Chapter 10
Preparation of Raspberry Pi for IoT-Enabled Applications

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ABSTRACT

This chapter shares the experiences in systematic, well-tested, and executed step-by-step procedure for the preparation of the Raspberry Pi single board computer (SBC) for the internet of things (IoT)-enabled applications. This chapter is useful for beginners and professionals working for automation of smart factories with the help of IoT and Cloud. Moreover, interesting data exchange techniques like low power wireless alternatives ZigBee, LORA, BLE, 6LowPAN, SigFox, and multi-queue telemetry transport (MQTT) are also stated. The related IoT preceding and succeeding technologies, like machine-to-machine(M2M), cyber-physical-systems (CPS), web of things (WoT), SCADA are also the part of insights. Various supporting technologies for the success of IoT like commercial and open source IoT cloud platforms, virtual agents(VA), and digital twins are also discussed.

INTRODUCTION

The first industrial revolution (IR 1.0) happened in 1984; the invention of the steam engine which has positively affected the human and animal hard work converted into the machinery efforts and also increased the import and export of the things. The second industrial revolution (IR 2.0) was happed around 1870, where the electricity was invented, and industrial products and the assembly lines were major contributions. The IR 2.0 resulted with the huge amount of increase in the capacity of the product manufacturing in less cost of the production. This resulted in the
side effect of the degradation in traditional employment, and the new field of the employments was increased. The IR 3.0 happened in 1969, where Electronics, Computer and Information Technology (IT) made the self-running automation. The positive results were caused a reduction in the product cost, marketing of the products and services. This also resulted into the computerization of the white-collar jobs. The IoT is the concept to allow the Internet-based communication to happen between physical objects including mobiles, smart watches, robots, drones, sensors, and controllers. (Wang et al., 2014; Garcia et al., 2014; Meana-Liorian et al., 2016)

To implement the IoT as fourth industrial revolution (IR 4.0), this is not new but evolved from the SCADA systems as industrial automation since the 1970s, leveraging the recent advancements in the information technology, to make available data in smart formats at the fingertips. The enabling technologies are mostly web-based portals, Android apps, alerts based mechanisms on the machine-learning techniques. The specially designed protocols like Multi-Queue Telemetry Transport (MQTT) for the Machine to Machine (M2M) and/or the IoT is also discussed.

The IoT characterizes the anytime, anywhere and anything. Anytime & any place means on the move, outdoors, indoors, night time, daytime, away from the PC, or at the PC. Anything means between PCs, Human to Human (H2H), i.e. not using PC, Human to Thing (H2T), using generic equipment, and Thing to Things (T2T).

ITU-T defines the IoT as: “A global infrastructure for the Information Society, enabling advanced services by interconnecting (physical and virtual) things based on, existing and evolving, interoperable information and the communication technologies”.

The European Union (EU) and more specifically the EU Projects Research Cluster in the IoT (IERC) gives the following definition: “A dynamic global network infrastructure with self-configuring capabilities based on standard and interoperable communication protocols where physical and virtual ‘things’ have identities, physical attributes, and virtual personalities and use intelligent interfaces, and are seamlessly integrated into the information network.”

The emergence of Mobile, the high-speed internet made everything available at the fingertips. The IR 4.0 is set up the standards for the IoT, and improving personal lives, our workplace, future industrial manufacturing efficiencies & capabilities, the field of the future internet, and next-generation networks. There are several applications found in healthcare domain. Very interesting examples to monitor the heart activities of the senior members of a family like grandparents and sending an SMS or email as an alert message to the responsible family member. The health monitoring devices are powered by human body’s thermal energy, and frequently monitors heart rhythms and detects the small problems.

For example, for improving the boiler efficiency the business initiative perhaps involves some questions that what is different time intervals when the boiler outage
The Information Systems View
www.igi-global.com/chapter/the-information-systems-view/117961?camid=4v1a

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David Rehak and Monika Grasseova (2012). Teaching Cases Collection (pp. 162-184).
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