RSSI BASED CONTOUR MAPPING FOR OPTIMUM ROUTER PLACEMENT

OUR TEAM

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PROBLEM DESCRIPTION

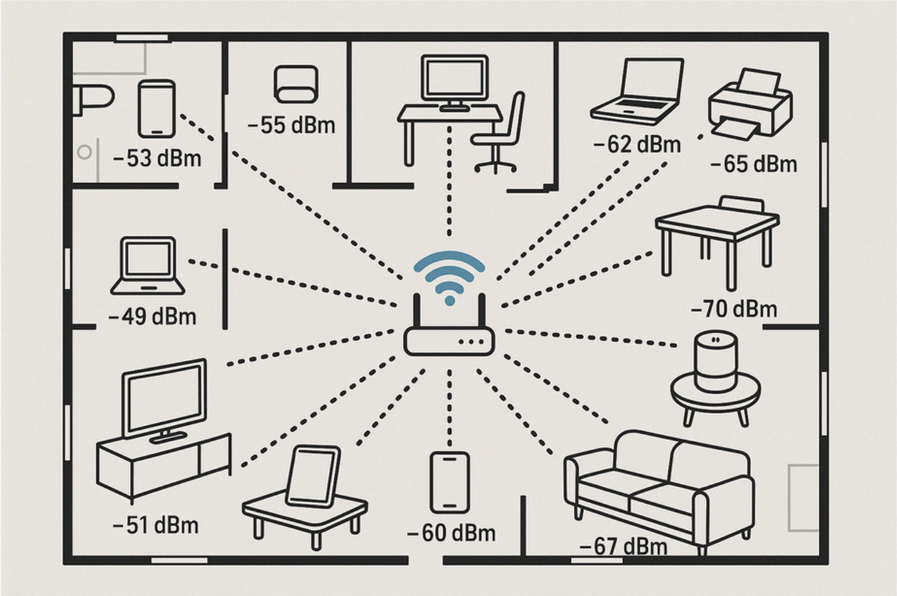


*FIGURE - RSSI VALUES VARY **ACROSS THE FLOOR** FOR DIFFERENT DEVICES*

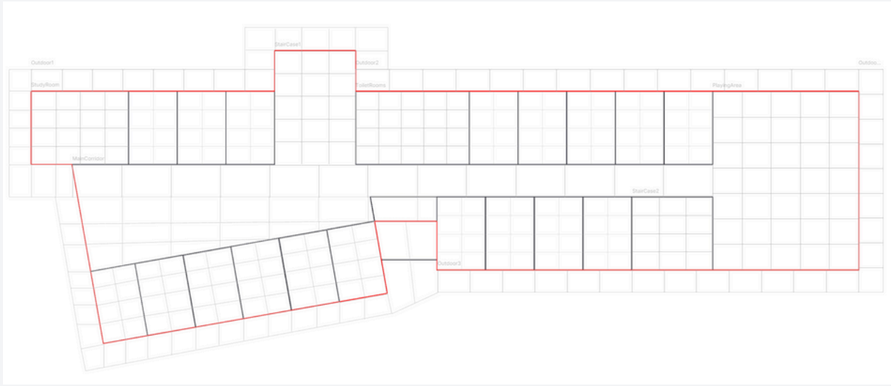
IN THIS PROBLEM WE AIM TO ANALYZE THE WI-FI SIGNAL STRENGTH IN OUR HOSTEL.

THIS PROJECT MEASURES RSSI USING A LAPTOP AT DIFFERENT SPOTS INSIDE AND OUTSIDE THE HOSTEL.

BY MAPPING SIGNAL STRENGTH AND AP LOCATIONS, WE AIM TO FIND WEAK ZONES AND SUGGEST BETTER AP PLACEMENTS TO IMPROVE COVERAGE AND USER EXPERIENCE.

EXPERIMENT DESIGN

B5 HOSTEL GROUND FLOOR



1.

WE STARTED BY CREATING A FLOORPLAN OF THE GROUND FLOOR BY FIRST CREATING AN OUTLINE OF THE BUILDING USING GOOGLE EARTH.
AND THEN CREATED INDOOR ROOMS AND GRIDS FOR EACH ROOM USING FIGMA

2.

