Consent

Consent for Participation in a Research Study

Study Title: Helping Users Write Complex Trigger-Action Programs

Principal Investigator: Blase Ur

Student Researchers: Abhimanyu Deora, Jason Vallee

IRB Study Number: IRB17-0621

DESCRIPTION: We are researchers at the University of Chicago doing a research study about helping users without prior programming experience write

rules that govern the behavior of Internet-connected devices they might own in the future. We will present you with an interface to write rules and ask you

to write rules to complete 7 tasks, in addition to answering questions about your completion of each task. The study will end with demographics questions.

Mechanical Turk workers who are age 18+, live in the United States, and have completed 100+ HITs with a 95%+ approval rating are eligible. Participation

should take about 1 hour.

RISKS and BENEFITS: The risks to your participation in this online study are those associated with basic computer tasks, including boredom, fatigue, mild

stress, or breach of confidentiality. The only benefit to you is the learning experience from participating in a research study. The benefit to society is the

contribution to scientific knowledge.

COMPENSATION: All participants who complete all tasks will be compensated $10.00 through Mechanical Turk. Participants who do not complete all

tasks will not be compensated.
PLEASE NOTE: This study contains a number of checks to make sure that participants are finishing the tasks honestly and completely. As

long as you read the instructions and complete the tasks, your HIT will be approved. If you fail these checks, your HIT will be rejected.

CONFIDENTIALITY: Your Mechanical Turk Worker ID will be used to distribute payment to you but will not be stored with the research data we collect from

you. Please be aware that your MTurk Worker ID can potentially be linked to information about you on your Amazon public profile page, depending on the

settings you have for your Amazon profile. We will not be accessing any personally identifying information about you that you may have put on your

Amazon public profile page.

Any reports and presentations about the findings from this study will not include your name or any other information that could identify you. We may share

the data we collect in this study with other researchers doing future studies – if we share your data, we will not include information that could identify you.

SUBJECT'S RIGHTS: Your participation is voluntary. You may stop participating at any time by closing the browser window or the program to withdraw

from the study. Partial data will not be analyzed.
For additional questions about this research, you may contact:

• Blase Ur, Assistant Professor, Department of Computer Science, University of Chicago. blase@uchicago.edu or (773)834-3034

For questions about your rights as a research participant, you may contact:

- The Social & Behavioral Sciences Institutional Review Board, University of Chicago   Phone: (773) 834-7835; E-mail: sbs-irb@uchicago.edu

Please indicate, in the boxes below, that you are at least 18 years old, have read and understood this consent form and agree to participate in this online research study.

	Yes	No
I am at least 18 years old.	○	○
I have read and understand this consent form.	○	○
I agree to participate in this online study.	○	○

May we release your (anonymous) survey responses as part of a public research dataset? [optional]

○ Yes   ○ No

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I am at least 18 years old.	○	○
I have read and understand this consent form.	○	○
I agree to participate in this online study.	○	○

May we release your (anonymous) survey responses as part of a public research dataset? [optional]

○ Yes   ○ No

Introduction

As 'smart devices' become more prevalent and more popular, consumers will need ways to tell their devices and services what they want them to do. One popular way of telling devices and services what to do is by writing graphical **rules**.

A rule is a statement that follows the format of **"IF [This] THEN [That]"**. For example, "IF I begin to cook, THEN have my music player start playing my favorite playlist". Or, "IF my oven reaches 600 °F, THEN turn it off". We will explain more about rules later in the tutorial.

In this study, you will be given 7 different tasks that you wish to tell some Internet-connected devices to accomplish. To do this, you will be provided with an interface that lets you create graphical rules for controlling different devices and services. You may create as many rules as you feel you need in order to complete each task.

NOTE: For each task, **all** the rules that you create will be applied to the device, which means your device will exhibit the behavior of **all** the rules you created.

We will present a brief tutorial in two parts. The first part will help you understand how these graphical rules function. At the end of this part of the tutorial, we will ask you to answer a few questions to make sure you understand. **Incorrectly answering the questions during the tutorial may automatically disqualify you from continuing the study.**

The second part of the tutorial will then instruct you in using the provided interface to create graphical rules in the specified format.

As 'smart devices' become more prevalent and more popular, consumers will need ways to tell their devices and services what they want them to do. One way of telling devices and services what to do is by writing **properties**.

