Wifi signal strength HeatMap of Cleveland State University Campus

Project Plan

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SOFTWARE PROJECT PLAN

1.0 Introduction

In recent years, there has been a lot of demand for Wi-Fi hotspots. In this project, we will examine the impact of different internal environmental factors on the coverage of Wi-Fi strength across campus buildings.

We know that that Wi-Fi router performance vastly depends on the surroundings and the position of the router. In an open space, signal propagates efficiently. With the help of the heat map, we can easily identify the specific position with poor signal reception and determine effective router positions

1.1 Project scope

Building a website, which represent a Wi-Fi access points (APs) [1] coverage heat map [2] in the city of Cleveland at the periphery of the Cleveland State University. With the help of the heat map, we can easily identify the specific position with poor signal reception and determine effective router positions.

Since APs deployed inside the college campus, we will investigate if coverage is sufficiently dense around the college building, on what conditions depend its performance, which area has lowest signal reception and which part has acceptable signal propagation.

We will show the results for the college campus, highlight the weakest and strongest coverage area through a heat map. Data collection for input will be done via measuring WIFI signal strength 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.

1.2 Major software functions

> - **React** for the frontend GUI Development
> - **Node.js** for the backend
> - **Mat lab** to generate the heat map and verify the data quickly
> - **Airport Wi-Fi scanner** to measure the WIFI signal strength
> - **Excel** to capture the data

1.3 Performance/Behavior issues

- 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

1.4 Management and technical constraints

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

2.0 Risk Management

Wi-Fi Signal strength keeps on changing all the time, resources will try to find most stable data to collect efficient sample for the input.

2.1 Project Risks

Technology risk: As resources are implementing this project first time, it might require extra training and lead to delays.

Operational risk: As resources are not well trained & inexperienced thus there is chance of poor implementation of the code.

Performance risk: With limited time and limited resources, project code might have performance issues.

Resources Availability risk: As developers are college students, need time for other subjects. Along with that location constraints and availability constraints are also there.

2.2 Risk Table

The complete risk table is presented below along with the Name of risk, probability; impact and RM3 pointer are provided.

Name of Risk	Probability	Impact	RM3
Staff Inexperienced	30%	2	
Sample size Significantly Low	80%	2	
Lack of training on Tools	40%	3	

Risk	Probability	Impact	RM3
Delivery deadline will be tightened	50%	2	
Limited Staff	30%	4	
Staff needs to be trained on new technology	20%	4	
Larger number of users than planned	40%	3	

Impact Values

1- Catastrophic
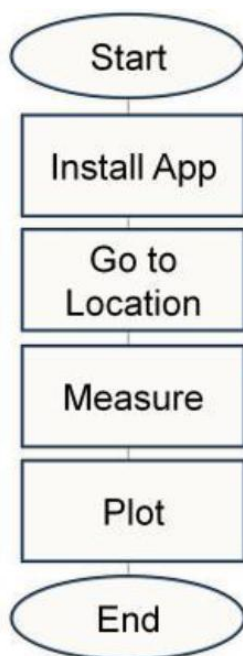2- Critical
3- Marginal
4- Negligible

2.3 Overview of Risk Mitigation, Monitoring, Management (RM3)

An overview of RM3 is provided here. The Complete RM3 is provided as a separate document or as a set of Risk Information Sheets.

3.0 Project Schedule

3.1 Project task set

Process Model

Framework activities and task set that have been selected for the project are presented below -
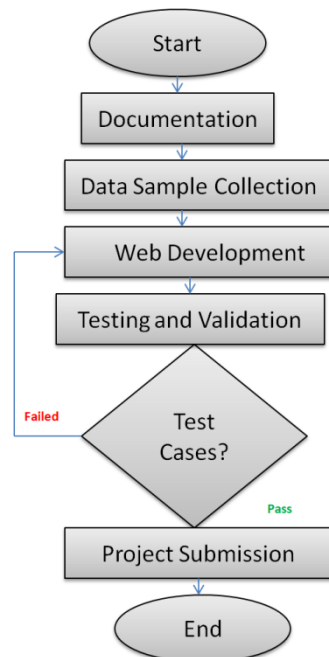
- Initial Discussion and Requirement Gathering
- Technical Document Creation
- Data Collection and Web Development
- Test Plan Generation
- Testing and Validation
- Final Report Preparation
- Final Presentation and Submission

3.2 Functional decomposition

A functional breakdown to be used for scheduling is presented below

- Documentation
- Design Finalization
- Technical Documents Generation
- Data Collection for input
- Web Development
- Testing, Verification
- Presentation
- Submission

3.3 Task network

```
                    Start
                      |
                      v
              Documentation
                      |
                      v
            Data Sample Collection
                      |
                      v
   +------>    Web Development
   |                  |
   |                  v
   |          Testing and Validation
   |                  |
   |                  v
   |  Failed       Test
   +------         Cases?
                      |
                      | Pass
                      v
              Project Submission
                      |
                      v
                    End
```

3.4 Timeline chart

Serial Number	Main Task	Sub Task	Timeline	Assigned to	Status
1	Requirement Gathering	Initial Discussion	Week1	Both	done
2		Finalize the Scope	Week 2	Both	done
3		Tasks Assignment	Week 3	Both	done
4		Design Finalization	Week 3	Both	done
5	Documentation	Project Plan	Week 4	Anubhuti	done
6		Software Requirement Specification Document	Week 5	Suman K	
7		Software Test Plan Documentation	Week 6	Anubhuti	
8		Software Design Specification Document	Week 6	Suman K	
9	Development	Data Gathering	Week 7	Anubhuti	
10		Environment Set up	Week 8	Suman K	
11		Development frontend	Week 8-11	Anubhuti	
12		Development backend	Week 8-12	Suman K	
13		Unit Testing frontend	Week 12	Anubhuti	
14		Unit Testing backend	Week 12	Suman K	
15	Test	Testing backend	Week 12	Anubhuti	
16		Testing frontend	Week 12	Suman K	
17		Website Verification	Week 12	Both	
18	Final Submission	Project Report Generation	Week 13	Both	
19		Project Presentation and Demonstration	Week 13	Both	
20		Project Submission	Week 14	Both	

4.0 Appendix

Supplementary information is provided here.

Serial Number	Key word	Details
1	APs	An access point is a device that creates a wireless local area network, or WLAN, usually in an office or large building. An access point connects to a wired router, switch, or hub via an Ethernet cable, and projects a Wi-Fi signal to a designated area.
2	Heat map	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.