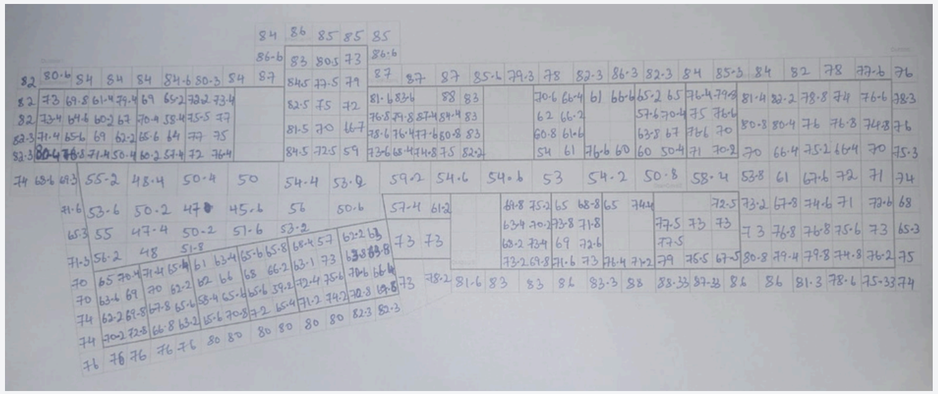
WE FIRST IDENTIFIED THE FACTORS THAT WILL AFFECT THE SIGNAL STRENGTH AS :

1. ROOM STATE: OPEN ROOM, CLOSED ROOM
2. DEVICE USED: MOBILE, LAPTOP
3. BAND: 2.4, 5 GHZ

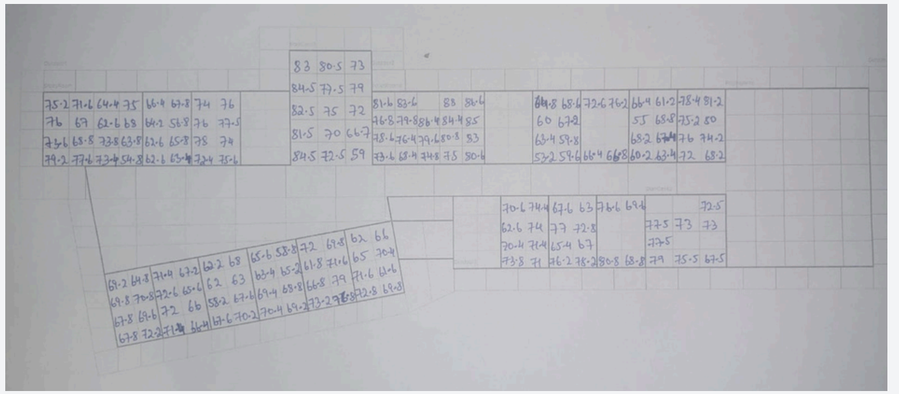
TO KEEP THE NUMBER OF EXPERIMENTS FEASIBLE WE USED A LAPTOP (WIFI CARD OF LAPTOPS > WIFI CARD OF MOBILE) AT 2.4GHZ BAND (RANGE OF 2.4 GHZ SIGNAL> RANGE OF 5 GHZ SIGNAL).

WE COLLECTED DATA AT ~500 POINTS WITH AVERAGING DONE AFTER COLLECTING DATA 5 TIMES AT EACH POINT USING A AUTOMATED WINDOWS POWERSHELL SCRIPT AND NIRSOFT WIFIINFOVIEW SOFTWARE