A property is something that a system can **always/never** do. For example, "My smart

music player should always play my favorite playlist when I'm cooking". Or, "My smart oven should never be set to more than 600 °F". We will explain more about properties later in the tutorial.

In this study, you will be given 7 different tasks that you wish to tell some internet-connected devices to accomplish. To do this, you will be provided with an interface that lets you create properties for controlling different devices and services. You may create as many properties as you feel you need in order to complete each task.

NOTE: For each task, **all** the properties that you create will be applied to the device, which means your device will exhibit the behavior of **all** the properties you created.

We will present a brief tutorial in two parts. The first part will help you understand how these safety properties function. At the end of this part of the tutorial, we will ask you to answer a few questions to make sure you understand. **Incorrectly answering the questions during the tutorial may automatically disqualify you from continuing the study.**

The second part of the tutorial will then instruct you in using the provided interface to create properties in the specified format.

Tutorial - E&S - Intro

Before we dive into our new interface, we have to define the terms "state" and "event" first.

A **state** is the status of a device that can be true over a period of time.
An **event** is the moment the state of a device changes.

Some examples are as follows.

Event	State
The light turns red.	The light is red.
The music player starts playing *Despacito*.	The music player is playing *Despacito*.
I arrive at home.	I'm at home.
The door becomes locked. *	The door is currently locked. *

*: Because "The door is locked" can be interpreted as an event and a state at the same time, we are going to use the terms "becomes" and "currently" to distinguish them.

We are going to present you with some sentences on the next page, please indicate if you think that sentence is a state or an event.

Tutorial - E&S - Test

${lm://Field/1}

○ It's a state.
○ It's an event.
○ I'm not sure.

Sorry, the statement "${lm://Field/1}" is ${lm://Field/2}.

IFTTT_Study2_Tutorial_E&S_Test

${lm://Field/1}

○ It's a state.
○ It's an event.
○ I'm not sure.

Sorry, the statement "${lm://Field/1}" is ${lm://Field/2}.

Tutorial

Each of the rules you create today will be in the same trigger-action format as the following example:

IF
It starts to rain
THEN

Turn the kitchen lights blue

We refer to the entire diagram you see above as a **rule**. A rule combines one IF with one THEN. We call "it starts to rain" a **trigger** because when it occurs, the rule will be triggered (will run). The trigger occurring causes the **action** specified by the rule to occur. In this case, the action is "turn the kitchen lights blue."

IMPORTANT: Every trigger you see in this study will be an event that effectively takes place in an instant. In addition, every action you see in this study will also be an event that effectively starts in an instant, even though it may take some time for the event to complete (e.g., brewing coffee for you).

It's also possible to add more conditions to a rule. For example:

IF
It starts to rain
WHILE
I am currently away from home
THEN
Turn the kitchen lights yellow

Note that the first part of the trigger, "it starts to rain," is an event that effectively takes place in an instant. However, the second part of the trigger, "I am currently away from home," is a state that is either true or false over a period of time, rather than just at an instant. Whenever the event occurs, the system checks whether any states are also true. If, and only if, all of the states are true when the event occurs, the action will occur.

Having states as part of the trigger is optional. Each trigger must contain **exactly one event**, but it can also contain **any number of state** triggers. The event and first state trigger, if any, are separated by "while," while all subsequent state triggers are separated from each other by "and."

Each of the safety properties you create today will be in the similar format as the following examples:

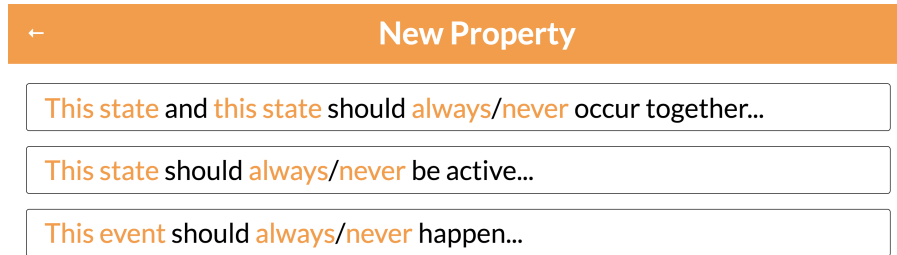The color of my smart light s**hould never** be red.

Or:

The color of my smart light **should always** be red.

