**CHAPTER-1**

**INTRODUCTION**

“The Internet of Things is a novel cutting-edge technology that offers to connect a plethora of digital devices endowed with several sensing, actuation, and computing capabilities with the Internet, thus offering manifold new services in the context of an intelligent environment.” These improvements and methods are credited with improving the quality of human life across various sectors, including healthcare, education, administration, city planning, energy consumption, etc.

“Gartner, Inc. forecasts that the enterprise and automotive Internet of Things (IoT) market will grow to 5.8 billion endpoints in 2020, a 21% increase from 2019.” Retrospectively, that adds up to a large number of interconnected devices. Studies and estimates project that by 2030, the worldwide count of IoT devices may be as large 125 billion.

“The Internet of Things (IoT) is a revolutionary communication paradigm that aims to bring forth an invisible and innovative framework to connect a plethora of digital devices with the Internet.” The primary focus of IoT as a concept is to make the internet universal and remotely accessible to all. After many years of its existence, IoT is continuing to gain momentum as the opportunities it offers are endless.

An IoT-based smart eco-system can be broadly defined as a large number of interconnected devices. Each of these devices have the capability to generate a vital piece of information and possesses the sensibility and infrastructure to share it with the other devices in the network. “IoT devices can use any available communication networks such as public Wi-Fi, Bluetooth, cellular networks (LTE/LTE-Advanced), and satellites to communicate with the cloud-based application center.” Some of the challenges faced in terms of the connectivity of the IoT devices are as follows:

• It is challenging to provide a strong and stable connection to mobile devices such as vehicles.

• Transition from low level to high level connectivity

• Communication devices must be present in addition to the large number of IoT devices, especially if they are spread over a large area.

The first step in creating innovative solutions to a problem is to identify and thus understand the problem itself and the scope of impact it has. This can be followed by an idea on how the Internet of Things can play a role in tackling such a scenario. High investment costs and security deter university managements from implementing a fully IoT-based eco-system. Our project hopes to take the first step in this direction.

Keeping the above scenario in sight, our goal is to identify and solve the most common problems faced in any educational institution, taking our own university as a canvas.

For a long time, attendance has always been taken manually. This has caused multiple discrepancies and has wasted useful class time. In addition to this, classroom equipment like fans etc. have occasionally been left on thereby wasting considerable energy.

Our approach is a fully edge computed, integrated biometric-based solution for attendance which is modular and carried by the teacher to ensure security. An ambient and spatial sensor-based approach to dynamically turn on and off the fans and lights based on the occupants of the room.