TechBot - Choose Your Best Laptop

Group 204: Akshay Arunkumar Garg, Daniella Anwar, Rajanssh Gadhvi, Sana Sajesh, Vidisha Jain

Abstract. Modern technology is being introduced every day resulting in numerous types of laptops being produced by many different companies. Each company races to present the best features to gain more clients. Whereas our Techbots goal is to make it easier for users to choose what suits their requirements the most. Many people buy laptops, and in the long term, they become unsatisfied with their choice. In this study, we are introducing and presenting a new chatbot. This Techbot helps laptop users to choose the laptop that suits them the most, and non-laptop users to purchase laptops that meet their requirements. Techbot displays various types of questions and conversations till the client has made their choice upon their budget, purpose, and features. The outcome of this study will help tackle the difficulty of choosing a laptop by asking the users their requirements and providing them with suitable recommendations.

1 Introduction

Assistance robots are being used in various applications such as entertainment, education, and even medical fields. Smartphone brands like Apple, Samsung, LG, and Huawei are always in competition to be at the top of the list by selling the most products. This results in convincing the client to buy their products because some users will be peer pressured into buying something they are not 100% sure of. One of the main reasons we introduced and presented Techbot is because bots are taking over the role of customer service rather than humans. Gartner has predicted that in 2021, “more than 50% of enterprises will spend more per annum on bots and chatbot creation than traditional mobile application development or human assistance”. Therefore, Techbot has been created to not allow clients to wait in queues to ask questions about their required product. Instead, they will be relaxing at home deciding which laptop suits their requirements. This is an advantage of using chatbots like Techbot. Not only that but with the help of Techbot, it is assured that the client will think carefully about every feature they would like to witness in the product they purchase. For example, the color, memory size, type of OS, and processor.

The Problem Space: Some clients would rather purchase their laptops by physically going to the store and buying them, as they would be able to see and interact with the laptop physically. However, sometimes going to purchase laptops can be very time-consuming due to waiting in long queues for assistance or traveling long miles just to make a choice for your perfect laptop. As a result, clients will be unable to choose a laptop due to peer pressure from customer service staff trying to sell their products. Techbot is made to save time, where clients can be relaxed at home choosing their laptops with no one convincing them or putting pressure on them.

Conceptual Design: Our Techbot is made to assist users to choose the laptop that suits their choices and meets their requirements to purchase it while being extremely satisfied with it. We also aim for the bot to emulate the speed of assistance that is usually not seen in stores.

User and Requirements: The target users of this chatbot are regular laptop users, programmers, designers, gamers, or youth which is the young generation. The goal of this chatbot is a self-service UI (User Interface) that is available 24/7 to guide confused users to the most applicable choice that will meet their requirements. Our Techbot is also aimed at users who depend on using laptops for work, studies, gaming, or communication. Especially college or university students who will use laptops for studying or attending online classes. Techbot was able to deliver all the requirements listed below:

- R1- Users can interact with Techbot easily by selecting the appropriate answer.
- R2- Users must be able to make up their minds on which laptop achieves their requirements.
- R3- Techbot must be able to predict the question the user should be asked next.
- R4- Techbot must be able to address the correct question which will help choose the required laptop.
- R5- Techbot must be able to view at the end, the laptop that best suits the user according to their previously answered questions.
- R6- Techbot should respond rapidly to users which saves their time.
- R7- Techbot must be easy to understand.

Design: Techbot was designed according to two different conditions. The first condition is the high-quality bot with rapid response and questions leading to the correct choice of laptop. For example, it asks 'Do you have a preferred choice of RAM?' This bot also gives the impression to the client that it is a more friendly bot. Techbot is very chatty to gain the most amount of information, which could then display the most suitable laptop for each different client with all the required information (Figure 1). Whereas the less chatty bot has comparatively fewer questions and gives you less detailed choices.

