Chapter 13
Revolutionizing Healthcare:
The Synergy of Computer Vision and IoT Integration

Galiveeti Poornima
https://orcid.org/0000-0003-4289-114X
Presidency University, India

Sukruth Gowda M. A.
Presidency University, India

Ritu Raj Lamsal
https://orcid.org/0000-0002-3751-2785
University of Malaga, Spain

ABSTRACT

The integration of computer vision and IoT is transforming healthcare by enabling precise diagnostics, real-time monitoring, and personalized care. This chapter explores the synergy of these technologies, highlighting their role in disease detection, smart medical devices, and remote patient management. It addresses challenges such as data privacy, interoperability, and ethical concerns, while showcasing real-world applications and future directions. By leveraging AI-driven innovations, the convergence of computer vision and IoT holds immense potential to revolutionize healthcare, driving efficiency, accessibility, and improved patient outcomes globally.

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1. INTRODUCTION

The rapid diffusion of computer vision and IoT in the healthcare sector enables intelligent, automatic, and connected systems (Dwivedi et al., 2022). Computer vision is a branch of artificial intelligence that focuses on extracting insights from visual data, particularly when it involves certain implications regarding the medical picture. It has potential applications such as automated disease detection, surgical assistance, and patient monitoring (Haleem et al., 2022). As an example, with the help of computer vision algorithms, X-rays or MRI scans can be examined to detect fractures or tumors more accurately than humans reducing diagnostic errors and making treatment planning faster.

The IoT solves healthcare problems by interconnecting medical devices, sensors, and systems for data exchange and seamless communication in real-time (Zeadally and Bello, 2021). Wearable devices including fitness trackers and smartwatches capture important health data which can then be remotely monitored by medical professionals. IoT-enabled devices enhance operational efficacy in a hospital setting with smart patient care and resource management (Elendu et al., 2024). Actually, when you join these two technologies you get a huge synergistic effect and some of the innovations based on this technology integration are: remote diagnostics, automated health conditions monitoring, robotic surgery etc. By doing so, it not just augments patient outcome but also makes health care more effective and accessible.

Computer vision and IoT in healthcare can be defined as modern medical technology that integrate the world and connectivity together, which can revolutionize the solution to address some of the most challenging issues in diagnostic precision, clinical supervision, administration efficiency (Ponnada et al., 2025). This combination allows IoT-connected devices gather, analyze, and interpret real-time data while computer vision extracts valuable insights from visual sources such as medical imaging. Combined, they enable automation and the improvement of processes such as disease detection, tailored treatment planning, and remote patient monitoring; thereby decreasing the workload on healthcare professionals and decreasing human error (Barua, 2024). More than just for diagnostics, this goes to the heart of the increasing need for at-home and accessible healthcare. As an example, IoT based devices can help in continuous monitoring of the patients vitals and algorithms can evaluate the data to find any signs of complications allowing for faster responses. Such a method will, of course, improve patient outcomes and most importantly — over time it will also be more cost-effective both in terms of better utilizations of resources as well as being a part of an efficient healthcare system. Through the infusion of intelligence, new generation connected solutions are expected to transform care delivery and health outcomes across the globe by combining computer vision with IoT.