

Pre-screening Survey:

1. What is your MTurk ID?

2. Are you proficient in English? **[Bold indicate eligibility criteria]**

- ☐ **Definitely yes**
- ☐ Probably yes
- ☐ Might or might not
- ☐ Probably not
- ☐ Definitely not

3. Do you use any smart IoT devices (e.g., smart thermostat, smart home camera, smart lightbulb, smart speakers such as Amazon Echo/Google Home) in your household? **[Bold indicate eligibility criteria]**

- ☐ **Yes**
- ☐ **No**
- ☐ I do not know what a smart IoT device is

4. (If Yes to #3) What type(s) of smart IoT devices do you use in your household?

Please select all that apply.

- ☐ Smart thermostat
- ☐ Smart speaker with a voice assistant (e.g., Google Home, Amazon Alexa)
- ☐ Smart toothbrush
- ☐ Indoor smart home security camera
- ☐ Smart doorbell camera
- ☐ Smart lightbulb with motion sensor
- ☐ Smart smoke detector
- ☐ Smartwatch
- ☐ Smart TV
- ☐ Smart lock
- ☐ Smart switch
- ☐ Smart plug
- ☐ Others (Please specify)

5. Do you wish/plan to purchase any IoT devices for your household in the future?

- ☐ Yes
- ☐ No

6. (If Yes to #5) What type(s) of smart IoT devices do you wish/plan to purchase for your household in the future?

Please select all that apply.

- ☐ Smart thermostat
- ☐ Smart speaker with a voice assistant (e.g., Google Home, Amazon Alexa)

- ☐ Smart toothbrush
- ☐ Indoor smart home security camera
- ☐ Smart doorbell camera
- ☐ Smart lightbulb with motion sensor
- ☐ Smart smoke detector
- ☐ Smartwatch
- ☐ Smart TV
- ☐ Smart lock
- ☐ Smart switch
- ☐ Smart plug
- ☐ Others (Please specify)

Main Survey.

1. **Technical Knowledge of Privacy Tools Scale (TKPTS)** – *Collected from [1]*

2. **Technology Trusting Belief Scale (7-point Likert (Strongly disagree – 1 to Strongly agree - 7))** – *Collected and adapted from [2]*

Please rate each statement to indicate the extent to which you agree or disagree with that statement.

Integrity

1. IoT manufacturers are truthful in their dealings with me.
2. IoT manufacturers can be characterized as honest.
3. IoT manufacturers keep their commitments.

Competence

1. IoT manufacturers are competent and effective in manufacturing IoT devices that fulfill my expectations and needs.
2. IoT manufacturers perform their role of manufacturing IoT devices that fulfill my expectations and needs.
3. IoT manufacturers are capable and proficient in manufacturing the IoT devices that fulfill my expectations and needs.

Benevolence

1. IoT manufacturers act in my best interest.
2. IoT manufacturers do their best to help me if I need help.
3. IoT manufacturers are interested in my well-being, not just their own.
4. Please select “Strongly disagree” for this statement. **[AC1]**

3. Introduction of Data Management Plans:

This study is being performed to explore the understandability of different features of a data management plan that an IoT manufacturer is considering to offer with the purchase of an IoT device. The name of the IoT manufacturer will not be disclosed due to the anonymity requirement. As data management is a core requirement for any IoT device, the IoT manufacturer is considering two types of data management plans that consumers can choose from.

The **basic data management plan** includes functionality related to cloud data management and will be offered without any additional fee.

The **premium data management plan** includes additional functionality related to data collection and sharing preferences and users will **require to pay an additional yearly fee (yet to be decided) to purchase the premium plan. This fee is in addition to the purchase price of the device.**

The feature comparison chart below provides details for both plans including what features they offer.

| Features | Basic data management plan (free and included with the device price) | Premium data management plan (purchased separately) |
|--|--|---|
| Cloud data management: <ul style="list-style-type: none">• Automatic cloud data backup• Free cloud storage of 2 TB• View and download cloud data from anywhere | ✓ | ✓ |
| Control over cloud data: <ul style="list-style-type: none">• Option to delete data stored in the cloud | | ✓ |
| Control over data sharing: <ul style="list-style-type: none">• Option to opt-out from third-party data sharing by the IoT manufacturer | | ✓ |
| Control over data usage: <ul style="list-style-type: none">• Option to limit the IoT manufacturer from using collected data for any purposes other than for the purpose of device functionality | | ✓ |

Please take your time to review both options as we will be asking multiple questions related to your understanding of both plans and the features in the next sections.