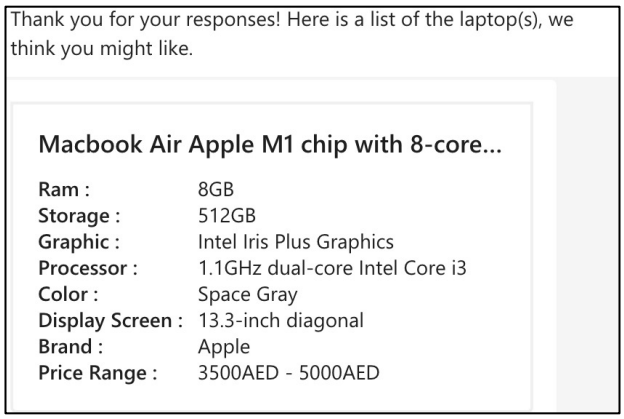


Figure 1 : Chattier bot with more details of the laptop

Techbot has been designed in a way in which it will be able to collect small details from the participant to address them with the correct choice of laptop. The interaction between the bot and the user is displayed as a conversation between a customer service employee and the customers themselves in real life. This is to imply to the participants that they will be making the perfect choice of laptop as if they are speaking to a real person, however, they are more relaxed, at home and there are no queues to stand in. Techbot is able to do a number of interactions, such as asking questions, showing the different types of laptops, and displaying the specs of the laptop. The prototype that we have developed is a high-fidelity prototype, in other words, the representation of the chatbot is in its closest resemblance to the final design in terms of details and functionality. Both chatbots were interacting and were designed using

high-fidelity.

2 Prior Work

Techbot is one of the many bots that is playing the role of an employee or a staff member. This is because the bots are rising and are in demand. Amber Dermoudy in October 2018 [2] has also stated that "Chatbots can be operational 365 days a year and 24 hours a day, allowing them to serve your customers even while you're sleeping or doing other tasks".

Techbot could characterize conversational intelligence. This means that the bot can effectively ask questions and be able to communicate and chat with the user to conclude the best suitable laptop for the user. Jain, Kumar et al in 2018 [3] has stated that "conversational Intelligence refers to the ability of a chatbot to effectively converse beyond the technical capability of achieving a conversational goal".

As Techbot has been shown to save customers time and allow them to decide the most suitable laptop, this increases the relationship between customers and the chatbot as they find the bots very beneficial. Purington et al. (2017) [4] claimed that some chatbot clients described the bot Alex as a family member or a friend even. This shows the bond that has been created between AI and humans.

3 Research Question and Hypothesis

Research Question: The research question for our study is regarding which mode of interactivity of the bot is well perceived by the user.

Hypothesis: Here is the hypothesis addressed in our study and the corresponding null hypothesis.

- **H1:** One bot will be more interactive to use than the other one.
- **H0:** One bot will NOT be more interactive to use than the other one.

4 Experiment Design

Conditions: In our experiments, there were two conditions that met our hypothesis. Subjects were asked to participate in one of the two conditions, which were a less chatty bot that asks for fewer requirements or the chattier bot which asks for more requirements of the laptops from the participants or the subject taking part in our experiment. Our study was a between-subject experiment in which participants were given only one condition to perform. Here, subjects were assigned alternatively/randomly to the conditions. By doing so, an almost equal number of subjects will be experimenting with conditions that will help in getting balanced data for both conditions.

The Task: In the experiment, first users were asked to fill in the consent form, which they had to accept for performing the experiment and further interact with the chatbot which will be assigned to them. After the consent form was accepted, participants were asked to fill in the pre-questionnaire form. In which they were asked questions related to their experience of buying a laptop and interacting with the chatbot which suggests a laptop to them. As there were two conditions participants were randomly assigned to one of the conditions, in which they interact with one chatbot. In the first condition, the chatbot was more interactive and the users had to interact with the chatbot using buttons, images, and other graphical characteristics. In this condition, users were also asked more questions about their requirements. Another feature that will be observed in this condition is that the users will receive more information on the laptops. Whereas in the second condition, the chatbot will be less interactive. This means users will interact using text. This also means that the participants will be given limited questions and limited information about the various categories of

laptops. After the subjects were done interacting with the chatbot, they were asked to fill the post questionnaire form.