OPEN DOOR

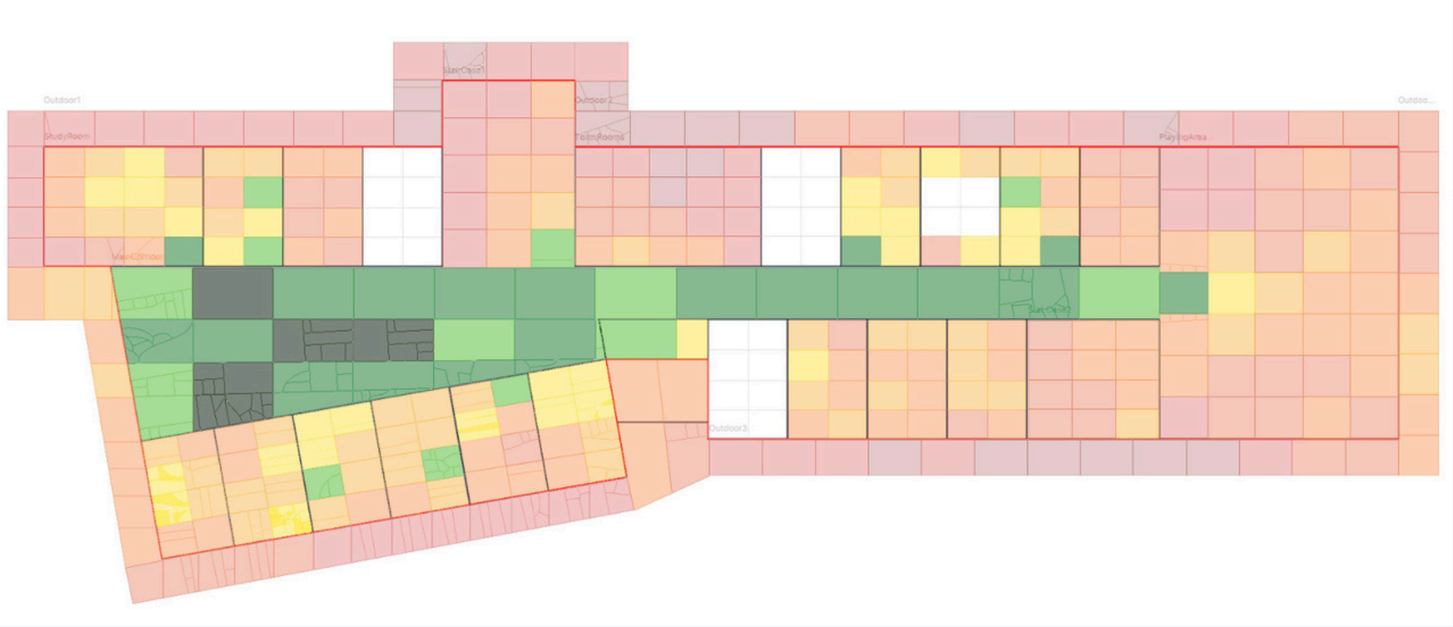


CLOSED DOOR



EXPERIMENT DESIGN

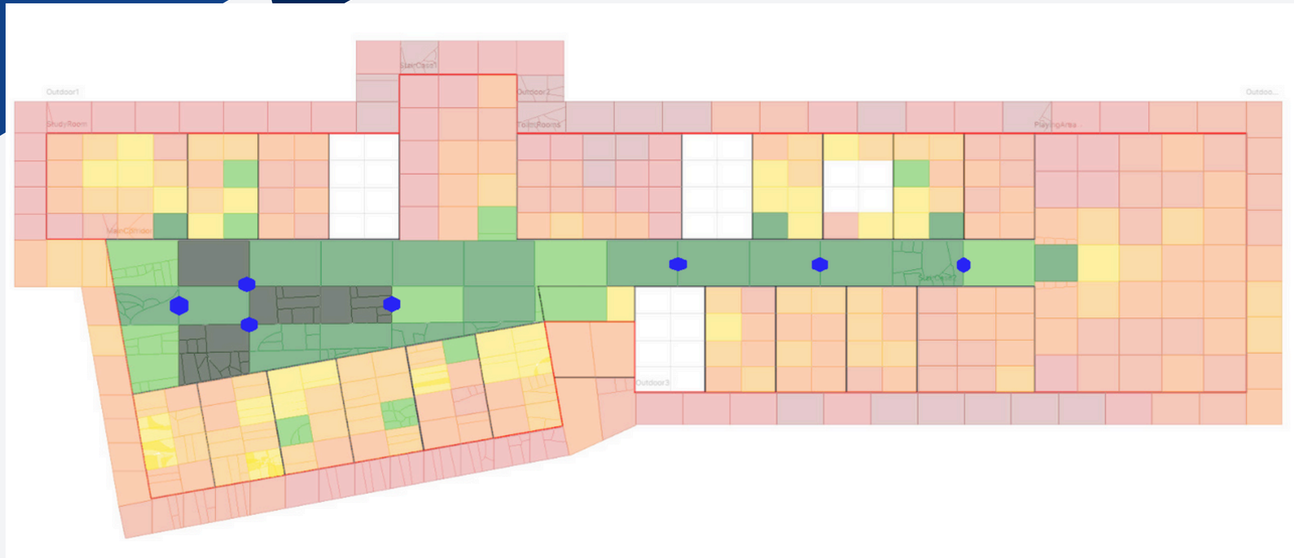
3. WE USED GIMP SOFTWARE TO CREATE A COLOR MAP TO GET A VISUAL UNDERSTANDING OF THE SITUATION