4. Attention Check Questionnaire:

[Participants will have to answer the following questions correctly before they can move to the next section]

1. Which data management plan(s) offer the “*View and download cloud data from anywhere*” option?

- ☐ Basic data management plan
- ☐ Premium data management plan
- ☐ Both plans
- ☐ I am not sure

2. Which data management plan(s) offer the “*Option to opt-out from third-party data sharing*” option?

- ☐ Basic data management plan
- ☐ Premium data management plan
- ☐ Both plans
- ☐ I am not sure

3. Which data management plan(s) offer the “*Option to delete data stored in the cloud*” option?

- ☐ Basic data management plan
- ☐ Premium data management plan
- ☐ Both plans
- ☐ I am not sure

4. Which data management plan(s) offer the “*Option to limit the IoT manufacturer from using collected data for any purposes other than for the purpose of device functionality*” option?

- ☐ Basic data management plan
- ☐ Premium data management plan
- ☐ Both plans
- ☐ I am not sure

5. Which data management plan(s) offer the “*Automatic cloud data backup*” option?

- ☐ Basic data management plan
- ☐ Premium data management plan
- ☐ Both plans
- ☐ I am not sure

5. Optimal Price Point Questions (Van Westendorp's Price Sensitivity Questions)

Yearly-subscription fee – HR group. smart device: indoor smart home security camera

Imagine that there were reports of multiple recent break-ins in your neighborhood and you decided to buy a \$30 indoor smart home security camera to monitor the inside of your home (similar to the one shown in the image below). This camera can automatically record videos and send notifications to your phone when it detects movement.



Along with the camera, the IoT device manufacturer is considering to offer a premium data management plan **for a yearly subscription fee. We are doing a market research study to determine the price that users might be willing to pay for such a data management service.**

The same feature comparison chart for both data management plans are shown below one more time for you to compare the plans.

| Features | Basic data management plan (free and included with the device price) | Premium data management plan (purchased separately) |
|--|--|---|
| Cloud data management: <ul style="list-style-type: none"> Automatic cloud data backup Free cloud storage of 2 TB View and download cloud data from anywhere | ✓ | ✓ |
| Control over cloud data: <ul style="list-style-type: none"> Option to delete data stored in the cloud | | ✓ |
| Control over data sharing: <ul style="list-style-type: none"> Option to opt-out from third-party data sharing by the IoT manufacturer | | ✓ |
| Control over data usage: <ul style="list-style-type: none"> Option to limit the IoT manufacturer from using collected data for any purposes other than for the purpose of device functionality | | ✓ |

Please answer the following questions by reviewing the table and the features included in the data management plans. **While answering the questions, keep in mind that the price of the indoor smart home security camera itself is \$30, and the basic plan is included in that price.**

Price sensitivity Questions:

1. At what price would you begin to think that the yearly subscription fee of the premium data management plan is **so cheap** that you would question the quality of the service and not consider it (in USD \$)? [Text entry]
2. At what price would you begin to think that the yearly subscription fee of the premium data management plan is a **bargain** - a great buy for the money (in USD \$)? [Text entry]
3. At what price would you begin to think that the yearly subscription fee of the premium data management plan is **getting expensive**, but you still might consider it (in USD \$)? [Text entry]
4. At what price would you begin to think that the yearly subscription fee of the premium data management plan is **too expensive** to consider it (in USD \$)? [Text entry]

Likelihood to choose the premium plan:

1. How likely are you to choose the premium data management plan over the basic plan at the time of purchasing the indoor smart home security camera? (5-point Likert scale: Extremely unlikely – 1 to Extremely likely – 5)

Yearly-subscription fee – LR group. smart device: smart lightbulb with motion sensor

Imagine that there were reports of multiple recent break-ins in your neighborhood and you decided to buy a \$30 smart lightbulb with motion sensor to monitor the inside of your home (similar to the one shown in the image below). This lightbulb can automatically turn on and send notifications to your phone when it detects movement.