Variables: There are two types of variables independent and dependent variables. In our study, independent variables will be the input methods used, which could either be text-based or buttons (Quantitative & Subjective). Another variable is the information provided to the user regarding the laptops (Quantitative & Subjective). However, the dependent variable that we will measure is the perceived friendliness and the general opinion on the easiness of the bot as measured and collected by our questionnaire (Quantitative & Subjective).

Confounding Variables: One of the confounding variables that we have measured is the prior use of a similar bot which was collected by the pre-questionnaire.

Questionaries: The type of questions that we will use in our questionnaire are non-leading, closed, and clear specific questions. The questionnaires that we are providing are going to be pre and post questionnaires. The pre-questionnaires provide information regarding the user's previous experiences with laptops. However, the post-questionnaire provides feedback after the user interacts with the chatbot.

5 Data Collection

The data for our study was collected as per the General Data Protection Regulation (GDPR). The personal data of the participants have not been taken for any purpose in our study. This makes the data collected Anonymous and Unlinked.

There was a total of 57 participants, which included: Females - 21, Males – 33 and Others – 3 (Graph 1). Our experiment was between subjects, where 29 participants were exposed to TechBot1 and 28 participants to TechBot2.

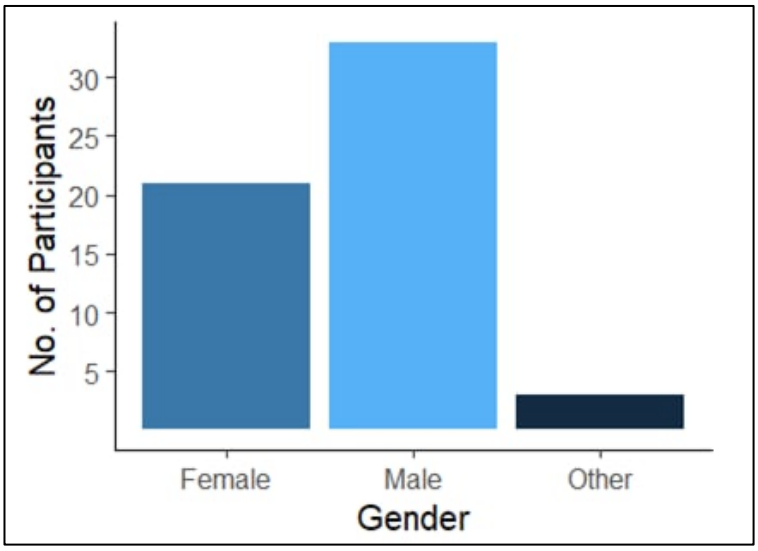


Figure 2 : Graph demonstrates the gender of participants.

6 Analysis

To address our research question, which was regarding the interactivity of the bot we took into account the dependent variables which were the friendliness and easiness of the bot.

Rating	Number of Responses	
	TechBot 1	TechBot 2
1	0	0
2	1	1
3	6	0
4	8	7
5	14	20

Figure 3: Rating of users on TechBot 1 and TechBot 2.

The above table shows the users overall ratings on both the bots. From this we can see that a majority of the participants agree that TechBot 2 is better than TechBot 1, which can be concluded from the number of people who gave the bot a rating of 5.

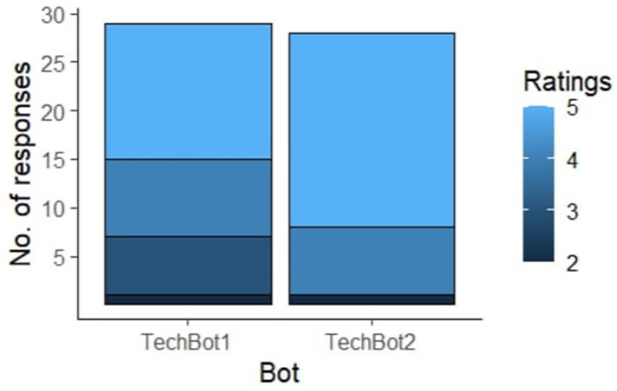


Figure 4: Rating of users on TechBot 1 and TechBot 2.