We refer to the entire diagram you see above as a **property**. A property is a statement

that describes something that should always/never happen.
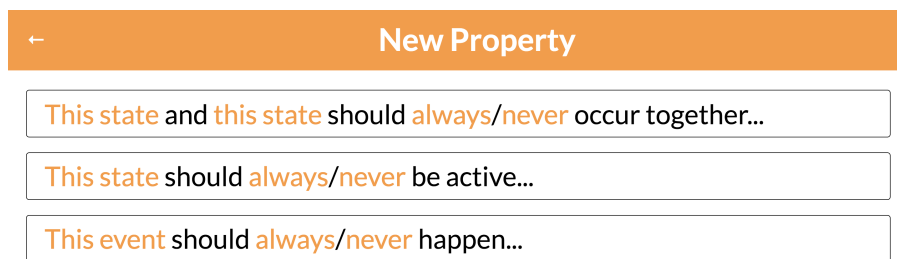
Now let's add some twists to it.

We'll present you with three options first (Fig. 1). Each option will take you to different templates that give you different capabilities to express the property you want to enforce.

← New Property
This state and this state should always/never occur together...
This state should always/never be active...
This event should always/never happen...

Fig. 1 The interface that shows up after you click the "Add a new Property" button.

← New Property
This state and this state should always/never occur together...
This state should always/never be active...
This event should always/never happen...

The first option is "This and That should always/never occur together". The "This" and "That" keywords both represent states, given that it's hard for two events to happen at the exact same time. For example:

My smart door is open **and** I'm not at home **should never occur together.**

Another example that uses "always" is as follows:

My stove is on **and** my ventilator is on should always occur together.

This property makes sure that whenever your stove or your ventilator is on, the other subject will be on as well. **In addition, with this property enabled, whenever your stove or your ventilator is off, the other subject will be off at the same time.**

The property can be more complex, involving more than two states. For example:

My faucet is running **and** my dishwasher is running **and** my washing machine is running

should never occur together.

This property makes sure that there are at most two machines using water at the same time.

←	New Property

This state and this state should always/never occur together...
This state should always/never be active...
This event should always/never happen...

The second option is **"This state should always/never be active..."**, in which you can specify a desired or undesired state. There are four variations under this category.

←	Configure Property

This state should always/never be active
This state should always/never be active for more than this long
This state should always/never be active while that
This state should always/never be active for more than this long while that

1. The first option is the simplest. One example could be:

My music player's volume is below 70 **should always be active**.

2. The second option let you be able to specify how long the state can last. For example:

My music player is on should never be active **fo**r 12 hours.

3. By selecting **the third option**, you can add **conditions** about when the state should always or never be active. For example:

My music player is on should never be active **while** it's nighttime.

You can add any number of states after this one. A two-state example is as follows:

The light is on should always be active **while** a family member is in the living room **and** it's night time.

4. If you'd like to use both of these two conditions at the same time, **the fourth option** is the right choice. For example:

<u>My music player is on</u> should never be active **for** <u>1 hour</u> **while** <u>it's nighttime</u>.

←	New Property

This state and this state should always/never occur together...

This state should always/never be active...

This event should always/never happen...

The third option is **"This event should always/never happen..."**, in which you can specify a desired or undesired event. For example:

My light **should never** turn red.

There are two variations of this format.

1. If you'd like to say an event should never happen when it's in some state, you can specify your desired safety property as follows:

<u>My light turns red</u> should never happen **while** <u>it's nighttim</u>e.

2. If you'd like to say an event should always/never follow another event, you can specify your desired safety property as follows:

<u>My front door closes</u> should always happen **within** <u>5 seconds</u> **after** <u>I enter the front door</u>.

Tutorial - Test

Which option should you pick if you want to say: ${lm://Field/1} ?

○ This and That should always/never occur together...
○ This state should always/never be active...
○ This event should always/never happen...

