Internet Of Things

A thesis submitted in partial fulfillment of the requirements for the award of the degree of

B.Tech

in

INFORMATION TECHNOLOGY

By

Shreyash Vijakar(171080075)

under the guidance of Pranav sir

INFORMATION TECHNOLOGY
VJTI
MUMBAI-400019

MAY 2019

BONAFIDE CERTIFICATE

This is to certify that the project titled **Internet of things** is a bonafide record of the work done by

Shreyash vijaykar (171080075)

in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology** in **Information Technology Engineering** of the **VJTI,Mumbai**, during the year 2018-2019.

Pranav Nerurkar
Guide

V.B Nikam
Head of the Department

ABSTRACT

Internet of Things (IoT) is a rapidly growing emerging topic of technical, social, and economic significance. Objects are being combined with internet connectivity and powerful data analytic capabilities that promise to transform the way we work and live. At the same time, however, the Internet of Things raises significant challenges that could stand in the way of realizing its potential benefits. One of them is standardization, due to the numerous different technologies that have to work together in an IoT system. In a fully interoperable environment, any IoT device would be able to connect to any other device, regardless of manufacturer or technology. In practice, interoperability is more complex. Open standards can facilitate interoperability, but yet it is poorly understood which strategies need to be executed in order to create standards that allow a degree of functional openness. This research therefore explores which innovation strategies have been applied by actors in the field with respect to open standardization and which implications it has for innovation. By using a theoretical framework that combines elements from complex technical system, dominant design theory, standardization theory and lead users, an exploratory study has been carried out. More than 150 documents have been analyzed by means of qualitative data analysis and coding. The results show that several standards dominate the market at the moment and that standardization is mainly driven through proprietary approaches by companies, leading to a fragmented IoT field in which devices are just party interoperable with each other. It becomes more recognized by actors in the field that IoT only succeeds if devices are fully interoperable. Creating middleware that allows connecting devices operating on different technologies, learning from users and open source platforms are examples of strategies that enable full interoperability. The open nature of IoT leads to the creation of dominant configurations, in which its components can rearrange depending on the context. This has implications for innovation. Since IoT is not a consolidated industry in which a dominant design guides incremental innovation, innovation stems from linking components together by focusing on inter-industry collaboration and user involvement instead. This will stimulate the further development and deployment of IoT.

TABLE OF CONTENTS

Chapter 1

Introduction

The Internet of Things (IoT) is a new, but at the same time an old term. It was already mentioned by Kevin Ashton in 1999, while holding a presentation at Proctor Gamble. He used the term to link the idea of radio frequency identification (RFID) to the then new topic Internet [1]. Since then the use of this term has blossomed and major companies have predicted an increase in IoT [2, 3, 4]. One prediction is that the number of connected things in the world will have a thirtyfold increase between 2009 and 2020, thus by 2020 there will be 26 billion things that are connected to the Internet [2]. The reason IoT has become so huge depends partly on two things: Moore's law and Koomey's law. Moore's law states that the number of transistors on a chip doubles approximately every two years [5]. This has enabled people to develop more powerful computers on the same sized chip. Intel, a well-known semiconductor chip maker had during 1971, 2300 transistors on a processor and by 2012 their current processors contained 1.4 billion transistors [6]. This is an increase of approximately 610 000 Koomey's law explains that the number of computations per kilowatt-hour roughly doubles every one and a half years [7]. Kevin Ashton states that these two laws have together enabled us to create powerful and energy efficient computers. By turning the graph for Moore's law upside down it can be interpreted as the size of a computer (of a fixed capacity) is halved every two years. Doing the same thing to Koomey's law can be interpreted as the amount of energy needed to perform a computation is dropping at a rapid rate [8]. Combining these interpretations tells us that we can perform the same amount of computations on increasingly a smaller chip, while consuming decreasing amounts of energy - hence computations are becoming more energy efficient. The potential result is a small, powerful, and energy efficient computer which enables us to provide more advanced services using less chip area and at a lower energy that what has been possible before. Defining the term IoT can be somewhat difficult because it has many definitions depending on who is defining the term [9]. The basic concept of IoT is to connect things together, thus enabling these "things" to communicate with each other and enabling people to communicate with them [10]. What these things are varies depending on which context the term is used and the aim of using the thing. In this thesis we have chosen to follow the definition of IoT proposed by ITU's Telecommunication Standardization Sector (a United Nations agency which specializes in ICT): "... a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies". Interconnecting the physical world with the virtual world and applying this concept to all things opens up new possibilities in the sense of being able to at any time access anything from any place. Providing new possibilities will also generate new threats, security risks, and expose vulnerabilities in the unexplored world of interconnected everything. "Things" in the physical world are objects that physically exist and from the perspective of IoT we are able to sense, operate, and connect to these things, while in the virtual world "things" are objects that can be stored, accessed, and processed IoT involves sensors in order to collect information. Sensors are already being used in daily life, however most people may not realise it. Smartphones contain different kind of sensors, such as 2 — Introduction accelerometers, cameras, and GPS receivers. Built-in sensors are nothing new in today's society. Kevin Ashton said that IoT is already happening, but we might not see it compared to Smartphones which can both be seen and touched. RFID is such an IoT-technology that exists but is not necessarily seen; so the development of IoT might progress a long way before it is visible for everyone

Chapter 2

References

[1] Internet of things

[2] M. Baudoin (1997). Apprends

[3] P. Daly (1998). Graphics and Colour URL http://tex.loria.fr/ graph-pack/grf/ http://directory.google.

[4] A. Diller (1999). L ATEX Line by Line

[5] S. Fear (2005). Publication

[6] P. Flynn (2005). A beginner's introduction

[7] M. Goossens, F. Mittelbach, and A. Samarin

[8] M. Goossens, S. Rahtz

[9] G. Grätzer (1999)