From the above graph, we can see that the number of people who gave a rating of 5 for the TechBot 2 is comparatively more than TechBot 1. Also, very few people have given TechBot 2 a rating below 3. Hence, we can conclude that the participants found TechBot 2 to be better.

The descriptive statistics is performed on one of the dependent variables which is the general opinion on the easiness of the bot. Participants that found TechBot1 was Extremely easy were 19, while TechBot2 was also Extremely easy for 25 participants.

The test which we picked for our study was the Wilcoxon test which is a non-parametric statistical hypothesis test. The reason behind selecting this test was because the data we have collected was non-parametric. Also, our data was ordinal. The p-value of our test turned out to be **0.04327325** and it is a significant difference. As the p-value is less than 0.05, we reject the null hypothesis of our study.

In our bot, during the conversation, the bot asks the question, “Do you have a preferred choice of a brand (please enter yes or no)?”. By asking this question, the bot is taking into consideration the users’ preferences on what they want. If the user responds to the question with a yes, our bot will then ask the question, “Please select the brand you prefer?” which displays a list of brands that are available. On the other hand, if the user doesn’t have

a specific category in their mind, then the bot will display results based on the other choices of the user.

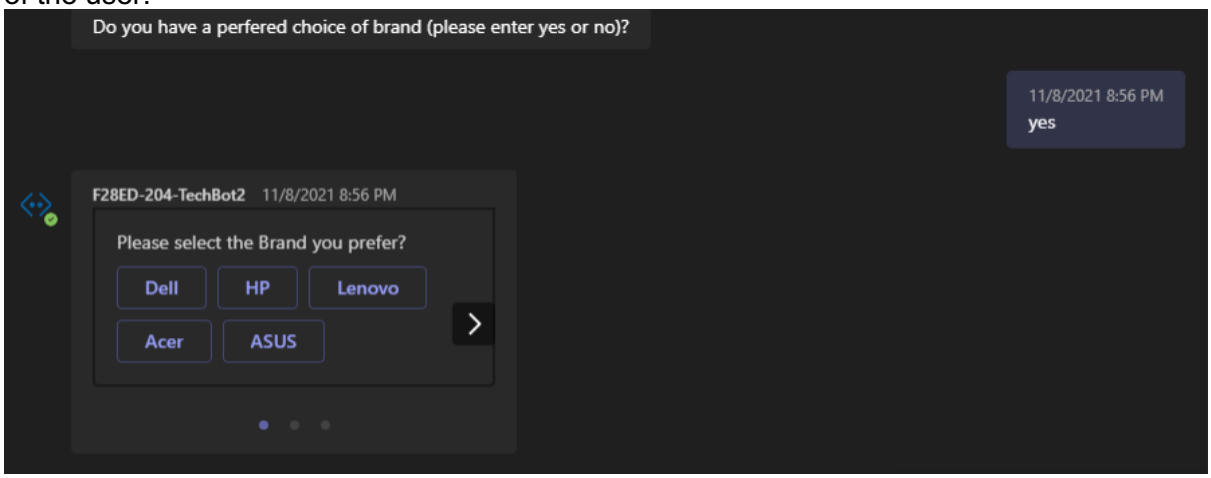


Figure 5: Sample interaction with TechBot.

One improvement that could be made in our bot is while displaying the results. We feel that displaying the images of the laptop along with technical specs would make it more reliable and help the user make a better choice of what they want. Another improvement that could be made is increasing our database. By doing so, we would be able to generate concise results and provide the user with better recommendations of laptops.

7 Conclusion

From our analysis based on the experiment, we can conclude that the TechBot 2 is more interactive than the TechBot 1, which can be seen from the user's response in the ratings. We feel that this is because Techbot 2 provides a more interactive layout where the users can easily figure out their choices. It also asks users more questions to give them better results. We have also provided the users with more information on the laptops, which could help them make a better decision.

