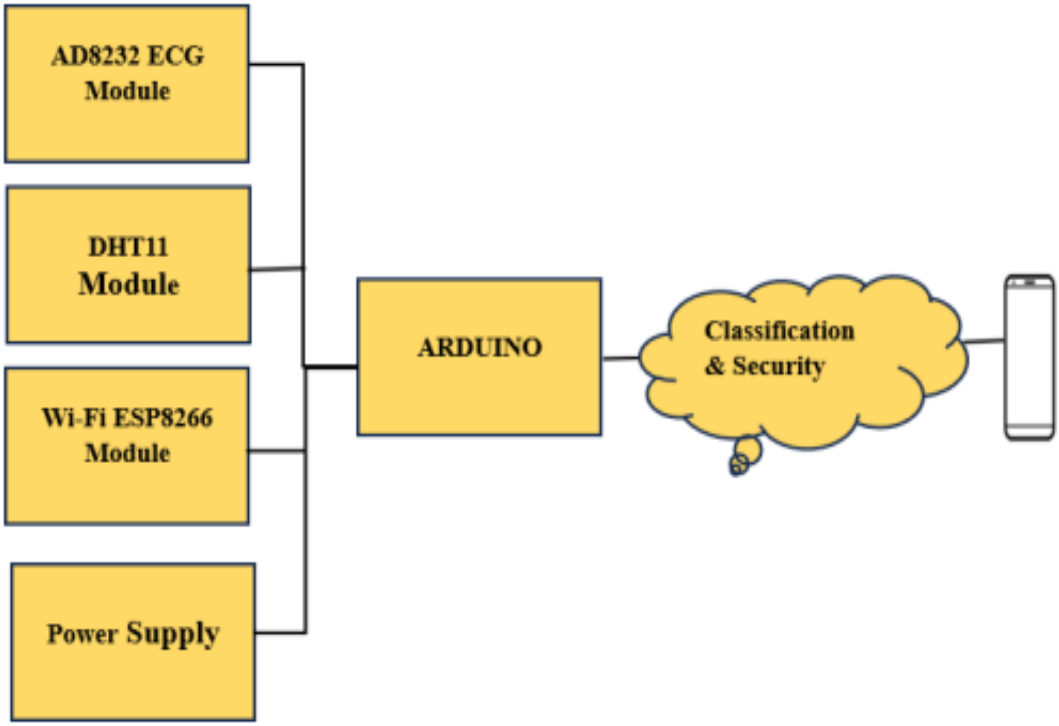

Figure 1: proposed diagram

The idea of employing sensors and sensor networks for activity recognition and tracking has become increasingly popular over the past 20 years [7]. One of the first activity detection frameworks could identify the physical movements of the user by gathering movement information from different parts of the body by placing multiple accelerometers on the human body.

RESULT AND DISCUSSION

Sensors, smartphones, smart TVs, and other intelligent devices can now be integrated easily with the help of the Internet of Things, which has drawn much attention over the last few years. Wearable IoT is a subcategory of the Internet of Things that is centered on wearable technology communication and connectivity. At the same time, wearable IoT has shown great promise in the healthcare industry, providing the infrastructure required for medical data transmission and communication [12].

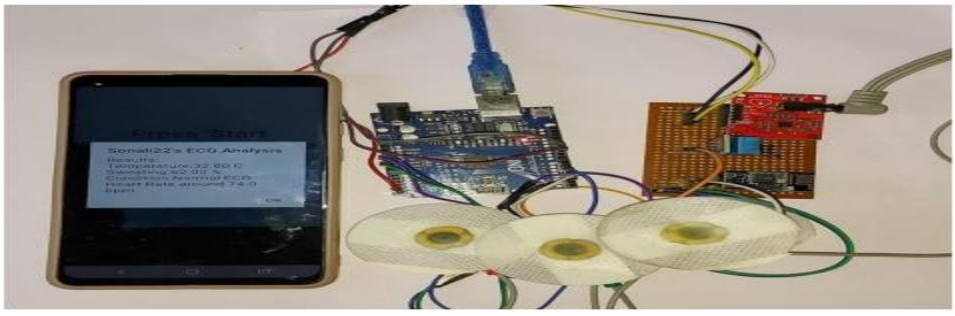

Figure 2: Hardware Setup of IoT-Based Wearable Device for ECG Monitoring

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This sensor tracks blood flow through the earlobe, providing a simple way to evaluate heart function. The amount of blood varies over time as the heart pumps blood via the earlobe's veins. The sensor detects the amount of light that is transmitted after shining a tiny incandescent light on the earlobe. The clip can also be applied to the tip of a finger or to the flesh between the thumb and index finger [13][14].

