Group(Tushar)

Final Report

AP/ITEC 3230 - Section M

I.

1. a) Overview

These end users are the people most affected by this system, and in turn makes them a stakeholder. Another stakeholder has to be the company that ensures a secure connection to your home devices and protects them from external actors and protects your personal data. These stakeholders generally want an efficient and intuitive way to interact with their home automation devices and have a distinct need to be able to create their own unique setup.

b) User Characteristics and Use Cases

Stakeholder: The end users that interact with the system through the mobile/web application. The other stakeholder are the people involved in the security and custodians of your data.
Primary users: Tech-savvy people that are going to be using the system to automate certain processes within their home.
Secondary Users: Guests/family that visit or live there
Tertiary users: Interior designers and business owners influence its purchase, customers within a business building would be influenced by the purchase

Educational Level:	**High school graduate or above**
Computer Expertise:	Basic, competent users that know how to interact with user interfaces, and know how to navigate through applications
Age Range:	**18-30**
Frequency of use:	They will use this interface frequently as they need to be able to turn lights on and off daily, and to control various other appliances.

c) Requirements - Use cases

1.

Use Case Name	Have the equipment give feedback through accomplished tasks
Participating Actors	User
Flow of Events	1. Scroll to the desired category (Security, appliances, casting, or smart speakers) 2. Click on chosen device that you wish to manipulate 3. Choose the goal that you wish to achieve
Precondition	System displays home screen
Postcondition	● The device that has been manipulated or given a task has its visual status change as a result of choosing and clicking the goal (Light dims, or lock opens as a result of interaction).
Quality	● The system should be able to respond immediately, ● The action should happen in at least 1 second, and at most 5 seconds.

2.

Use Case Name	Allow customization of the list of devices and their specific attributes
Participating Actors	User
Flow of Events	1. Scroll to the desired category (Security, appliances, casting, or smart speakers) 2. Click on chosen device that you wish to manipulate 3. Click on the settings button and customize the device (the three dots in the top right corner)
Precondition	System displays home page
Postcondition	● The settings interface for each category is shown. ● If a list of devices within the device is manipulated, depending on the nature of the change, there will be feedback after. ● Example, if there's a timer set, a status icon appears on the corner of the device's icon showing there's a timer on.
Quality	● System should respond within 1 second(time of feedback and should also be instantaneous for the update to the home page ui). ● The action should happen within 1 second, as when you get to the homepage to confirm your settings, your manipulations to the device(s) should be able to be observed and reminded of.

3.

Use Case Name	Grant access to data records on home automation categories
Participating Actors	User
Flow of Events	1. Click the home data button(shown at the top of the app), then click the category you'd like to get data from 2. Click and manipulate data to see based on time restrictions, highest usage, etc.
Precondition	System displays the home page with the home data button shown at the top with other important functions.
Postcondition	• Different device categories and groups show their usage records • Usage can show alerts based on certain aspects of the data shown.
Quality	System should respond within 1 second. The usage reports can be allowed a time of 3 seconds to load.

II.

2. High Fidelity prototype link **DONE**

https://drive.google.com/file/d/1uDhvo-57bNw3J1jeM6nbS1hJN01Jk-2b/view?ts=5e7afcd5

III.

3. Phase 1 Evaluation

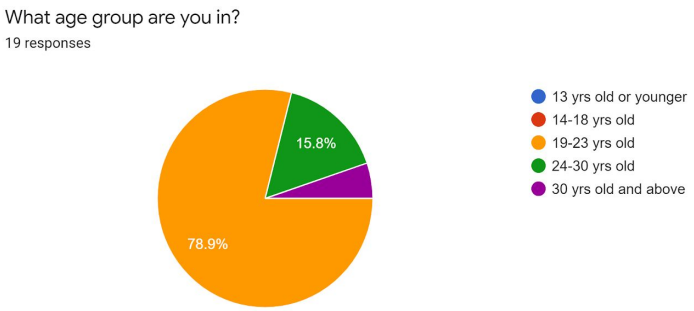
1. *Provide (in point form) the comments that you received from your audience during Q&A. Describe if and how the comments have been addressed to the improvement of the prototype. Use a table as follows (I provide two examples):*

Q&A Comments from Audience	
Reported Issue	**Response**
Add a function to group devices together	Added Device group functionality
Add correlating data in Home Data function.	Added correlating data in Home data function.