The future work for this experiment could be making the chatbot more empathetic. By doing so, users would get the feel of talking to a human, which may help them convey their thoughts and requirements in a better way. Additional feedback from the participants to help improve our Techbot. This analysis may give further insight into how to achieve participant's satisfaction and more suggestions will assist in building up both bots. This will help users and companies have a moderate experience with Techbot.

8 References

[2] Amber, D. 'How Ai is changing the face of customer service', Entrepreneur Middle East, [online]. Available at: https://www.entrepreneur.com/article/321730 (Accessed: 2 December 2020)
[3] Available at: https://wwwtandfonlinecom.ezproxy1.hw.ac.uk/doi/full/10.1080/10447318.2020.1841438 (Accessed: 2 December 2020)
[4] Purington et al, 'How AI is changing the face of customer service', International Journal of Human-Computer Studies, [online]. Available at: https://www-sciencedirect-com.ezproxy1.hw.ac.uk/science/article/pii/S1071581921000197#bib0041 (Accessed: 2 December 2020)

9 Appendices

1. Experimental Plan

F28ED Technical Specifications Template
Group number: 204

1. Goals and Objectives

What do you want to get out of the experiment? What hypothesis are you testing (please write out your hypothesis clearly as a statement)?

The goal of this chatbot is a self-service UI that is available 24/7 to guide confused users to the most applicable choice that will fill their requirements. The hypothesis of this project is that one Bot will be more interactive to use than the other.

2. Participants

Who would you ideally want to test on? Who is your target user?

This chatbot is aimed at users who depend on using laptops for work, studies, gaming, or communication. Specially college or university students that will use laptops for studying or attending online classes. The target users of this chatbot are professional/technological computer programmers, youth or gamers which is the young generation.

3. Experiment Design

a. What are your conditions? How many will you have? In almost all cases, the answer will be two. If your hypothesis requires more than two conditions to test, please seek approval from the course instructors before submitting your experiment plan.

We will be having only two conditions in our chatbot, that will meet our hypothesis. The first condition is that the chatbot will be more interactive. In this condition, users will interact with buttons, images, and other graphical characteristics. In this condition, users will also be asked more questions about their requirements. Another feature that will be observed in this condition is that the users will receive more information on the laptops. The second condition is that the chatbot will be less interactive. This means users will interact using text. This also means that the participants will be given limited questions and limited information about the various categories of laptops.

b. Is your experiment between-subject or within-subject?

[Within-subject = one subject, two conditions;

Our experiment is between-subject because one user will be exposed to only one interface (one condition).

c. What are your independent and dependent variables?
[Independent variable = what you manipulate.
Dependent variable = what you are testing to see if it changes.]

Our independent variable will be the input methods used, which could either be text based or buttons (Quantitative & Subjective). Another variable is the information provided to the user regarding the laptops. (Quantitative & Subjective)
However, the dependent variable that we will measure is the perceived friendliness and the general opinion on the easiness of the bot as measured and collected by our questionnaire. (Quantitative & Subjective)

d. Randomization and ordering. How will you assign a subject to a condition? Think about what order you will give the subjects each condition. Why are you doing this?

In our experiment, each subject will be assigned a condition alternatively. By doing so, almost equal number of subjects will be experimenting both condition which will help in getting balanced data for both the conditions.

e. Is your experiment a controlled experiment- is there anything you need to think about that might influence the results? Is everything else the same? What are the confounding variables?
[Confounding variable = a variable that can influence your dependent variable and affect the results.]

One of the confounding variables that we have measured is the prior use of a similar bot which was collected by the pre-questionnaire.

f. What types of questionnaires/surveys will you give to the users and when? Provide the actual questionnaires in the separate Essay Box in the quiz.

The type of questions that we will use in our questionnaire are non-leading, closed, and clear specific questions.
The questionnaires that we are providing are going to be pre and post questionnaires. The pre-questionnaires provide information regarding the user's previous experiences with laptops. However, the post-questionnaire provides feedback after the user interacts with the chatbot.

