Chapter 3
Modelling and Designing of IoT Systems Using UML Diagrams: An Introduction

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ABSTRACT

Despite the rapid growth in IoT research, a general principled software engineering approach for the systematic development of IoT systems and applications is still missing. Software engineering as a discipline provides the necessary platform to carry on the underlying design, coding, implementation, as well as maintenance of such systems. UML diagrams present a visually comprehensible outlay of the construction of IoT systems. The chapter covers the modelling of IoT systems using UML diagrams. Starting with the architectural design of any IoT system to behavioral aspects is covered in this chapter using a case study of IoT-based remote patient health monitoring system. The diagrams shown in this chapter are the sample diagrams for understanding IoT-based complex systems. The chapter focuses on the work carried out by Franco Zambonelli in context of developing abstract model of an IoT system using software engineering concepts. The chapter also focus on the pioneer work carried by J. F. Peters in intelligent system design patterns for robotic devices using pattern classification.

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INTRODUCTION

The term “Internet of Things” (IoT) was first used in 1999 by British technology pioneer Kevin Ashton to describe a system in which objects in the physical world could be connected to the Internet by sensors. Ashton coined the term to illustrate the power of connecting Radio-Frequency Identification (RFID) tags used in corporate supply chains to the Internet in order to count and track goods without the need for human intervention. Today, the Internet of Things has become a popular term for describing scenarios in which Internet connectivity and computing capability extend to a variety of objects, devices, sensors, and everyday items. Internet of Things is a platform where every day devices become smarter, every day processing becomes intelligent, and every day communication becomes informative. While the Internet of Things is still seeking its own shape, its effects have already stared in making incredible strides as a universal solution media for the connected scenario. (Giusto.D et al., 2010).

Though IoT and software engineering paradigm are greatly disconnected, any system that has a wide spread applicability needs to be built on concrete concepts. Software engineering as a discipline provides the necessary platform to carry on the underlying design, coding, implementation as well as maintenance of such systems. With the abundance of applications that have emerged due to the IoT concept, there are a number of underlying processes that now need to be generalized as for example the data gathering, service discovery and the interfaces design. The contributors to successful software for IoT are mainly the designers, testers and the developers. However their level of association to an IoT project is different. An application designer works with the design of the application while the tester and the developer are more connected to the simulation, programming framework and execution platform backend. UML diagrams aim to guide the IoT design to a more standardised methodology of development and deployment. It presents a visually comprehensible outlay of the construction of IoT systems.

In this chapter, the authors attempt at framing the key concepts and abstractions that revolve around the design and development of IoT systems and applications, and that could represent the ground on which to start shaping the guidelines of a new IoT-oriented software engineering discipline. Architecture specific study does always pave the conformation of related field. The lack of overall architectural knowledge is presently resisting the researchers to get through the scope of Internet of Things centric approaches.
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