Chapter 2
IoT in E-Health, Assisted Living, and E-Wellness

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ABSTRACT

Considering the immense assistance of the internet of things (IoT) in several industries, including the healthcare IoT (H-IoT) and internet of medical things (IoMT), it has performed better not only in the hardware but in the underlying software categories as well. While the use of IoT in the paradigm of healthcare is salient, expectations on improvements on the infrastructure are a few of the incidents that ought to be addressed. Appreciating and acknowledging the above, in this chapter, the authors introduced a generic concept of H-IoT, developed an appreciation relating 42 recently published articles from the time period of 2017-2021 (relating COVID-19), critiqued, and also provided the future directions of H-IoT/IoMT in the perspective of COVID-19 pandemic.

INTRODUCTION

The prototypes of IoT have been enabling the technological capabilities in the 4.0 industries by enhancing their purpose and improving their progression; not only multiplying but ensuring an exponential growth (Castiglione, A., et al., 2021). The H-IoT and IoMT is one of the segments of 4.0 medicine industries at an infancy stage, regardless of being implemented since the last few decades, using devices to monitor patients' health and wellness– through e-health, assisted living and e-wellness strategies. Considering,

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COVID 19 pandemic, a live scenario, although H-IoT is at an infant stage, appreciating the applications and the value it has added to the real time information connecting domains by presenting results faster than before, it has proven to progress beyond the incremental growth. On this background, the recent and the unprecedented pandemic with new challenges have made several industries including healthcare to revise their monitoring and traditionally follow guidelines. IoT is one of the priorities among them (Adil & Khan, 2021).

The Internet of Things (IoT) has been enabling society's technological capabilities by warranting their purpose and improving the progression, multiplying them, and ensuring exponential growth in various 4.0 Industries. The IoT is usually described as the collection of Internet-enabled 'things or intelligent devices, increasingly interconnected with other 'things' in a mass ecosystem. Similarly, the Industrial Internet of Things (IIoT) comprises sensors, actuators, industrial processes used for automation, and data collection (Kashani et al, 2021). On this background, the H-IoT (Healthcare Internet of Things) is perhaps a recently discovered term describing the IoT devices/smart devices for monitoring patients' health and wellness – they collect and transmit patient-centric information such as health status and medical devices used by them (MacDermott et al., 2019). The IoT can facilitate the automation of many day-to-day operations. Although H-IoT is at an infancy stage, appreciating the applications it has brought and the value it has added to the real-time information connecting domains by presenting results faster than before, it has proven to be successful (Qadri et al., 2020).

The remainder of the paper is as follows: Section 2 displays Related works in H-IoT –Appreciation to the history of IoT and its inclusion in the Health Industry. In Section 3, we look at protocols of IoT. Section 4 details the usage, including real-life applications/importance benefits/challenges. Section 5 highlights our solution to securing H-IoT in Covid 19 pandemic and achievements. Section 6 includes Machine Learning in H-IoT and identifies future work in Section 7. Lastly, we discuss the findings and conclude in sections 8 and 9. Thus, the key contributions of this paper can be summarized as below; this chapter will display the issues, controversies and problems in the 4.0 Medicine industry in absence and after incorporating IoT in the perspective of live COVID-19 pandemic, the solutions and recommendations to enhance their level of performance as well for the patients/user's satisfaction. Lastly, this chapter will also summa rize the achievements of e-health and suggest future areas of research directions also highlighting gaps in previous similar research.

RELATED WORKS

According to Eysenbach, he describes e-health as the juncture of medical facilities; health services and information; the involvement of the internet and related technologies (Eysenbach, 2001). Butpheng, Yeh and Xiong also acknowledges e-health as an standard and effective means to enhance the quality of health-care services with evidence information' (Butpheng, Yeh, & Xiong, 2020). Similarly, Dixon mentioned e-health as the delivery of healthcare with numerous technologies with quality, safety and cost-effectiveness (Dixon, 2007). Similarly, Shashank and Bichile emphasized that search-engines provide any relevant information to health during the times query (Shashan & Bichile, 2004). However, whether the server leads to accurate information is always in question as well as the quality assessment tool to ensure that these sites are checked regularly for the nation's security and well-being (Azzawi, Hassan, & Bakar, 2016). Moreover, Kashani et al. also recognized the sustainable resources and the application