4. Metrics

What metrics will you collect? For each, list whether they are quantitative or qualitative; and objective or subjective.

We will be collecting various metrics for the analysis. One of which is the interactivity of the bot, which is quantitative and objective. Another metric that will be used is the easiness in using the bot, users' satisfaction with the results, and the overall experience of user which will be quantitative subjective. And the last one is the user's suggestion for improvement and it will be qualitative subjective.

5. **Ethics:** is your experiment ethical? Does it place subjects in a difficult position or make them feel bad? Is deception involved (if so, describe how you will debrief participants)?

Yes, it is ethical. Participation is voluntary and participants can withdraw at any time. There will be no pressure to participate. We will not be collecting personal data nor sharing any data. It will also not be involving deception.

6. **Analysis**

What statistics will you do? Will you do descriptive and/or inferential stats? You must perform a statistical test to evaluate your hypothesis, but you may report on other statistics of interest.

We will be using descriptive statistics and inferential statistics in our project. The inferential statistical test is done to ensure whether the null hypothesis is accepted or rejected. The descriptive statistics we will be doing on our data is mode or median.

2. Ethics Approval Form

F28ED Ethics Approval Form for Expo Experiments

Students: Akshay Garg ag2006, Daniella Anwar daa16, Rajanssh Gadhvi rg2005, Sana Sajesh ss2033, Vidisha Jain vj2001

Title: TechBot

Supervisors: Ioannis Konstas/Theodoros Georgiou/Ryad Soobhany

1. Abstract

[Describe project briefly]

New technology is coming every day and many new laptops are released with new technologies. In this project, we are creating a chatbot that will recommend to users which laptop they can buy as per their requirements. The main purpose is to help the user choose which laptop suits their requirements the most.

2. Purpose of Study

[Briefly state the aim of the study and the methods to be used (e.g., user interface evaluation, online questionnaire, system performance, etc)]

Our aim is to help the users and navigate them to the most suitable laptop that will achieve their requirements.
We will be using multiple methods, including a set of carefully crafted questions, with clear specific questions and using intuitive scales.
Another method that will be implemented is heuristic evaluations which are a set of usability principles that will evaluate whether the chatbot elements conform to these tried and tested principles.

3. Does the research involve human subjects? (Y/N)

YES

4. Will personal data be collected? (Y/N)

NO

4a) If yes, will the information be anonymised and unlinked? (Y/N)
4b) Or will it be anonymised and linked? (Y/N)

5. **Will personal data be collected? (Y/N)**
   NO

Use of Human Participants

6. **Please outline the nature of the research involving human participants. Please detail why the research aims cannot be met with existing data.**

The nature of the research that we will involve in this project is using questionnaires. The questionnaires that we will be collecting are to help us get feedback from the participants about previous experiences they had with laptops or what they are looking for in our chatbot to fulfil their requirements.

7. **Are all participants to be recruited over 16, able to give informed consent, and have no known impediment that might affect their ability to participate in the study? (Y/N)**
   YES

8. **How long will participants have to decide whether to take part in the study?**

Five minutes

9. **Does the study involve actively deceiving participants? (Y/N)**
   NO

   If YES

   Detail the nature of the deception and why it is necessary to achieve the goals of the study.

   Detail how and when the deception will be explained to the participants.

10. **Will participants be using non-standard hardware, e.g., eye-trackers, development prototypes? (Y/N)**
    NO

    If YES

    Detail the nature of the hardware system to be used.

    Detail the task that participants will be asked to conduct with the hardware.

    Give details of safety measures used to protect participants.