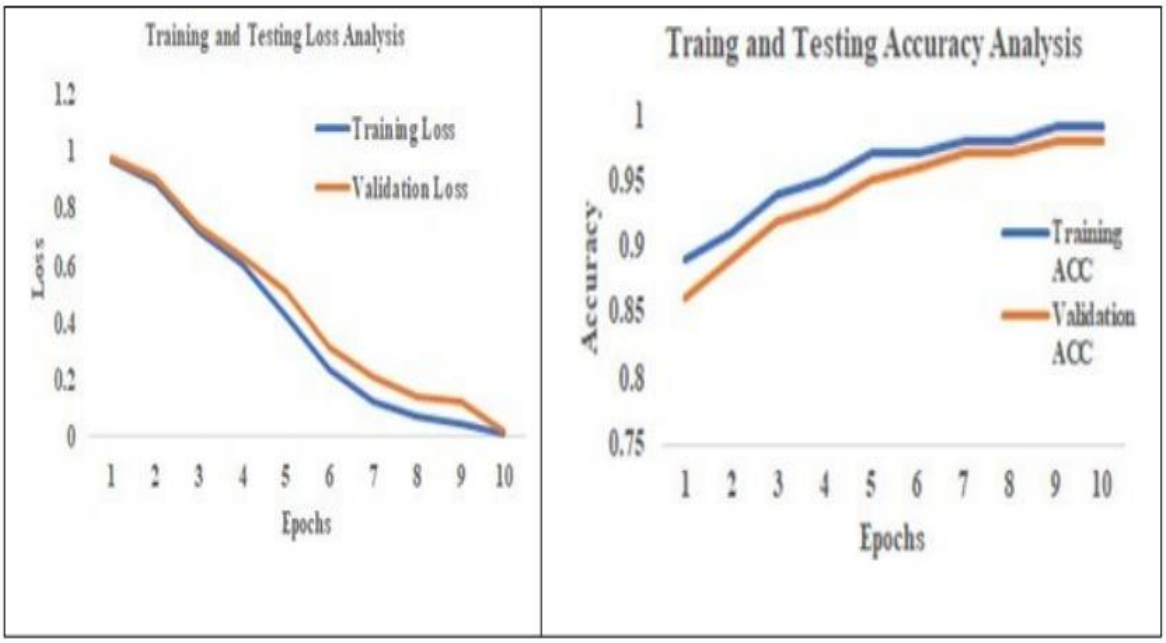
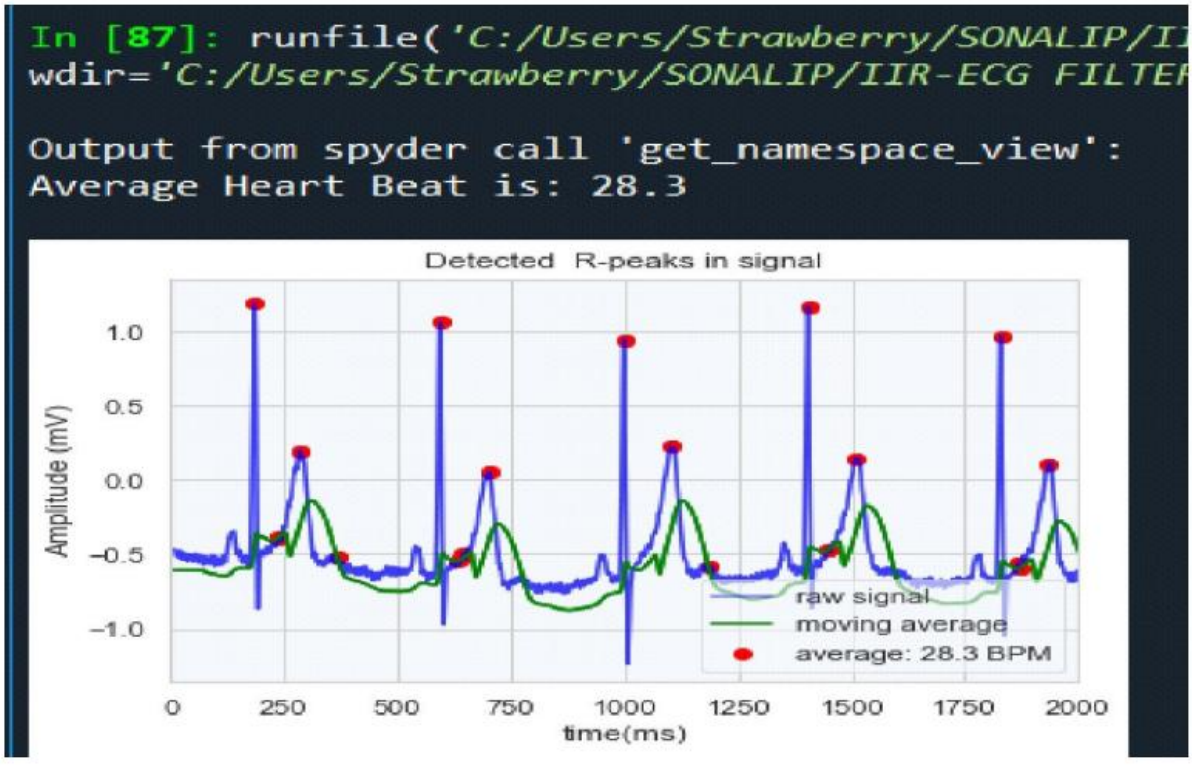
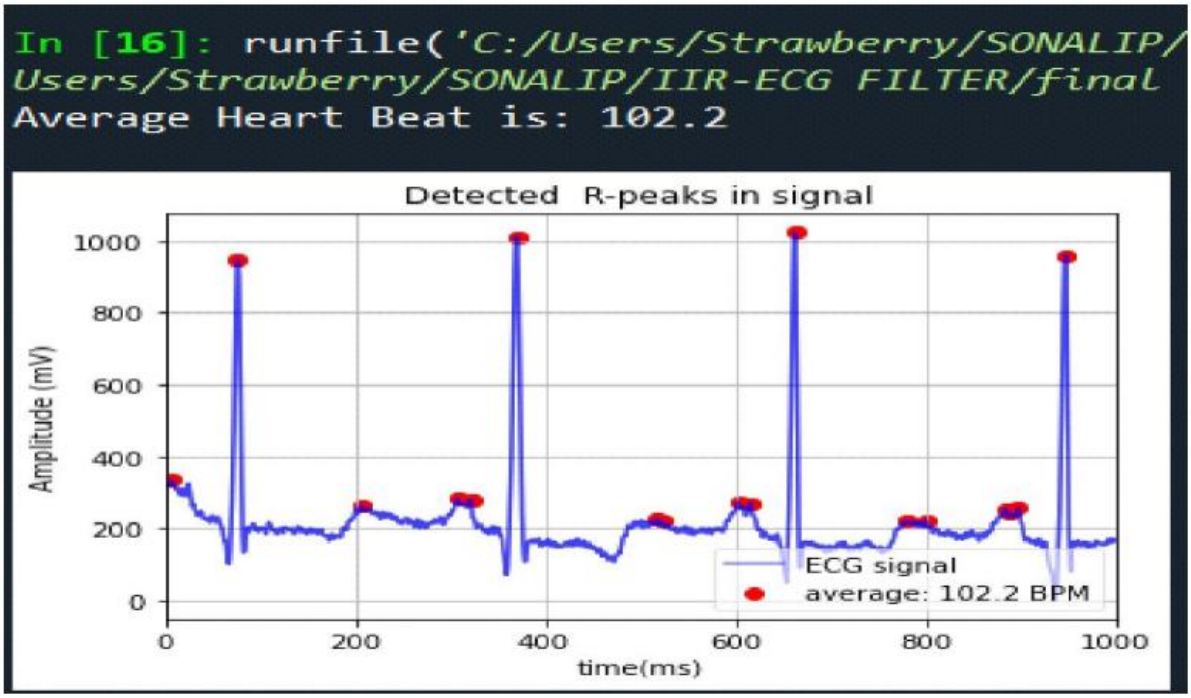