2. *Analyze the questionnaire results that you got from your class. Work as follows*

a. *Quantitative data: build whatever visualizations are necessary, and draw conclusions with respect to your design (3-4 sentences at most).*

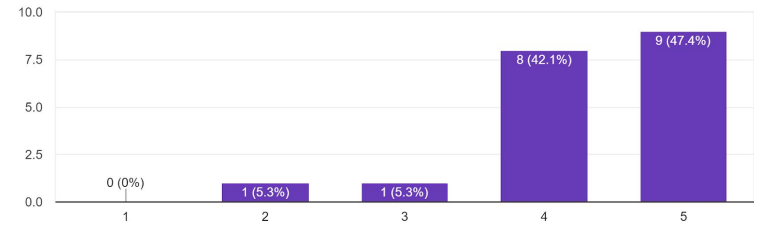
The response we received from our questionnaire suggests our prototype was aesthetically pleasing and easy to use for our target audience. The mode for most of the questions regarding this were for our prototype being visibly pleasing and simple to use.



This pie chart shows that our test users were mostly around our target group of being 18-30 yrs old.

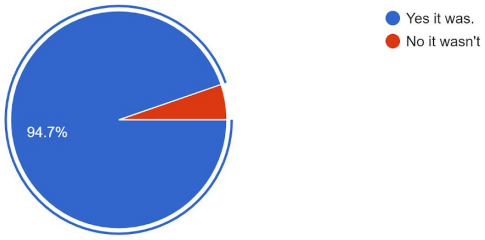
Would you say that the functions of the home devices are easy to use?

19 responses



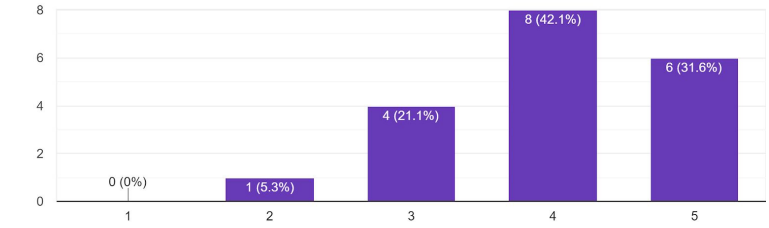
Do you find the application to be visible and easy on the eyes?

19 responses



How confident are you on using this app for the first time?

19 responses



These 3 charts above show that most of our test users found our prototype to be pleasing to the eye and easy to use.

b. *Qualitative data: transcribe all comments and code them using Nielsen's heuristics as codes.*

Qualitative Data	
Comment	**Nielsen Category**
"maybe if I could rename the lights from light one light two to dining room or kitchen lights"	Flexibility & Efficiency of Use
"switching off lights, viewing other rooms in the house, locking the main door,"	Flexibility & Efficiency of Use
"Create username"	Consistency & Standards
"ability to connect to third party softwares such as google home and amazon alexa"	Flexibility & Efficiency of Use
"ability to make item groups for example one for lights so all items in a group can be controlled together with ease."	Flexibility & Efficiency of Use
"Music control and light effects Voice command"	Flexibility & Efficiency of Use
"grouping devices"	Flexibility & Efficiency of Use
"Option to turn on or off everything with one click"	Flexibility & Efficiency of Use
"Name my devices"	Consistency & Standards