Along with the lightbulb, the IoT device manufacturer is considering to offer a premium data management plan **for a yearly subscription fee. We are doing a market research study to determine the price that users might be willing to pay for such a data management service.**

The same feature comparison chart for both data management plans are shown below one more time for you to compare the plans.

| Features | Basic data management plan (free and included with the device price) | Premium data management plan (purchased separately) |
|--|--|---|
| Cloud data management: <ul style="list-style-type: none"> Automatic cloud data backup Free cloud storage of 2 TB View and download cloud data from anywhere | ✓ | ✓ |
| Control over cloud data: <ul style="list-style-type: none"> Option to delete data stored in the cloud | | ✓ |
| Control over data sharing: <ul style="list-style-type: none"> Option to opt-out from third-party data sharing by the IoT manufacturer | | ✓ |
| Control over data usage: <ul style="list-style-type: none"> Option to limit the IoT manufacturer from using collected data for any purposes other than for the purpose of device functionality | | ✓ |

Please answer the following questions by reviewing the table and the features included in the data management plans. **While answering the questions, keep in mind that the price of the smart lightbulb with motion sensor itself is \$30, and the basic plan is included in that price.**

Price sensitivity Questions:

1. At what price would you begin to think that the yearly subscription fee of the premium data management plan is **so cheap** that you would question the quality of the service and not consider it (in USD \$)? [Text entry]
2. At what price would you begin to think that the yearly subscription fee of the premium data management plan is a **bargain** - a great buy for the money (in USD \$)? [Text entry]
3. At what price would you begin to think that the yearly subscription fee of the premium data management plan is **getting expensive**, but you still might consider it (in USD \$)? [Text entry]
4. At what price would you begin to think that the yearly subscription fee of the premium data management plan is **too expensive** to consider it (in USD \$)? [Text entry]

Likelihood to choose the premium plan:

1. How likely are you to choose the premium data management plan over the basic plan at the time of purchasing the smart lightbulb with motion sensor? (5-point Likert scale: Extremely unlikely – 1 to Extremely likely – 5)

6. Manipulation Check Questions (smart device: indoor smart home security camera for HR group; smart lightbulb with motion sensor for LR group)

1. What type of smart device were you asked to consider while answering the price points for the premium data management plan?
 - ☐ Smart thermostat
 - ☐ Smart speaker with a voice assistant
 - ☐ Smart toothbrush
 - ☐ Indoor smart home security camera
 - ☐ Smart lightbulb with motion sensor
 - ☐ Smart smoke detector
 - ☐ Smart plugs
 - ☐ I am not sure

2. What was the price of the IoT device that you were asked to consider while answering the price points for the premium data management plan?
 - ☐ \$10
 - ☐ \$20
 - ☐ \$30
 - ☐ \$40
 - ☐ \$50
 - ☐ \$60
 - ☐ I am not sure

3. On a scale of 0 to 10, how sensitive do you think the data collected and stored by a <smart_device> is? **0: Not at all sensitive; 10: Extremely sensitive. [Slider options]**

7. Understandability of Data Management Questionnaire:

Feature 1: Cloud data management

As a reminder, the IoT manufacturer is considering to offer the following feature as part of both the basic and the premium plan:

Cloud data management:

- Automatic cloud data backup
- Free cloud storage of 2 TB
- View and download cloud data from anywhere

1. Which of the following(s) are implied based on the description (highlighted text) of the above feature? Please indicate True/False. **If you are not completely sure about any of the statements, please use your best judgement to indicate your answer.**

| Statement | True | False |
|--|------|-------|
| Data collected by the sensors of the IoT device will be uploaded to cloud without any user intervention and prompt | √ | |
| The IoT device requires an active internet connection to upload data to cloud | √ | |
| Cloud storage of 2TB is free without any additional charge | √ | |
| If users want more than 2TB storage, they have to pay for the additional storage | √ | |
| Users can view and download the data stored on the cloud | √ | |
| Users can delete the data stored on the cloud | | √ |

[The following content will be changed based on users correct answers in the above questions where X indicate number of correct answers]

["Your answer" and "Score" columns are generated based on participant's answer, where, 1 in the "Score" column indicates correct answer and 0 in the "Score" column indicates wrong answer]

You answered **X of the 6** statements correctly that are implied by the below feature description.

Cloud data management:

- Automatic cloud data backup
- Free cloud storage of 2 TB
- View and download cloud data from anywhere

Please review the items you answered incorrectly below (0 in the Score column).

| Statement | Correct Answer | Your Answer | Score |
|--|----------------|-------------|-------|
| Data collected by the sensors of the IoT device will be uploaded to cloud without any user intervention and prompt | True | | |
| The IoT device requires an active internet connection to upload data to cloud | True | | |
| Cloud storage of 2TB is free without any additional charge | True | | |
| If users want more than 2TB storage, they have to pay for the additional storage | True | | |
| Users can view and download the data stored on the cloud | True | | |
| Users can delete the data stored on the cloud | False | | |

2. Please briefly explain what additional information you think should have been included (if any) in the following feature description to enhance clarity in terms of the feature's implications.

