

Chapter 6

Semantic Interoperability in Internet of Things: Architecture, Protocols, and Research Challenges

Kamalendu Pal

 <https://orcid.org/0000-0001-7158-6481>
City, University of London, UK

ABSTRACT

The industry's internet of things (IoT) applications have drawn significant research attention in recent decades. IoT is a technology in which intelligent objects with sensors-enabled RFID tags, actuators, and processors communicate information to cater to a meaningful purpose in the industry. This way, IoT technology aims to simplify the distributed data collection in industrial practice, sharing and processing information and knowledge across many collaborating partners using suitable enterprise information systems. This chapter describes new methods with grounded knowledge representation techniques to address the needs of formal information modeling and reasoning for web-based services. The chapter presents a framework, apparel business decentralized data integration (ABDDI), which uses knowledge representation methods and formal languages (e.g., description logics – DLs) to annotate necessary business activities. This type of web service requires increased interoperability in service management operations.

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INTRODUCTION

Humanity dwells on mother earth with ambitious goals demanding unprecedented social, economic, and environmental challenges. Science, technology, and innovation are playing an enormous role in realizing these ambitious goals. The process of creative destruction started by technological progress can help change economies and improve living conditions by increasing productivity, reducing production costs and prices, and helping to raise real wages. One of the essential ingredients to create a better world is using technology to move forward and unprecedented change in its scope and pace of daily life.

This way, harnessing the frontier of technologies help to mitigate the persistent gaps among developed and developing nations in getting and using existing technologies. It also creates and delivers innovations (including non-technological and new forms of social innovation), could be transformative in creating sustainable development goals and producing more prosperous, inclusive, and healthy societies. They provide the prospect of solutions and opportunities for sustainable development that are better, cheaper, faster, scalable, and easy to use. The extent of technological advances' development impact has already ushered in the transformative implications of information and communication technologies (ICTs) in many countries worldwide. However, these new technologies are often threatening to outpace the ability of societies and policymakers to adapt to the changes they can create, giving rise to widespread anxiety and ambivalence or hostility to some technological advances.

The question of where ideas come from is on the mind of a researcher visiting a research laboratory, a painter's workshop, or an inventor's experiment laboratory. It is the secret human society hope to see – the magic that happens when new things are born. Even in environments geared for creativity like the discovery of millimeter radio wave by Professor Jagadish Chandra Bose. The world is witnessing the tremendous influence of wireless communication technology on daily working activities. The modern wireless telecommunication is heavily influenced by three great scientific minds – James Clerk Maxwell (Mahon, 2004), Jagadish Chandra Bose (Sarkar et al., 2006), and Tim Berners-Lee (Berners-Lee, 2000). James Clerk Maxwell provided the theoretical foundation of electromagnetic wave propagation; Jagadish Chandra Bose showed to his colleagues the transmission of millimeter waves by transmitting this new type of waves in Presidency College (Calcutta, India) laboratory, and Tim Berners-Lee created the World Wide Web at CERN (Geneva, Switzerland). Today's computer data communication network is at once intangible and in a constant state of mutation, growing larger and more complex with each passing second. A large portion of the world business community is using this incredible network of networks for day to day works.

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