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Network Protocols

Project Description

This document provides a detailed description of project. It does not contain any implementation or coding details.

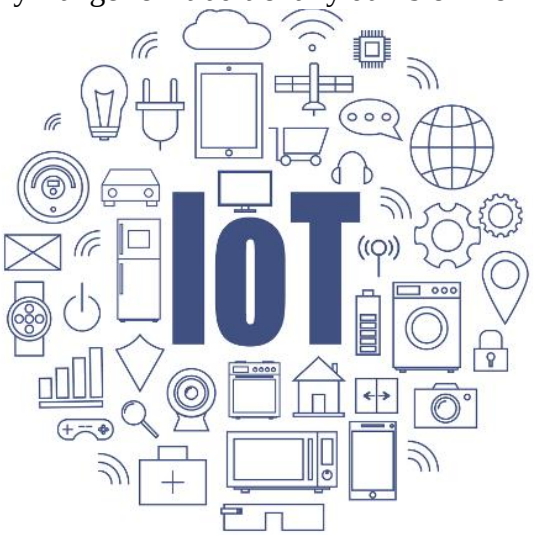
1. Introduction

In this section, you will be introduced briefly to some topics to help you to understand the project clearly.

1.1 Internet of Things

The Internet of Things (IoT) is the network of devices such as vehicles, and home appliances that contain electronics, software, actuators, and connectivity which allows these things to connect, interact and exchange data.

The IoT involves extending Internet connectivity beyond standard devices, such as desktops, laptops, smartphones and tablets, to any range of traditionally dumb or non-internet-enabled physical devices and everyday objects. Embedded with technology, these devices can communicate and interact over the Internet, and they can be remotely monitored and controlled.



This filed is one of the most important and promising technological topics today. Some market researchers estimate that there are more than 20 billion connected devices and counting. Around us, there are smartphones, wearables, and other devices, all of which use sensors. Nowadays, sensors play an important role in our everyday life and in IoT. Sensors monitor our health status (e.g. a heartbeat), air quality, home security, and are widely used in the Industrial Internet of Things (IIoT) to monitor production processes. For these reasons, it is important to know how they work and how we can use them to acquire information.

1.2 Google Firebase

Cloud computing is the the use of various services, such as software development platforms, servers, storage and software, over the internet, often referred to as the "cloud."

Google Firebase is providing cloud serivces for web and mobile application development. Firebase is a mobile and web application development platform developed by Firebase, Inc. in 2011, then acquired by Google in 2014. As of October 2018, the Firebase platform has 18 products, which are used by 1.5 million apps.

Firebase Services needed for this project:

- **Firebase Authentication**: Firebase Auth is a service that can authenticate users using only client-side code. It supports social login providers Facebook, GitHub, Twitter and Google (and Google Play Games). Additionally, it includes a user management system whereby developers can enable user authentication with email and password login stored with Firebase.
- **Realtime Database**: Firebase provides a realtime database and backend as a service. The service provides application developers an API that allows application data to be synchronized across clients and stored on Firebase's cloud. This platform provides client libraries that enable integration with mobile platforms such as Android, iOS and others.

1.3 Mobile Development

1.3.1 What is Mobile Development?

Mobile development refers to the creation of apps for use on devices such as tablets, smartphones, automobiles and watches. Mobile development often incorporates features of mobile devices that may not be available on desktop devices. An example of this is the ability to operate a device or play a game simply by moving the smartphone around in space. Another popular example is the augmented reality game Pokémon Go. Mobile apps are designed and built for different operating systems. The Android operating system (OS) is the most popular followed by Apple's iOS.

As part of the development process, mobile user interface (UI) design is also essential in the creation of mobile apps. Mobile UI considers constraints, contexts, screen, input, and mobility as outlines for design. The user is often the focus of interaction with their device, and the interface entails components of both hardware and software.

1.3.2 Mobile Operating Systems Commonly Used

	
Android is mobile operating system developed by Google. It is based on Linux kernal and other open source softwares. Google has further developed Android TV for televisions, Android Auto for cars and wear OS for wrist watches, each with specialized UI.Variants of Android are also used on game consoles, digital cameras, PCs and other electronics.	iOS (formerly iPhoneOS) is a mobile operating system created and developed by Apple Inc. exclusively for its hardware. It is the operating system that presently powers many of the company's mobile devices, including the iPhone, iPad, and iPod Touch

1.3.3 Why you should start developing apps for Android?

There are several reasons for developers choose Android OS to develop apps for Android devices first, rather than iOS, Windows and/or Blackberry.

- **Market Share:** This has to be the number one reason why developers should develop for Android first. According to statcounter, Android absolutely dominated the number of smartphones shipped worldwide in the last month of 2018, with 75% market share.

- **Low Barrier of Entry:** To develop for iOS devices, a developer must use a Mac. However, Android app development can be done on Windows, Mac and Linux. Also, to register as a developer on the Apple App Store requires a yearly fee of $99, whereas to register as a developer on the Google Play Store requires a one time payment of $25.

- **Portability:** Native Android apps are developed using the Java programming language, Java is a proven and powerful programming language, used on a wide range of devices and operating systems. Learning Java can open doors for other opportunities, including the ability to develop applications for other operating systems (Windows, Linux) and devices.

2. Project Aim

The aim of this project is developing Android application that displays temperature in the different indoor environment. The application will be named as **Thermonitor**. **Thermonitor** is a simple app to use the temperature sensors in your phone to show the temperature near your phone. The app should be dessigned in a beautiful design and provides great precision. The app should help users to check temperature instantly from anywhere.

