Chapter 6
Designing Real-Time Interactive Dashboards for City-Wide Health and Environmental Monitoring:
A Data Visualization Approach to Sustainable Medical Care

C. V. Suresh Babu
https://orcid.org/0000-0002-8474-2882
Hindustan Institute of Technology and Science, India

V. Karunya Lydia
Hindustan Institute of Technology and Science, India

M. Jeevananthan
Hindustan Institute of Technology and Science, India

S. Sidharth
Hindustan Institute of Technology and Science, India

ABSTRACT

The research presents a Smart Health and Environment Dashboard which merges patient health monitoring with environmental measurements to foster sustainable healthcare practices. The platform solves the issues of previous systems while speeding up decision processes by uniting sensor-based data collection with AI-

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driven analysis and interactive visualization. The study implemented design science methodology through prototyping and user simulations and complete evaluation against neuroergonomics and user experience standards. The research revealed substantial improvements in overall system usability together with enhanced system responsiveness and precise monitoring which delivers for public health management. The team successfully conducted investigations into telehealth systems and mobile applications together with predictive AI functionality and expansion to other metropolitan regions. The findings demonstrate that real-time data infrastructures play an essential role in transforming contemporary urban healthcare systems toward sustainable and effective healthcare delivery.

1. INTRODUCTION

The combination of IoT devices and cloud computing with AI allows healthcare systems to deliver prompt and customized care through their advanced technological capabilities. Through immediate analysis of health data these systems make early diagnosis possible and direct individualized treatments and improve medical resource distribution. Real-time monitoring stands as a vital element for urban settings since it protects people and health officials from quick response requirements to air pollution and infectious diseases and lifestyle-related illnesses.

Health data together with environmental information exist in large complex datasets which presents difficulties for turning raw data into meaningful actionable knowledge. Data visualization addresses this issue through dashboard creation that transforms raw data into interactive displays which expose patterns and enable swift decision-making. Modern monitoring systems have transitioned from basic wearables into sophisticated platforms which integrate IoT sensors with AI analysis and mobile platforms to provide constant individualized preventive care.

The combination of urban stressors includes low air quality and high noise alongside quick disease spread in city areas. The sustainability-focused design of smart healthcare systems delivers enhanced health results while cutting waste production and optimizing resource management. The protection of air quality from dangerous levels leads to decreased hospital visits and improved community wellness. Studies of smart cities reveal that unifying health monitoring with environmental tracking systems enhances disease control and speeds up hazard detection while promoting community engagement for better sustainable urban development.