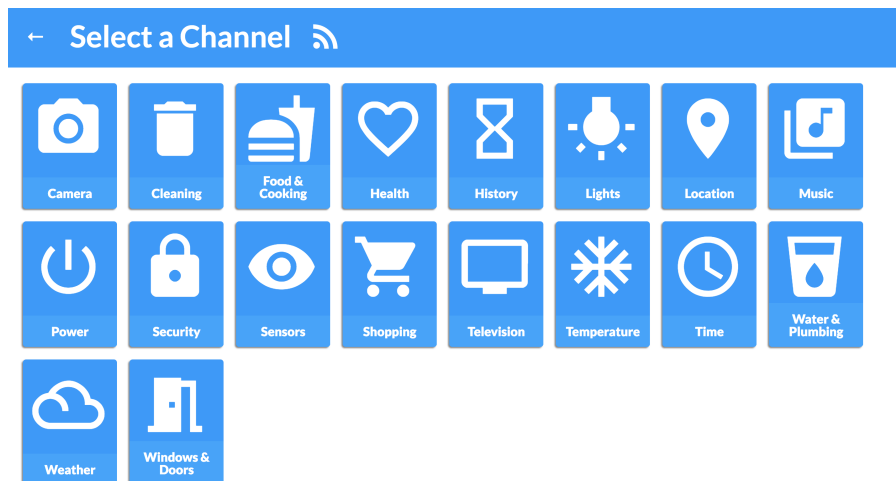Sorry, the correct answer should be "${lm://Field/2}".

Tutorial - Channels

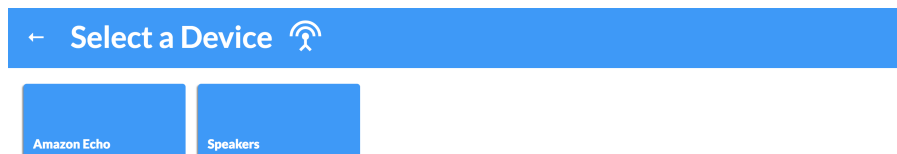After knowing the format of rules, the next step is to select a channel.

A channel is a category that describes the task you are trying to accomplish. For example, if you want to change the channel on your Smart TV, you would find such a feature in the Television Channel.

Some features can be found in multiple channels: if you wanted to turn your lights on, you could do so from the Power Channel or the Lights Channel-- it makes no difference which you select.

Following is a screenshot of the page where we present you all the channels.

When you decide which channel you want to pick, you can click on it, and all related devices are going to show up. For example, if you want to write a trigger which is related to music, then you can click on the music card, and the following page will show up.

Once you click on the device you want, you will see all the capabilities the device supports, and you can specify the behavior of the device by clicking on the capability and set values for it.

Most of the channels in the interface should be straightforward and contain the capabilities you would expect from the name. However, we'd like to briefly explain the **History Channel.** The history channel can give you the ability to specify events or states based on the usage history of devices. Following are the possible things you can specify by using the history channel (click History Channel -> Device Tracker).

←   **Select a capability for** *Device Tracker*

| Event Frequency | Previous State | Time Since Event | Time Since State |

Event Frequency: How many times has an event happened in a certain time period?
Previous State: What was the state of a device a certain amount of time ago?
Time Since Event: How long has it been since a particular event happened?
Time Since State: How long has it been since a device was in a particular state?

NOTE:

Q: When should I use the History Channel?

A: 1) If you are very sure that the rule you'd like to create falls in the four options above, please use History Channel instead of the channel that relates to the subject.
2) If you are not so sure whether you should use the history channel or not, please try to create rules by using the rest of the interface first. After some trials, if you still find it very hard to express the desired time frame by using the rest of the interface, History Channel might be a good place to look at.
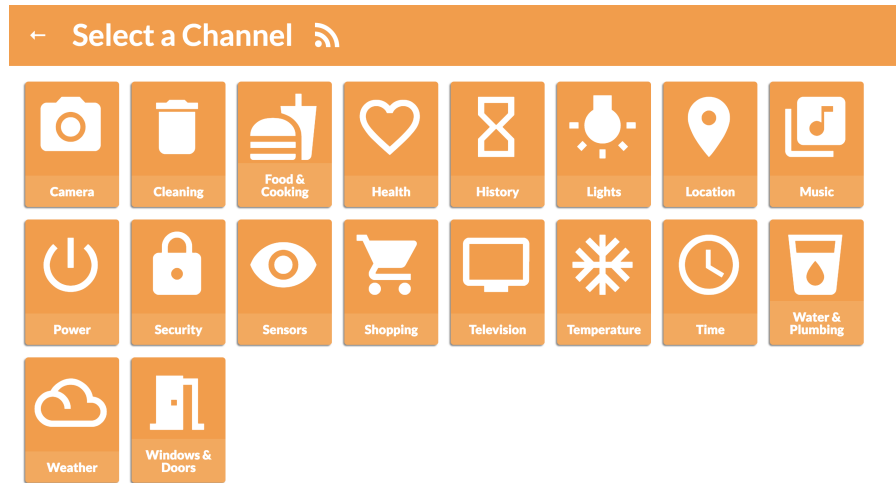
After knowing the format of properties, the next step is to select a channel.