Cloud data management:

- Automatic cloud data backup
- Free cloud storage of 2 TB
- View and download cloud data from anywhere

Feature 2: Cloud control

As a reminder, the IoT manufacturer is considering to offer the following feature as part of the premium plan:

Control over cloud data:

- Option to delete data stored in the cloud

1. Which of the following(s) are implied based on the description (highlighted text) of the above feature? Please indicate True/False. **If you are not completely sure about any of the statements, please use your best judgement to indicate your answer.**

| Statement | True | False |
|---|------|-------|
| Data uploaded to the cloud will be deleted automatically after a certain retention period | | √ |
| Users will have the option to delete data uploaded in the cloud | √ | |
| Deleting cloud data will stop device data collection | | √ |
| Deleting cloud data will stop data upload to the cloud | | √ |
| Please select “False” for this statement [AC2] | | |

[The following content will be changed based on users correct answers in the above questions where X indicate number of correct answers]

[“Your answer” and “Score” columns are generated based on participant’s answer, where, 1 in the “Score” column indicates correct answer and 0 in the “Score” column indicates wrong answer]

You answered **X of the 4** statements correctly that are implied by the below feature description.

Control over cloud data:

- Option to delete data stored in the cloud

Please review the items you answered incorrectly below (0 in the Score column).

| Statement | Correct Answer | Your Answer | Score |
|---|----------------|-------------|-------|
| Data uploaded to the cloud will be deleted automatically after a certain retention period | False | | |
| Users will have the option to delete data uploaded in the cloud | True | | |
| Deleting cloud data will stop device data collection | False | | |
| Deleting cloud data will stop data upload to the cloud | False | | |

2. Please briefly explain what additional information you think should have been included (if any) in the following feature description to enhance clarity in terms of the feature's implications.

Control over cloud data:

- Option to delete data stored in the cloud

Feature 3: Data sharing

As a reminder, the IoT manufacturer is considering to offer the following feature as part of the premium plan:

Control over data sharing:

- Option to opt-out from third-party data sharing by the IoT manufacturer

1. Which of the following(s) are implied based on the description (highlighted text) of the above feature? Please indicate True/False. **If you are not completely sure about any of the statements, please use your best judgement to indicate your answer.**

| Statement | True | False |
|---|------|-------|
| Users will have the option to restrict third-party data sharing | √ | |
| Data sharing with third-party will be restricted by default | | √ |
| If a user opts out from third-party data sharing, the IoT device will stop collecting and storing data | | √ |
| If a user opts out from third-party data sharing, the IoT manufacturer will not have access to the collected data | | √ |
| If a user opts out from third-party data sharing, the IoT manufacturer will not share the collected data with third parties | √ | |

[The following content will be changed based on users correct answers in the above questions where X indicate number of correct answers]

["Your answer" and "Score" columns are generated based on participant's answer, where, 1 in the "Score" column indicates correct answer and 0 in the "Score" column indicates wrong answer]

You answered **X of the 5** statements correctly that are implied by the below feature description.

Control over data sharing:

- Option to opt-out from third-party data sharing by the IoT manufacturer

Please review the items you answered incorrectly below (0 in the Score column).

| Statement | Correct Answer | Your Answer | Score |
|---|----------------|-------------|-------|
| Users will have the option to restrict third-party data sharing | True | | |
| Data sharing with third-party will be restricted by default | False | | |
| If a user opts out from third-party data sharing, the IoT device will stop collecting and storing data | False | | |
| If a user opts out from third-party data sharing, the IoT manufacturer will not have access to the collected data | False | | |
| If a user opts out from third-party data sharing, the IoT manufacturer will not share the collected data with third parties | True | | |

2. Please briefly explain what additional information you think should have been included (if any) in the following feature description to enhance clarity in terms of the feature's implications.

Control over data sharing:

- Option to opt-out from third-party data sharing by the IoT manufacturer

Feature 4: Data usage

As a reminder, the IoT manufacturer is considering to offer the following feature as part of the premium plan:

Control over data usage:

- Option to limit the IoT manufacturer from using collected data for any purposes other than for the purpose of device functionality.