Figure 3: Training and Testing Loss and accuracy

Blood pressure sensor is a non-invasive way of measuring an individual's blood pressure. It captures the mean arterial pressure, diastolic pressure, and systolic pressure using the oscillometric method.



(a)



(b)

Figure 4: Screen Shot of DR and RR interval for different 1000 data

For most, especially those who have high blood pressure, monitoring blood pressure at home is vital. Blood pressure varies to accommodate the body's demands and is affected by a wide range of factors such as breathing, posture, mood, activity level, and sleeping [15].

CONCLUSION

The health and behaviour monitoring techniques that are currently being used with wearable IoT technology are succinctly summarized in this publication. It also presents a novel architecture for a health monitoring system called WISE, which enables cloud-based information access and real-time patient or senior citizen observationIn addition to changing the healthcare system, this is expected to reduce healthcare expenses. But there are still a number of obstacles to overcome, such developing an affordable wearable IoT platform that maintains scalability, resilience, security, and privacy. To properly detect disease trends from past data and, ideally, forecast possible future illnesses, the data mining module needs to be improved. Machine learning methods including support vector machines (SVM), neural networks, and deep learning can be used. In addition to this, physical activity recognition is another important component in the upgrading of the WISE system, as the physical activity level of a person plays a central role in his health. For this reason, collecting this information is very essential for identifying, predicting, and diagnosing potential diseases.

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