

Software Engineering and the Adoption of Internet of Things: A Systematic Literature Review

Mustafa Moosa Qasim

*Intelligent Medical Systems Department,
College of Computer Science and
Information Technology, University of
Basrah, 61001, Iraq.*

mustafa_mq87@uobasrah.edu.iq

Ali Raad Abdulkareem

*Computer Science and Information
Technology Department, College of Physical
Education and Sport Science, University of
Basrah, Basrah 61001, Iraq.*

ali.raad@uobasrah.edu.iq

Abstract—Recent interest in integrating Internet of Things (IoT) technology with software engineering has grown owing to its potential to transform several fields. The purpose of this research is to review the literature that are related to the integration of IoT with software engineering and explores the opportunities, challenges, and future directions. To fulfil this objective, a total of 22 articles related to the issues were reviewed using PRISMA. The findings showed that new software developments due to cloud computing and IoT need IoT-compatible architectures. Data security, authentication, access control, and trust management take precedence. The study also reveals managerial, architectural, security, interoperability, scalability, and professional training challenges in software engineering using IoT technologies. Despite these challenges, IoT is changing healthcare, smart cities, and industrial automation. The findings highlight the need for interdisciplinary collaboration and particular solutions to solve IoT-software engineering integration issues.

Keywords— *IoT adoption, Software engineering, Security, SLR, PRISMA*

I. INTRODUCTION

The Internet of Things (IoT) revolutionizes device communication by connecting and exchanging data to enable diverse applications [1]. It boosts efficiency and automation in several industries. Sensors and smart technologies in devices and systems enable process automation, predictive maintenance, and resource optimization in the IoT [2]. Enhanced efficiency reduces costs, increases productivity, and improves resource allocation, making IoT valuable in manufacturing, logistics, healthcare, and agriculture [3]. IoT generates massive amounts of data from linked devices and sensors, enabling data-driven decision-making [4], [5]. Data analysis may show trends, guide decision-making, and give insights [6]. IoT links the physical and digital worlds, promoting communication and collaboration [1]. Through easy connectivity between items, systems, and

people, the IoT fosters innovation, creativity, and new business models [7]. IoT systems link homes, cities, cars, and factories [6]. Devices and services can cooperate to enhance safety, quality of life, and customization [4], [5]. IoT impacts society, economy, and technology, spurring innovation, economic growth, and social transformation [8].

Software engineering accelerates IoT adoption by providing frameworks, procedures, and tools for design, implementation, and management [9], [10]. IoT hardware, communication protocols, and software applications are challenging to integrate [11]. Software engineering solves this by integrating IoT device and platform software design, development, and integration [12] [13]. Complex IoT systems need modular architecture, agile software engineering, and component-based development [14], [15]. Decomposing IoT systems into modules and components accelerates software development [16]. Agile development and quick prototyping help firms adapt to the IoT and new technologies [17]. Software engineering guarantees IoT security, dependability, and scalability [18]. Software programmers may handle data privacy, cybersecurity, and system performance as connected devices expand and IoT systems create huge volumes of data [17] [19]. By following software design, testing, and deployment best practices, software engineers may construct secure IoT systems that fulfil stakeholders' needs and protect data [20]; [21]. Software engineering techniques simplify IoT deployment, accelerate time-to-market, and unleash linked technology's full potential to enable industry innovation and digital transformation. Few studies examined IoT adoption with software engineering [20].

This study addresses several gaps in the literature on software engineering and IoT adoption. IoT usage is rising across enterprises and sectors, but the literature lacks a thorough understanding of how software engineering techniques contribute to IoT adoption [22], [23], [1]. Second, academic