Data Protection Compliance

11. **I confirm that**
    - All data will be stored on a HWU server

- No identifiable personal information will be presented in public or in any report
- Linked anonymised data will be linked so that the identifying codes will be kept in a secure locked cabinet or in a password protected file
- Linked anonymised data will only be retained for the duration of the consent granted by the participant and will be destroyed after February 2022
- External data and systems will be used within the licence terms specified

in accordance with GDPR legislation. (Y/N)
YES

Health and Safety Risk Assessment

12. I confirm that the project involves only standard IT equipment and exposes participants to no more hazards than a conventional office environment. (Y/N)

YES

Supervisor's comments:

Declarations

Group
I confirm that the above information is accurate and a true reflection of the intended study.
Name: 204
Date:
Supervisor
I, as supervisor of the above student group, have checked the above for accuracy and I am satisfied that the information provided is a true reflection of the intended study.
Name:
Date:

3. Consent Form

TechBot / GROUP NO. 204
Heriot-Watt University, Computer Science Department

Consent to Act as a Subject in an Experimental Study

Principal Investigator: Akshay Garg ag2006, Daniella Anwar daa16, Rajanssh Gadhvi rg2005, Sana Sajesh ss2033, Vidisha Jain vj2001

Description:
Various firms are releasing new laptops these days, and yet many people are unaware of this. Many people buy laptops and after that, they are not satisfied with their choice. Our chat bot, will help tackle the difficulty of choosing a laptop by asking the users their requirements and providing them with suitable recommendations. It will help users choose the latest and the most appropriate laptop for them.

There are minimal risks for you to participate in this study. All personal information will be kept in accordance with the provisions of the GDPR Data Protection Act. Your participation will not affect how well you do in your courses (if you are a student) or affect your relationship with the university in any way.

You are free to decline to participate in this study. Should you decide to participate, you are free to end your participation at any time. Such a decision by you will not adversely affect or alter you status with the university in any way.

Participation voluntary consent: I certify that I have read the preceding and that I understand its contents. My electronic signature below (for the purposes of this form, typing your name is sufficient) means that I have freely agreed to participate in this study.

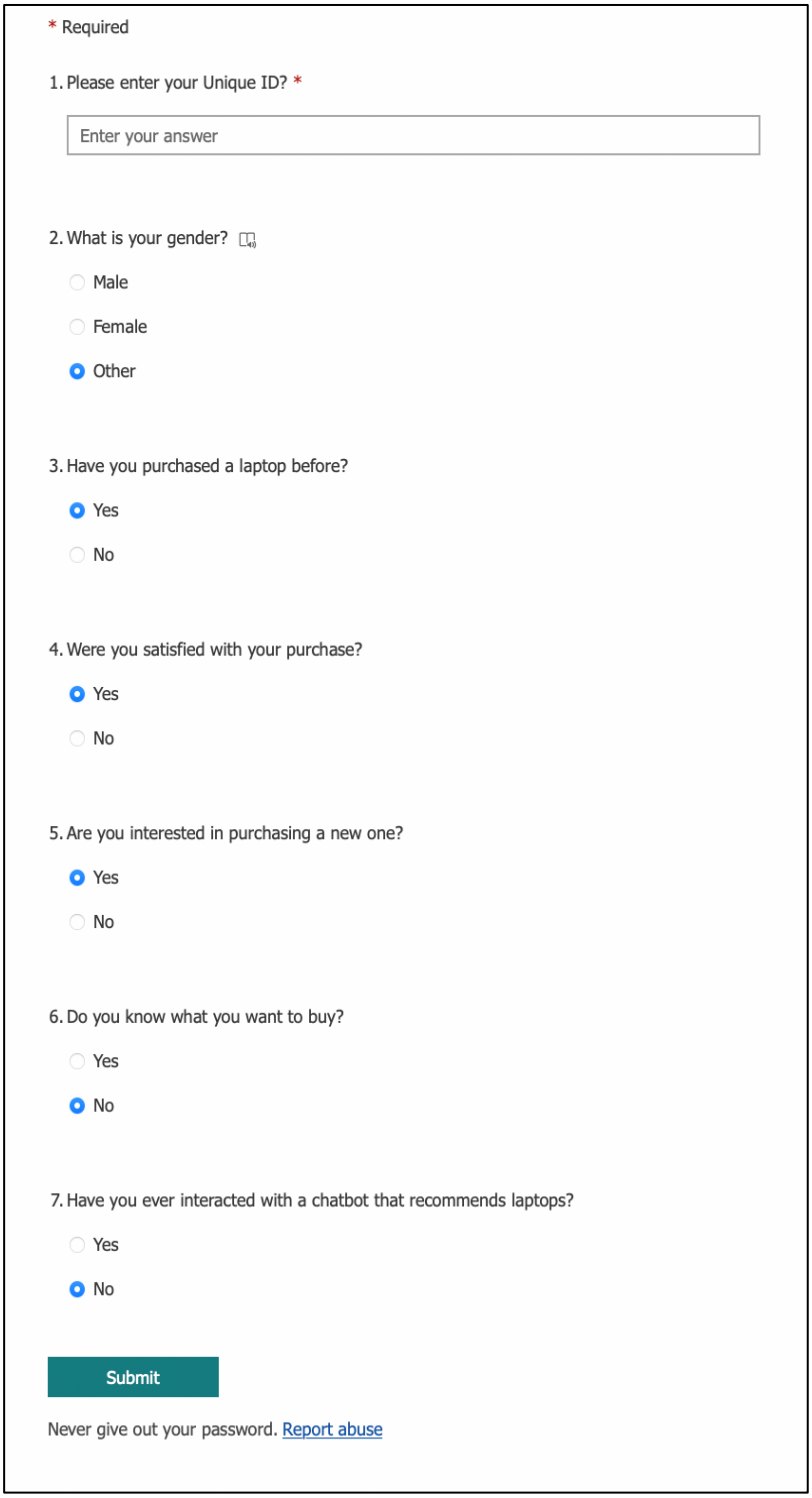
1. Do you consent to participate in this experiment? *