“speech recognition”	Flexibility & Efficiency of Use
“Way to manage other users/controllers.” “Control wi-fi (the most evilest of things) [i.e. What devices can use the wifi]. and of course an ability to group certain devices into one custom switch [ex. User creates a switch called party mode switch and details which devices will be triggered and what they do (timers or delays or more)]. Another idea is to have it automatically group like devices together [ex. for the lights, if there's 6 located in the living room, the app automatically groups them into one switch called 'Living Room Lights']”	Flexibility & Efficiency of Use
“Security features”	Flexibility & Efficiency of Use
“A feature to turn on all systems on and off at once”	Flexibility & Efficiency of Use
“Location of light information”	Flexibility & Efficiency of Use
“A locking system. Since it is a smart home system. maybe a button on your phone to lock/unlock or a spatial distance from phone to lock. Both would require more security.”	Flexibility & Efficiency of Use

c. *Using the above results, develop a table such as the one below, to show how you used them to improve the prototype.*

Comments from Questionnaire		
Quote	**Nielsen Category**	**Response**
“Create username”	Consistency and Standards	Added registration & login section
“Maybe if I could rename the lights from light one light two to dining room or kitchen lights”	Flexibility and Efficiency of Use	Name setting created when device/device group is set up.
“A feature to turn on all systems on and off at once”	Flexibility and Efficiency of Use	Device group feature added

A lot of the results above were requests to see a feature to group devices together or change a device’s name, so we just boiled it down to these 3 things rather than adding more to the table and making it redundant

IV.

4. Phase II Evaluation

   4.1

Effectiveness	The system should be able to achieve the home device tasks/inquiries quickly and on the spot as high latency would be an issue when it comes to things such as security Criteria: ● How fast the user can perform the main functions of the app.
Efficiency	We'd like to minimize the amount of frames that it takes to achieve a task while still allowing a high degree of cleanliness within the interface design. Criteria: ● How many frames an average/single user goes through in their pursuit of performing tasks.
Learnability	Without a tutorial, the system should be easily understandable with the affordance-focused UI we created. Criteria: ● How quickly users perform tasks on their first try, and then the average of the ones beyond.
Usefulness	This system would allow for everyday things to be done through our UI, this system would make it more desirable than things such as google home. Criteria: ● How do the users feel about certain functions of the app (could be indicative of what they like or don't like compared to similar apps)
Memorability	Since this system is rather easy to traverse, remembering how to use the app is quite simple, as at most every task will have a low amount of frames needed to complete them. Criteria: ● The time taken to achieve a goal after a long time away from the system/app.

4.2

I.

Effectiveness	Criteria: ● How fast the user can perform the main functions of the app.
Efficiency	Criteria: ● How many frames an average/single user goes through in their pursuit of performing tasks.
Learnability	Criteria: ● How quickly users perform tasks on their first try, and then the average of the ones beyond.
Usefulness	Criteria: ● How do the users feel about certain functions of the app (could be indicative of what they like or don't like compared to similar apps)

II. This field study would be conducted strictly in a person's house as that's the only place that each evaluation goal can be applicable to its maximum capability.

III. A random selection of people within their homes would be taken, this is our primary user. The other amount would be people out of home (for smart-lock devices & monitoring). For each of these I would like to have about 20 or more for each criteria.

IV. Users would be given about 15 minutes to do the field study. This is because we wouldn't be able to find out the learnability aspect without some redoing of the certain tasks that need to be done. And we would allow some time for just exploring around the app itself.

V. The data that we would collect is going to be specifically in how useful and intuitive the application is for the user, and their reaction to the effectiveness of the system. The specific data techniques that we would use is through both observation, and through interviews. To reduce the effects of these field tests, I'd like to do it when they are free and preferably at home through a beta version of the app being installed onto a test phone, to get the genuine

physical and logical setting. The specific data that could be recorded through these means are how fast main functions are done, how many frames someone goes through to finish a task, the increase/decrease in time used to perform certain tasks, and their feelings on the system.

VI. With the data gathered, we take the mean amount for quantitative-related data, and with the usefulness portion(qualitative portion), we can draw conclusions on what users actually want within a system. Through these two methods, it allows us to gauge both, the capability to create a greater system, but to understand where we stand in relation to other system developed/in-development.