3. Project Structure

The project structure will be consisting from 3 different compoenets Android device, Google firebase and IoT device ESP8266.

- **Android App:** The Android app will scan for nearby ESP devices. The app should be able to connect to one ESP device using WiFi socket to read the tempreture value. After that, the app should be able to send the tempreture value to google firebase databsase.
- **ESP8266 (WiFi Module):** This device will be used as processing unit and as a gateway to send the tempreture value to Android app through WiFi.
- **Google Firebase:** The mobile platform that will store the tempreture values sent by the Android App.

Figure 3-1 shows the project structure and components needed for the project.

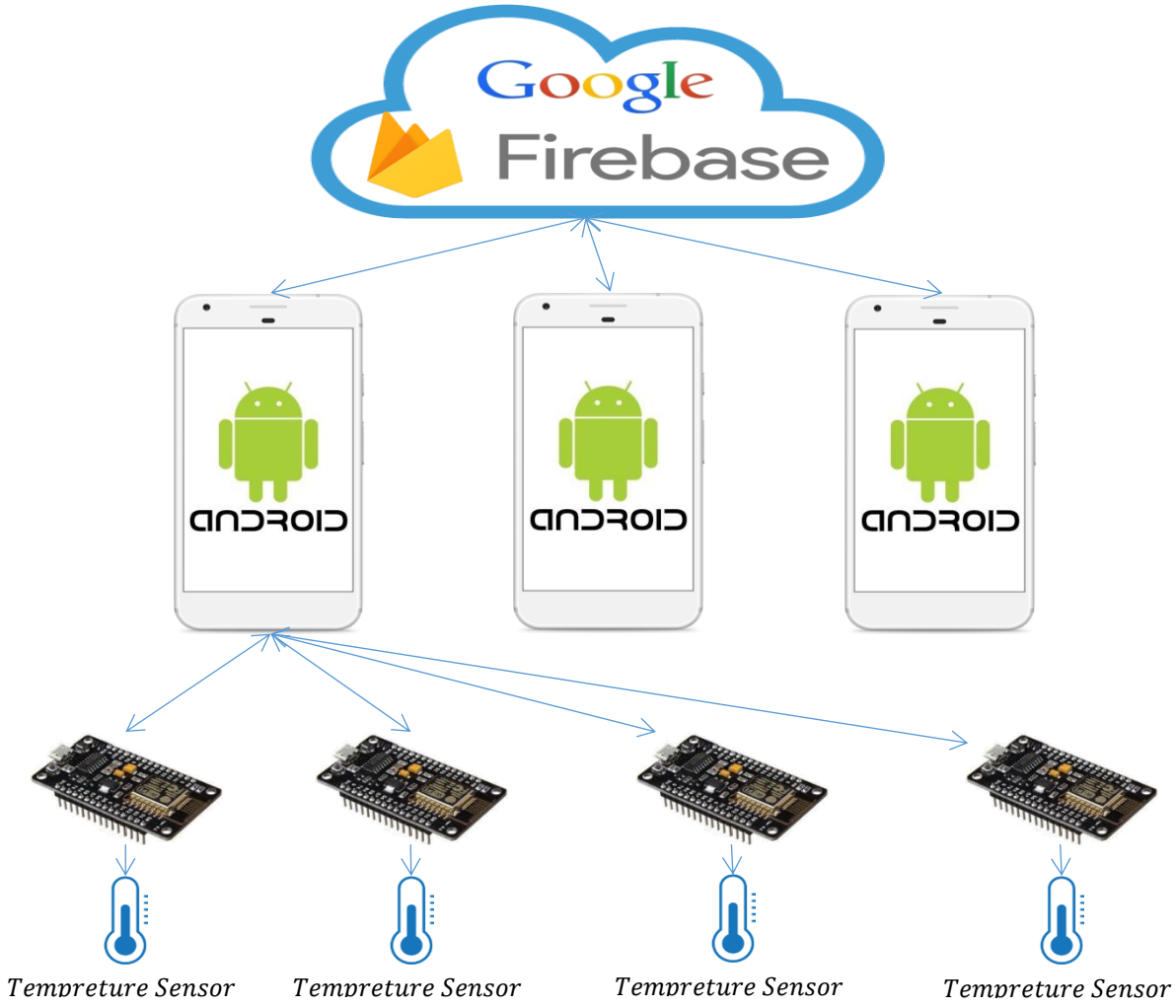


Figure 3-1 Project Structure

4. Programs needed for this project

- **Android Studio:** you can download it from the following link: https://developer.android.com/studio/
- **GENYMOTION: Android Emulator or Use Android Device** https://www.genymotion.com/
- **Arduino IDE** if you don't have it on your PC you can download it from the following link: https://www.arduino.cc/en/main/software
- **Conigure ESP8266 on Arduino IDE** if you did not configure it you can configure it using the following documentation (ESP8266 configure with Arduino IDE)
- **Create Account on Firebase** https://firebase.google.com/
- **Create Account on Github** https://github.com/

5. Project Teams

Each team should have **at least 2 members and Maximum 3 members**. The Project team should be submitted on the following link:

https://goo.gl/forms/GsHkNkiGo2lF1A9G2

The Deadline for submitting the teams on Thursday 31/01/2019 @ 23:59