

**UNIVERSITI TEKNOLOGI MARA**

**IOT-BASED  
VOICE-CONTROLLED  
LIGHTING SYSTEM**

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## ABSTRACT

Currently, the most common method of activation for lights and lamps is through the use of wall-mounted switches. These switches however could prove to be troublesome for some individuals especially to those who are disabled or the elderly as they have limited physical movements to move to the switches. Utilising Internet of Things (IoT) technologies could be very beneficial to create the ability to control and monitor a lighting system via mobile. Thus, the purpose of this project is to assist people with limited mobility with lighting control and deliver added values for general consumers. The objective of this project is to identify the user requirements for the mobile app development, design the mobile application and develop the lighting system and its mobile app. Interview sessions has been conducted to identify the user requirements for this project. An adapted version of the Mobile Application Development Lifecycle (MADLC) methodology was used for the mobile app development. The app prototype was designed using MarvelApp while the mobile application was developed using Android Studio. This IoT-based voice-controlled light is an ecosystem consisting of mobile application and an Arduino-based, Bluetooth-connected lightbulb. The mobile app enables users to connect the mobile phone to the light via Bluetooth, provides voice-control features through vocal commands for the lighting activation and deactivation as well as creating visual monitoring features of the user's usage patterns in a form of graphics. The app however has limited range of control from the light itself and only allows for switching lights on or off. In the future, both the mobile application is recommended to support data visualisation and illustration feature to improve data digestion among users while the lighting system is recommended to support Red, Green, Blue (RGB) colour gamut. In short, IoT-Based voice-controlled light improves the convenience in a household by providing wireless and meaningful solution to light activation and monitoring with the emergence of IoT.

**Keywords:** Internet of Things, Voice, Lighting system, Bluetooth, Arduino, Speech-recognition, Mobile Application Development Lifecycle

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# CHAPTER 1

## INTRODUCTION

An outline of this project is given in this chapter. This chapter includes background information, problem statements, project aim and objective, scope and significance.

### 1.1 Project Background

Internet of Things (IoT) platform is an ecosystem of devices, machines, appliances or any other things that can be connected to the internet to allow data integration and exchange between the computer system and physical devices (Laura, 2019). IoT creates a human-network relationship and an environment that has the capacity to become 'smart', with the aim of making daily life much more productive and convenient (Lasalle, 2016). The benefits that came with this technology saw recent growth of diversity of connectable devices to the network including household appliances, vehicles, medical equipment and digital assistants such as Amazon Alexa. Analysts stated that there were approximately around eight billion network-connected devices and projects an expansion to more than 25 billion by 2020 and generate an estimated US\$13 trillion in revenue by 2025 (Yoo, 2016). Based on these numbers alone, it is clear how massive the potential of IoT really is.

Home assistant devices are one of the more popular form of IoT technology. Some examples of this form of devices are Amazon Alexa and Google Home. These smart technologies come with cutting-edge technologies such as a sensitive microphone, which allows it to pick up any commands from human voice and then finds any relevant information from the commands given on the internet (Saltzman, 2017). Mobile phones can also be used as the microphone to activate these devices by recording the user's voice command and delivering them to its connected devices through appropriate signals. However, this complex technology can also be problematic for some. Seniors however may