4.3.1

I. I'll be evaluating:
- Effectiveness
- Efficiency
- Learnability
- Usefulness

II. What are the independent variables?
- Time spent to find each categories settings and functions
- Pages traversed in the interface (wrong and right actions)
- The difference in time taken to accomplish tasks compared to the first try.
- Outside of the tasks, what features the user wants to access.

III. What are the dependent variables of your experiment? Answer specifically and associate each dep. variable with an evaluation goal of (i) above and criteria you discussed in 4.1.
- Task success depends on how many mistakes and correct actions someone takes when traversing the pages in an interface.
- Task times are dependent on the time spent to find each categories settings and functions
- Learning time depends specifically on the difference in time to accomplish tasks compared to the first try.
- Overall satisfaction is dependent on the tasks that user wants to access, and the satisfaction of a user will determine how useful the system is to them.

IV.

In this experiment, a preferred design would be to do the within subjects design. This is because we'll have more continuity since we are using the same participants for both cases. Reducing participant variables.

V.

The drawback here is that since the participants may learn the interface faster earlier or be less performing because of being tired. We could fix this with counterbalancing, which means that we have half of the participants do a certain task and another to do another and then have them switch. This allows more variance within testing because we have more groups, and can get rid of participants learning the process too quickly when we aren't specifically looking for that specific goal.

VI. To lower the order effect, there will be more than one group, and within the experiment they will have to do different tasks within the interface. This is shown through having pages that don't include similar pages to another (split apart from settings, home data button and beyond).

VII. Quantitative

- How much average time it took for them to do the same type of task after the first time (seconds)
- How many times did they pick the wrong page when doing a task (seconds)
- Total completion time average, for min medium and max. (seconds)

Qualitative

- What features did they access outside of the experiment's needs? (simple observation)
- What did they like and not like about the app? (feedback)
- What's the likelihood that you would use this in your own house?

