Cleveland State University Wifi Analyzer

SOFTWARE REQUIREMENTS SPECIFICATION

Submitted by

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1.0 Introduction

In recent years, there has been a lot of demand for Wi-Fi hotspots. In this work, we examine the impact of different internal environmental factors on the coverage of Wi-Fi strength across campus building. We see a visual illustration of the wireless signal coverage and strength with the help of Wi-Fi heat map.

With heat map, we can easily identify the specific position with poor signal reception and determine effective router positions.

In large building areas with the help of heat map, we can easily troubleshoot signal fluctuations. Wi-Fi heat maps are considerably useful in revealing potential sources of signal interference, such as walls, furniture, large appliances, and other wireless devices.

Heat maps are quite popular these days. A properly configured Wi-Fi network improves communication between the devices that connect using it, which, in turn, assist productivity in a business. That is why it makes sense to ensure stable, well-built, and protected signal strength across the whole campus or area. One can find multiple Wi-Fi heat map software available on internet e.g. solar winds, Ekahau, Acrylic Wi-Fi etc. Some of them are paid and some are fully free. You can easily install it in your laptop or smart phone and use it. In few easy steps like install app , upload the map of the building or area you want to check then start moving from one location to other to capture the signal strength and see the color coded results.

1.1 Goals and objectives

Building a website, which represent a Wi-Fi access points (APs) coverage map in the city of Cleveland at the periphery of the Berkman Hall, Cleveland State University and show WIFI signal strength of the current location.

1.2 Statement of scope

Data collection for input will be done via measuring WIFI signal strength using mobile App around the college building (including basement where we have car parking). The smart phone uses application to measure Wi-Fi signal strength at a specific area.

Using this data as Input, we will send to our code. Using logics and functions our code will generate heat map and display through website as output.

We are planning to display heatmap of different floors on the website for the Berkman Hall of the Cleveland State University.

1.3 Software context

Heat map is a color-coded graph, which helps in determining the strength of the signals from high to low at different areas. Visual representation is easy to understand and locate specific area with poor signal strength. Rather than blindly guessing and installing routers at wrong place, heat maps really works efficiently to figure out the specific location.

With our website one can determine and analyze the weakest and strongest signal reception areas across the Cleveland State University campus.

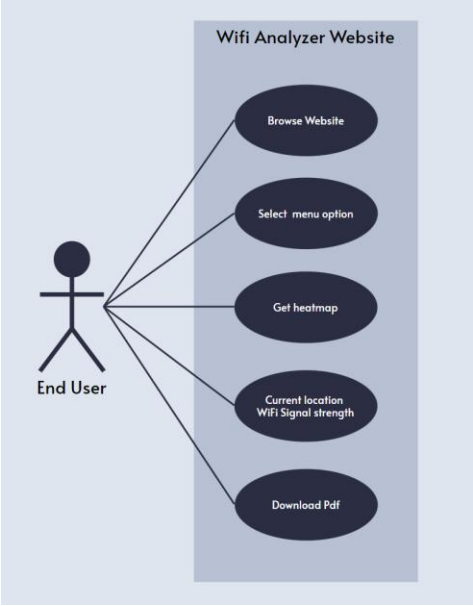
1.4 Major constraints

- With limited time and limited resources , Real time signal strength measurement is out of the scope of this project and will not be displayed via website
- Data collection for the entire campus of the Cleveland State University is also not possible with limited resources and it is not in scope of this project.
- Website will be limited to display heat map of one of the building of Cleveland State University

2.0 Usage scenario

2.1Use-cases

All use-cases for the software are presented below – As we know that customer can browse the website, can check the heatmap for different floors and download the heatmap as well.

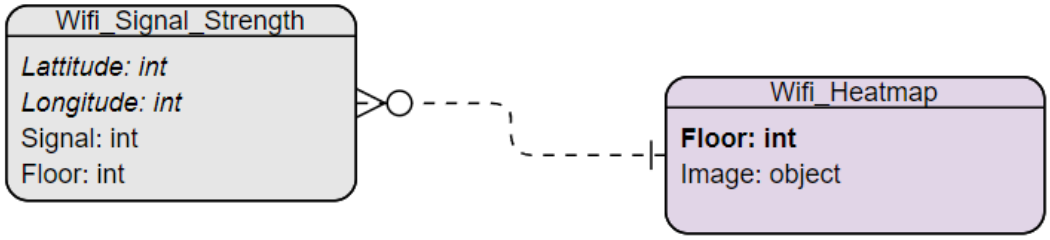


3.0 Data Model and Description

We are planning to capture all the data in a spreadsheet initially, like latitude and longitude along with WIFI signal strength. Then using MATLAB will generate heat map graphs. Based on each floor heat map images will be displayed on the website for the selected floor.

3.1.1 Relationships

Relationships among data objects are described using an Entity-Relationship Diagram (ERD) like form as mentioned below -



4.0 Functional Model and Description

This website displays college WIFI heatmap for different location based on which floor you selected forms the menu.

STIMULUS/RESPONSE SEQUENCES

- User picks a floor from the menu
- Website display heatmap of the specific menu selection

4.1. Description of Major Functions

Each Functional requirement is uniquely identified as below -

FUNCTIONAL REQUIREMENT LIST			
Requirement ID	**Must/Want**	**Requirement Statement**	**Comments**
FR004.1.1	Must	User should be able to see the homepage on accessing the website, it should show menu list on the page	When User will access the website link, he/she should be able to see menu on the home page. On page load it should list different floors.

