


# Chapter 6


## AI in Wearable Imaging Devices

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### ABSTRACT

*AI and wearable imaging devices are technologies changing real-time diagnostics, especially remote patient monitoring. This chapter explores AI's role in wearable imaging by highlighting its potential to enhance healthcare through greater accuracy, efficiency, and accessibility. It begins by examining wearable imaging applications in radiology and emphasizing their role in early disease detection. It delves into AI-driven advancement by improving image quality and diagnostic precision of ultrasound and MRI. Vital applications discussed include heart health monitoring, brain disorder assessment, and sports injury evaluation. AI's ability to analyze data, identify patterns, and predict health risks is also discussed. Additionally, the chapter covers device miniaturization, portability, and battery efficiency. Real-world examples illustrate AI's impact while challenges such as privacy, ethics, and regulatory concerns are addressed. Finally, the chapter looks ahead to AI's integration with telemedicine and emerging device innovations.*

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## A. INTRODUCTION TO WEARABLE IMAGING IN RADIOLOGY

Wearable imaging devices are changing how we look at health care. In the past, if patients needed X-rays, MRIs, or ultrasounds, they had to go to a hospital or clinic, make an appointment, and wait (Kassay & De Silva, 2022; Monteagudo, 2016; Smith & Adhami, 1999). It took time and could be a hassle. But now, technology is stepping in. With new tools and intelligent machines, we can monitor health in real time without long waits. These wearable devices let people watch their health from home or wherever they are (Thacharodi et al., 2024). For example, imagine wearing a device that tracks the heart's activities daily. If something unusual happens, the device quickly alerts you or your doctor (Rákay & Galajdová, 2020). This live data can help catch problems early, which is important, especially for those with a higher risk of health issues.

One of the most incredible things about these devices is that they do not just take one picture of the health; they can keep track of it over more extended periods. Instead of gathering information in a big one-time test, you get constant updates. This ongoing monitoring can help find trends that a single scan might miss. Now, let us discuss why these devices are even better with AI or artificial intelligence. While the wearables can do a lot on their own, when paired with AI, they become super intelligent. AI is capable of analyzing captured medical images and identifying issues quickly.

For example, a wearable ultrasound device with AI could take high-quality images of your body and analyze them immediately for any signs of trouble. This enables doctors to decide faster, helping patients even when they are remotely located.

Artificial intelligence significantly enhances the quality of images. Medical imaging sometimes reflects noise or lack of clarity. Yet, AI has the potential to rectify such issues virtually in seconds. AI processes the images and makes them instantly usable. Moreover, AI has the capacity to scan health data longitudinally to identify potential threats even before they have turned into serious diseases. This transformation from a reactive approach to a preventive one has the potential to revolutionize healthcare practices.

A deeper examination of the intersection of wearable technology and AI indicates the technologies can significantly transform the healthcare system. AI-enabled devices could deliver this by presenting explainable health information on medical imaging. These technologies would decrease the load on medical centers, decrease expenses, and enhance patient care.

In the subsequent sections, we will cover the operating principles of such devices, their current applications, and the future challenges that can be anticipated. Such a convergence of high-tech has the capability to realize an active healthcare system that is personalized to the needs of the individual. This is an inspiring time for the

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