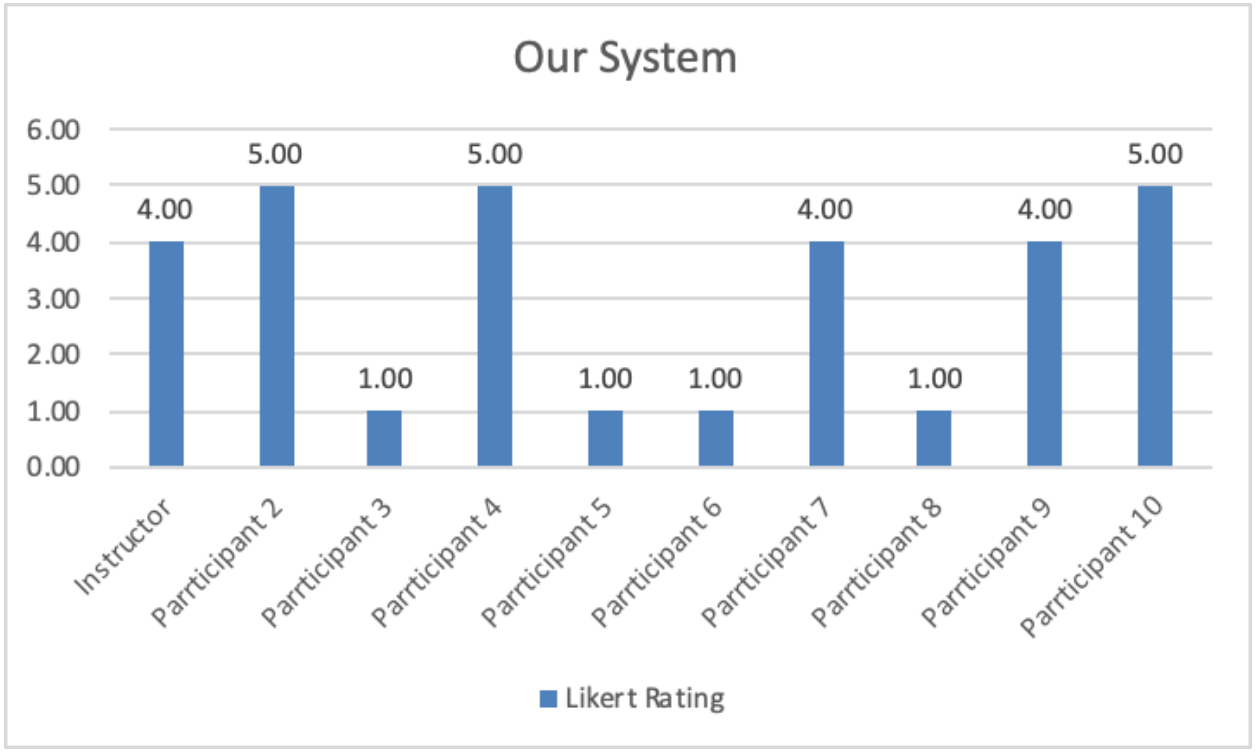
4.3.2

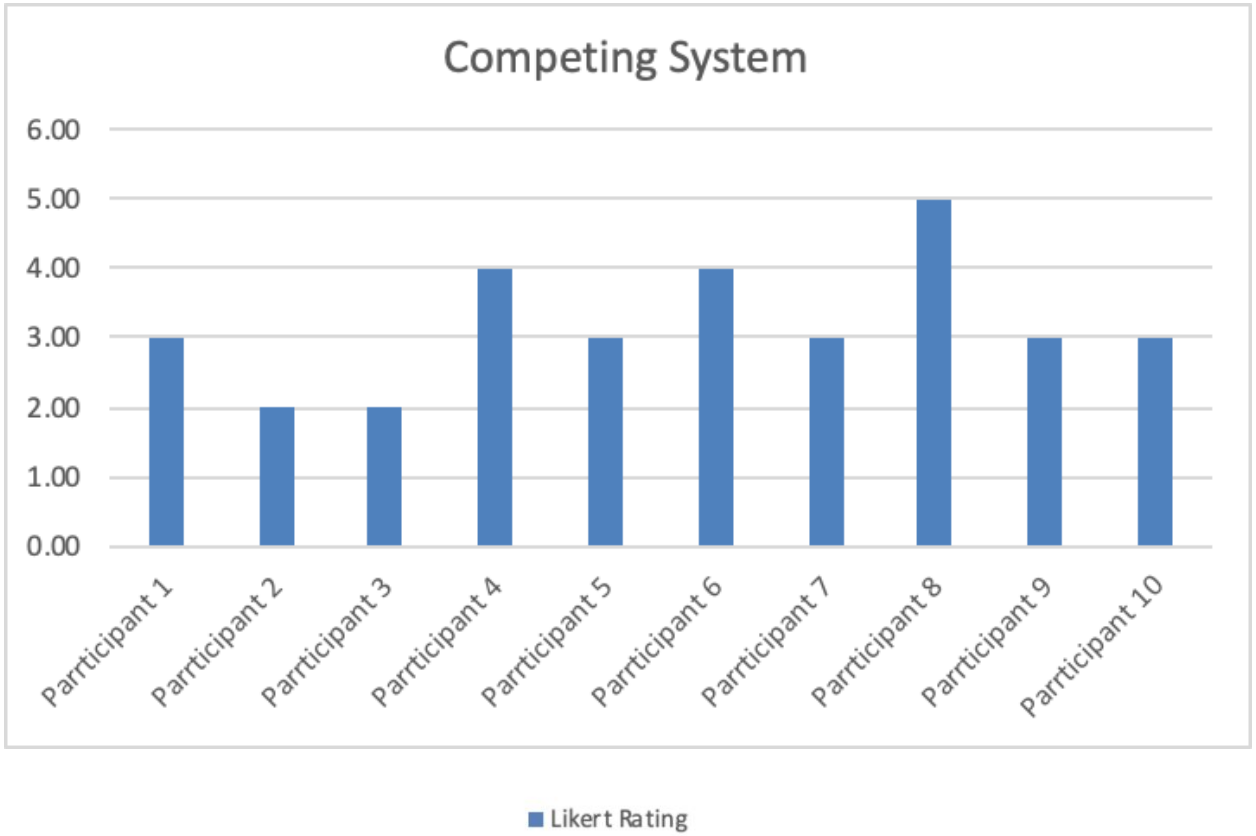
Questionnaire Question: 6. I believe that the system is easy to learn
Quantitative measure: How much time do they spend to do each step pertaining to the task?
Likert Rating: The instructor agreed to a rating of 4 out of 5