1. Which of the following(s) are implied based on the description (highlighted text) of the above feature? Please indicate True/False. **If you are not completely sure about any of the statements, please use your best judgement to indicate your answer.**

| Statement | True | False |
|---|------|-------|
| Users will have the option to limit data usage for the purpose of providing personalized services | √ | |
| Data usage for the purpose of providing personalized services will be restricted by default | | √ |
| Data usage that is required to keep the device functional cannot be restricted/limited | √ | |
| Restricting data usage for personalized services will stop device data collection | | √ |
| Restricting data usage for personalized services will stop data upload to the cloud | | √ |
| Please select “True” for this statement [AC3] | | |

[The following content will be changed based on users correct answers in the above questions where X indicate number of correct answers]

[“Your answer” and “Score” columns are generated based on participant’s answer, where, 1 in the “Score” column indicates correct answer and 0 in the “Score” column indicates wrong answer]

You answered **X of the 5** statements correctly that are implied by the below feature description.

Control over data usage:

- Option to limit the IoT manufacturer from using collected data for any purposes other than for the purpose of device functionality.

Please review the items you answered incorrectly below (0 in the Score column).

| Statement | Correct Answer | Your Answer | Score |
|---|----------------|-------------|-------|
| Users will have the option to limit data usage for the purpose of providing personalized services | True | | |
| Data usage for the purpose of providing personalized services will be restricted by default | False | | |
| Data usage that is required to keep the device functional cannot be restricted/limited | True | | |
| Restricting data usage for personalized services will stop device data collection | False | | |
| Restricting data usage for personalized services will stop data upload to the cloud | False | | |

2. Please briefly explain what additional information you think should have been included (if any) in the following feature description to enhance clarity in terms of the feature's implications.

Control over data usage:

- Option to limit the IoT manufacturer from using collected data for any purposes other than for the purpose of device functionality.

8. Trust perception to the Study's IoT manufacturer

In this survey, we did not disclose the name of the IoT manufacturer due to the anonymity requirement. **Despite not knowing who the IoT manufacturer is, solely based on your interaction with the survey and the survey questions**, please indicate your perception of this IoT manufacturer by answering the following question.

1. I believe the survey's IoT manufacturer would be –
 - Much less trustworthy than average IoT manufacturers
 - Somewhat less trustworthy than average IoT manufacturers
 - About the same trustworthy as average IoT manufacturers
 - Somewhat more trustworthy than average IoT manufacturers
 - Much more trustworthy than average IoT manufacturers
2. (If participant's answer is either "Much less trustworthy than average IoT manufacturers" or "Somewhat less trustworthy than average IoT manufacturers") Please briefly mention why you believe the survey's IoT manufacturer would be less trustworthy compared to average IoT manufacturers.
3. (If participant's answer is either "Much more trustworthy than average IoT manufacturers" or "Somewhat more trustworthy than average IoT manufacturers") Please briefly mention why you believe the survey's IoT manufacturer would be more trustworthy compared to average IoT manufacturers.

9. Demographic Questions:

1. What is your age (in years)?

2. What is your gender?

- ☐ Woman
- ☐ Man
- ☐ Non-binary
- ☐ Prefer not to disclose
- ☐ Prefer to self-describe _____

3. What is the highest level of education you have received?

- ☐ Less than high school
- ☐ High School graduate or GED
- ☐ Some College
- ☐ 2-year degree
- ☐ 4-year degree
- ☐ Master's degree
- ☐ Doctoral degree
- ☐ Professional degree

4. Which of these describes your personal income last year?

- ☐ \$0
- ☐ \$1 to \$9,999
- ☐ \$10,000 to \$24,999
- ☐ \$25,000 to 49,999
- ☐ \$50,000 to 74,999
- ☐ \$75,000 to 99,999
- ☐ \$100,000 to 149,999
- ☐ \$150,000 and greater
- ☐ Prefer not to answer

5. Do you have any other comments or feedback about the study? If not, please type or copy the text in quotation exactly as it is: "NO COMMENTS".

References

- [1] Kang, R., Dabbish, L., Fruchter, N., & Kiesler, S. (2015). {"My"} Data Just Goes {"Everywhere:"} User Mental Models of the Internet and Implications for Privacy and Security. In *Eleventh symposium on usable privacy and security (SOUPS 2015)* (pp. 39-52).
- [2] McKnight, D. H., Choudhury, V., & Kacmar, C. (2002). Developing and validating trust measures for e-commerce: An integrative typology. *Information systems research*, 13(3), 334-359.