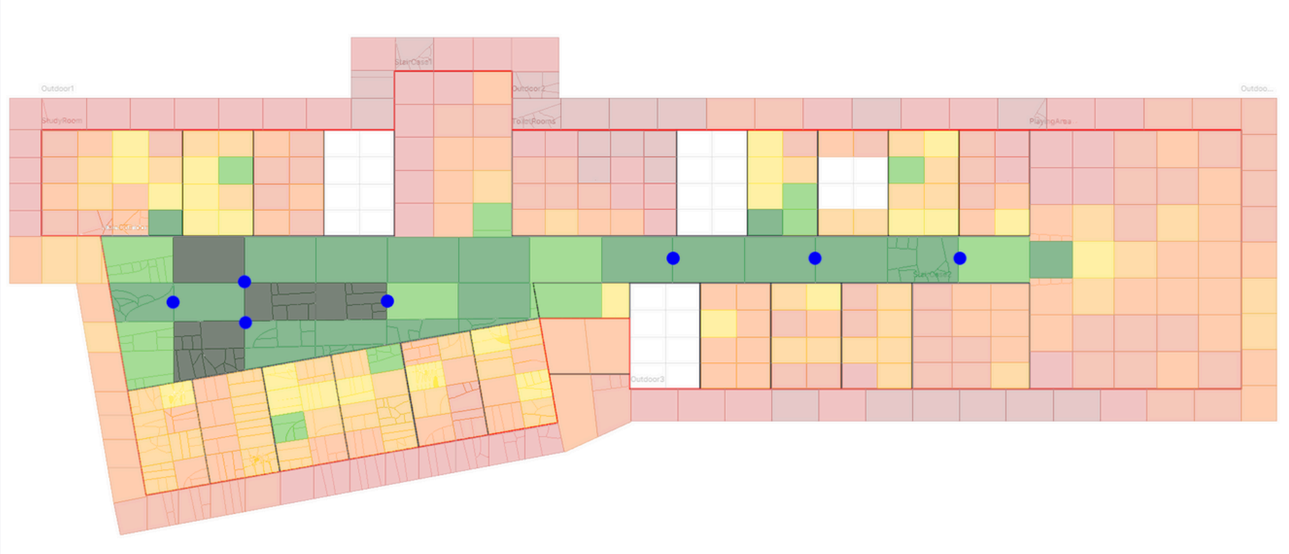
OPEN DOOR

EXPERIMENT DESIGN

RESULTS



OPEN DOOR



ROUTERS IN BLUE

CLOSED DOOR

ANALYSIS

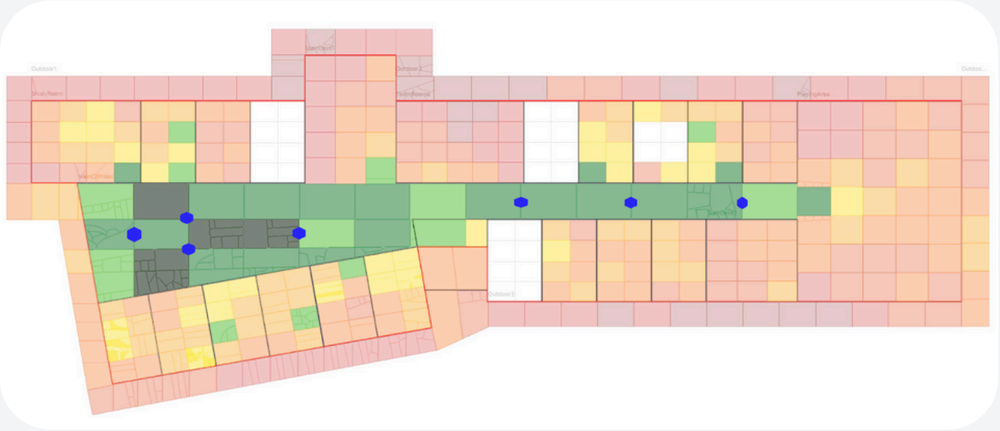
THE ANALYSIS REVEALS THAT THE SIGNAL STRENGTH INSIDE THE ROOMS RANGES FROM OK TO VERY WEAK WITH NEAR UNUSABLE SIGNAL STRENGTH IN THE COMMON ROOM AREA.