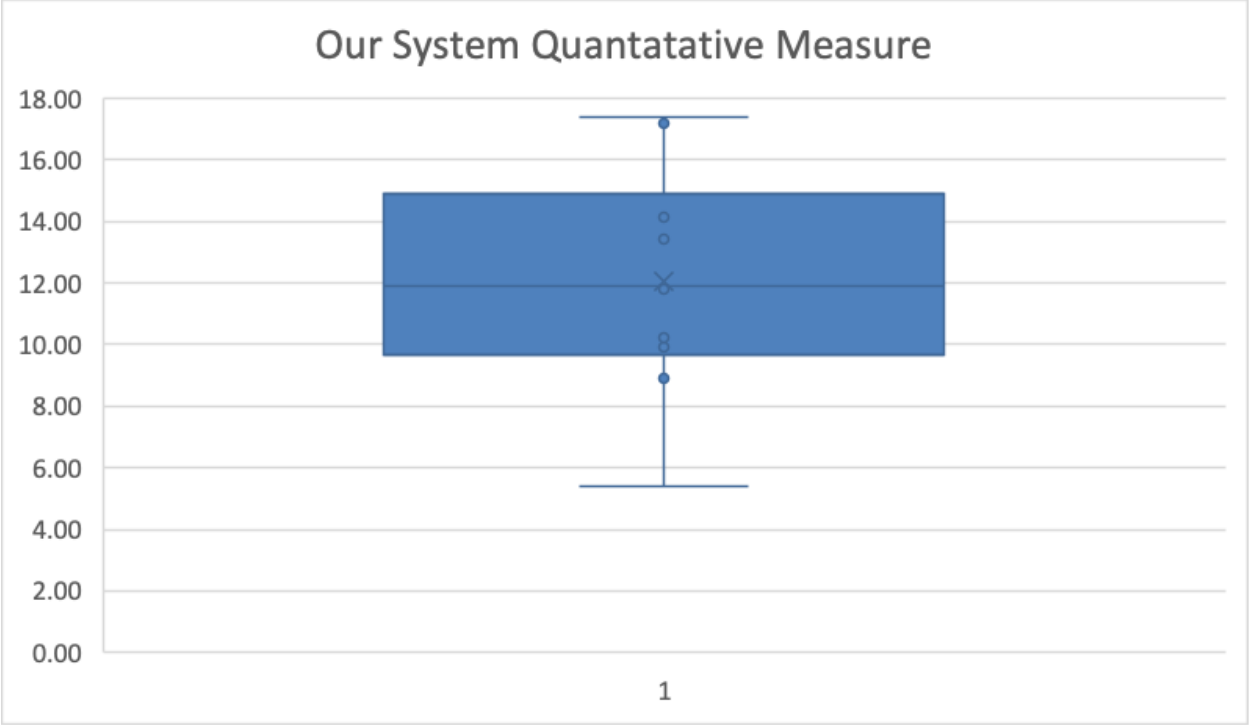
Result:

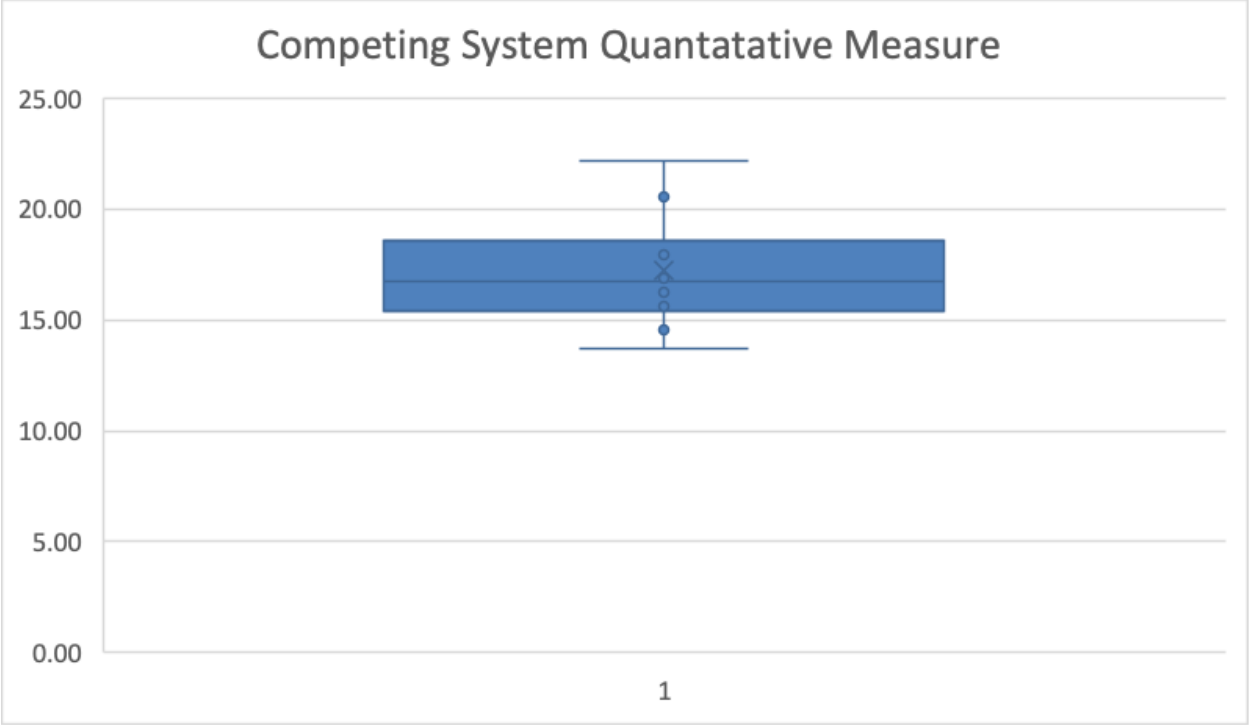
YOUR SYSTEM	Quantitative Measure	Likert Rating
Instructor	12.00	4.00
Parrticipant 2	11.79	2.00
Parrticipant 3	5.41	4.00
Parrticipant 4	9.90	5.00
Parrticipant 5	10.24	3.00
Parrticipant 6	13.42	5.00
Parrticipant 7	14.15	2.00
Parrticipant 8	17.37	4.00
Parrticipant 9	17.19	1.00
Parrticipant 10	8.90	5.00
COMPETING SYSTEM		
Parrticipant 1	16.61	3.00
Parrticipant 2	13.70	3.00
Parrticipant 3	15.64	4.00
Parrticipant 4	16.24	5.00
Parrticipant 5	14.57	2.00
Parrticipant 6	16.91	2.00
Parrticipant 7	22.18	3.00
Parrticipant 8	17.92	4.00
Parrticipant 9	20.57	4.00
Parrticipant 10	17.94	2.00

Likert Rating Comparison






Our System Quantatative Measure
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
1


Competing System Quantatative Measure
25.00
20.00
15.00
10.00
5.00
0.00
1

Observation

By producing, testing, and reviewing our prototype through experiments and studies, we believe that our system has a better user response as shown in our likert scale findings, showing that in comparison to competitors, we average a higher likert scale value. We have also shown to have a lower average time to complete steps within the tasks that we have chosen, showing that on average we have each step take 10 to 14 seconds compared to 16 to 18 on our competitors range. Overall with our quantitative results, we are certain that our system has an overall better user experience in relation to our competitors.