FR004.1.2	Must	Website will display heat map of “CsuWireless” WIFI connection from Berkman Hall’s different floors.	BH is Berkman Hall, One of the buildings of Cleveland State University.
FR004.1.3	Must	Menu items should have below options - Current Location - BH Ground Floor - BH First Floor - BH Second Floor - BH Third Floor - BH Fourth Floor - BH Map	BH is Berkman Hall , One of the building of Cleveland State University.
FR004.1.4	Must	On Website , user should be able to select one of the menu items (for the floors) to see heatmap	After selecting the value from the menu, User should be able to see the heatmap of that specific floor, showing what the strongest & weakest WIFI reception areas are.
FR004.1.5	Must	User should be able to Download the heat map in pdf format, using download button.	User should see a download button on the page bottom, so that he/she can click it and download the heat map on their system.
FR004.1.6	Want	User should be able to see current location WIFI strength as well in the side menu of the home page.	Website will display current signal strength of that WIFI connection using which system is connected along with other information.
FR004.1.7	Want	Current location will also be one of the options in the Menu, will be selected default	Current location will be the default option to display WIFI signal strength.
FR004.1.8	Want	All the Heat Map should display the ranges of strongest and weakest signal strength areas	Heat map should have legends, which should clearly elaborate strongest WIFI signal strength and weakest. Along with that how it is gradually changing.
FR004.1.9	Want	In Current location menu WIFI signal strength of the current signal should show SSID, BSSID, channel, Security , frequency, signal level , quality & speed etc.	

FR004.1.10	Must	Home Page header should have below text "Cleveland State University Wifi Analyzer"	
FR004.1.11	Want	If the system is not connected to any WIFI, current location option on the menu should be able to predict correctly.	
FR004.1.12	Must	Website will display heat map of “CsuWireless” WIFI connection from Berkman Hall’s different floors.	BH is Berkman Hall, One of the buildings of Cleveland State University.

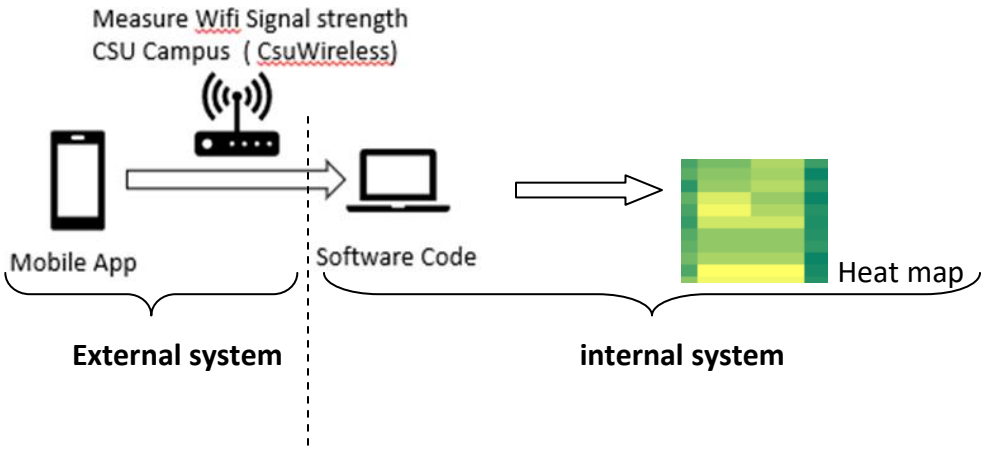
Each Nonfunctional requirement is uniquely identified as below -

NONFUNCTIONAL REQUIREMENT LIST			
Requirement ID	**Must/Want**	**Requirement Statement**	**Comments**
NFR004.1.1	Must	Home Page Menu should have background color #FFFFFF	
NFR004.1.2	Must	Home Page Menu should have fonts color #000000	
NFR004.1.3	Must	Home Page header should have below color: #006f51	
NFR004.1.4	Must	User should be able to Download the heat map	
NFR004.1.5	Must	Screen should load in <1 second	
NFR004.1.6	Must	When User will access the website link, menu should be left aligned.	
NFR004.1.7	Must	User should see a download button at the bottom of the page	
NFR004.1.7	Must	Heat map should show strongest area with yellow and weakest should be displayed by deep green	From Deep green to yellow it should gradually change and display different colors

4.2 Software Interface Description

4.2.1 External system interfaces

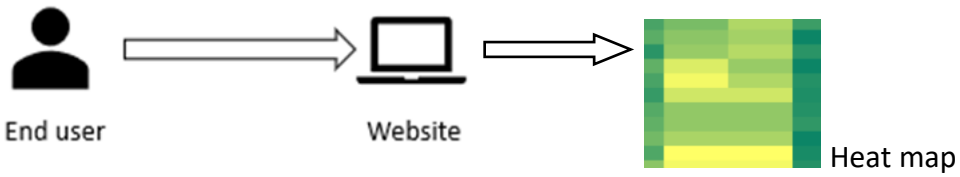
Interfaces to other systems, products or networks are described-



- **Front-end** – ReactJS with Typescript
- **Back-end** – NodeJS with Express and Typescript , MATLAB

4.2.2 Human interface

An overview of any human interfaces to be designed for the software is presented below. End user will click the website the link , website will display heatmap of the selected floor.



5.0 Restrictions, Limitations, and Constraints

- Wi-Fi signal strength will be measured only where we have access.
- Restricted area will not be considered for the signal strength measurement