THE SIGNAL STRENGTH IS EXCELLENT IN THE CORRIDORS

THERE IS ONLY A SMALL CHANGE OF ~3DB WITH OPEN DOOR AND CLOSE DOOR SETTING.

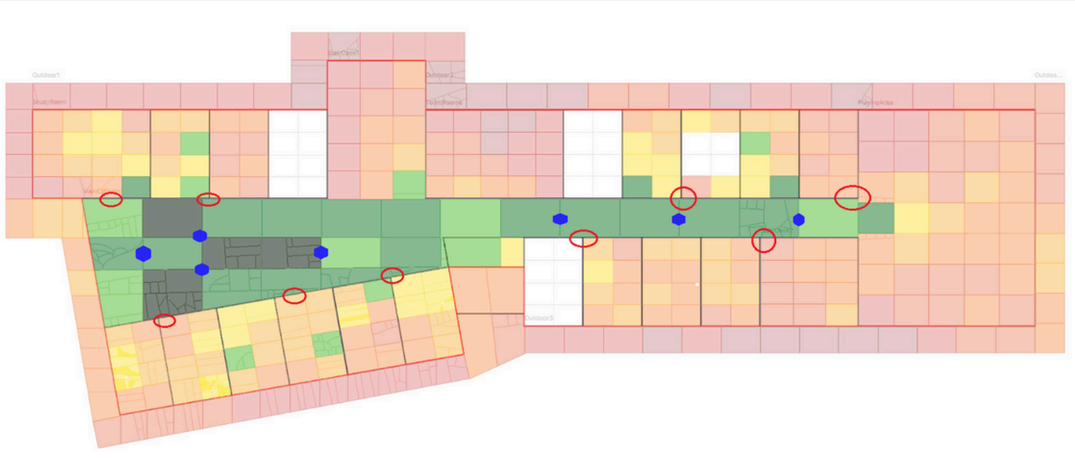
THE SIGNAL STRENGTH IS BETTER NEAR THE DOOR OF THE ROOMS AND GETS WORSE NEAR THE WINDOWS.

THE SIGNAL STRENGTH IS EXTREMELY WEAK JUST OUTSIDE THE HOSTEL.



INFERENCES

1. The system is badly designed wherein the signal strength is high in the regions where students spend the least amount of time (Corridors) and weak in inside the rooms/common room/study room(most time spent).
2. The routers should be placed near the walls instead in the center of the corridor for better coverage of the rooms and common room area.



RED CIRCLES INDICATE SUGGESTED LOCATIONS

INFERENCES

3. More powerful and more number of routers are needed. Strategic placement will help it can be noted that the signal strength drops very fast at the interface of the wall. Deploying powerful routers can significantly help the situation without moving a lot of things around

CONTRIBUTIONS

Creation of floor plan - Vasu
Script to measure and average RSSI - Ravi
Collection of data - Vasu, Vatsal, Ravi
Creating heatmap of avg rssi points on floor plan - Vatsal

PROJECT EXTENSION

WHILE THIS WAS IN ITSELF A PRETTY DETAILED ANALYSIS OF THE SIGNAL STRENGTH BEHAVIOUR ACROSS THE SPATIAL DIMENSION. A MORE THOROUGH ANALYSIS CAN BE DONE BY UNDERSTANDING MORE FACTORS SUCH AS THE COST OF THESE ROUTERS, COST OF INSTALLATION AND FIGURING OUT THE BEST POSSIBLE AND FEASIBLE SOLUTION TO UPGRADE THE SYSTEM FOR BETTER CONNECTIVITY.

THIS ANALYSIS CURRENTLY ALSO DOESN’T ACCOUNT FOR SIGNALS FROM INDIVIDUAL ROUTERS . SUCH DATA CAN ALSO BE FUSED WITH THE ANALYSIS TO UNDERSTAND IF ANY ROUTER IS UNDERPERFORMING/LESS CONTRIBUTING.

THANK YOU

RESOURCES:

HTTPS://EARTH.GOOGLE.COM/

HTTPS://WWW.SOLIDWORKS.COM/

HTTPS://WWW.FIGMA.COM/

HTTPS://WWW.NIRSOFT.NET/UTILS/WIFI_INFORMATION_VIEW.HTML

HTTPS://WWW.GIMP.ORG/