◯ Yes

Submit

4. Questionaries

Pre-Questionaries



* Required

1. Please enter your Unique ID? *

Enter your answer

2. What is your gender?

- Male
- Female
- Other

3. Have you purchased a laptop before?

- Yes
- No

4. Were you satisfied with your purchase?

- Yes
- No

5. Are you interested in purchasing a new one?

- Yes
- No

6. Do you know what you want to buy?

- Yes
- No

7. Have you ever interacted with a chatbot that recommends laptops?

- Yes
- No

Submit

Never give out your password. Report abuse

TechBot1 - Feedback Form

* Required

1. Please enter your Unique ID? *

Enter your answer

2. Were you able to decide which laptop you want to buy? *

- ◯ Yes
- ◯ No
- ◯ Not Sure

3. Were the recommendations as per your requirement? *

- ◯ Yes
- ◯ No
- ◯ Almost

4. Did you find the chatbot interactive? *

- ◯ Yes
- ◯ No

5. Have you used a similar chatbot before? *

- ◯ Yes
- ◯ No

6. How easy was it to use the bot? *

- ◯ Extremely easy
- ◯ Somewhat easy
- ◯ Neutral
- ◯ Somewhat not easy
- ◯ Extremely not easy

7. Rate your overall experience *

☆ ☆ ☆ ☆ ☆

8. Please give your suggestions to improve the bot

Enter your answer

Submit

TechBot2 - Feedback Form

* Required

1. Please enter your Unique ID? *

Enter your answer

2. Were you able to decide which laptop you want to buy? *

- Yes
- No
- Not Sure

3. Were the recommendations as per your requirement? *

- Yes
- No
- Almost

4. How satisfied were you with the amount of information provided by the bot? *

- Very satisfied
- Somewhat satisfied
- Neither satisfied nor dissatisfied
- Somewhat dissatisfied
- Very dissatisfied

5. Did you find the chatbot interactive? *

- Yes
- No

6. Have you used a similar chatbot before? *

- Yes
- No

7. How easy was it to use the bot? *

- Extremely easy
- Somewhat easy
- Neutral
- Somewhat not easy
- Extremely not easy

8. Rate your overall experience *

☆ ☆ ☆ ☆ ☆

9. Please give your suggestions to improve the bot

Enter your answer

Submit