A channel is a category that describes the task you are trying to accomplish. For example, if you want to change the channel on your Smart TV, you would find such a feature in the Television Channel.

Some features can be found in multiple channels: if you wanted to turn your lights on,

you could do so from the Power Channel or the Lights Channel-- it makes no difference which you select.

Following is a screenshot of the page where we present you all the channels.

When you decide which channel you want to pick, you can click on it, and all related devices are going to show up. For example, if you want to write an event or a state which is related to music, then you can click on the music card, and the following page will show up.

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← **Select a capability for** *Device Tracker*

| Event Frequency | Previous State | Time Since Event | Time Since State |

Event Frequency: How many times has an event happened in a certain time period?
Previous State: What was the state of a device a certain amount of time ago?
Time Since Event: How long has it been since a particular event happened?
Time Since State: How long has it been since a device was in a particular state?

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Instructions

In the next section, which is the main part of the study, we will assign you 7 tasks. For each task, you will click a link to an interface we provide, which will open in a new tab in your web browser. Complete the task in that tab in the web browser. After you complete the task, close the tab and answer our survey questions before proceeding to the next task. Note that you will not be paid for completing the survey unless you also use that interface to complete the tasks.

Tasks

Task ${lm://CurrentLoopNumber} of 7:

${lm://Field/2}

Please use the following link to create one or more rules to complete the task above. The link will open a new tab in your browser.

Once you've **saved** all the rules/properties you feel you need to complete the task, close the tab and continue with the survey.

https://super.cs.uchicago.edu/superifttt/${e://Field/mtid}/${lm://Field/1}/rules

Task ${lm://CurrentLoopNumber} of 7:

${lm://Field/2}

Please use the following link to create one or more properties to complete the task above. The link will open a new tab in your browser.

Once you've **saved** all the properties you think you need to complete the task, close the tab and continue with the survey.

https://super.cs.uchicago.edu/superifttt/${e://Field/mtid}/${lm://Field/1}/sp

I believe the rule (or set of rules) I just created successfully completes the task.

○ Strongly agree
○ Somewhat agree
○ Neither agree nor disagree
○ Somewhat disagree
○ Strongly disagree

I believe the property (or set of properties) I just created successfully completes the task.

○ Strongly agree
○ Somewhat agree
○ Neither agree nor disagree
○ Somewhat disagree
○ Strongly disagree

Why?

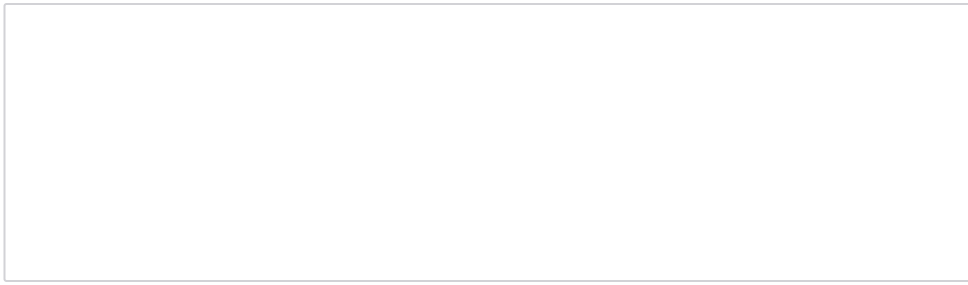I found it **easy** to complete this particular task by using the interface provided.

○ Strongly agree
○ Somewhat agree
○ Neither agree nor disagree
○ Somewhat disagree
○ Strongly disagree

Even if you believe the program will generally **function as intended**, can you think of any unusual situations that you believe might cause the program to behave incorrectly?

○ Yes, there could be situations that might cause the program to behave incorrectly.
○ No, there is no such situation that might cause my program to behave incorrectly.
○ I'm not sure.

Please specify all the situations that you believe might cause the program to behave incorrectly.

Please specify all the unusual situations you have taken into consideration and why you feel your program will not fail.
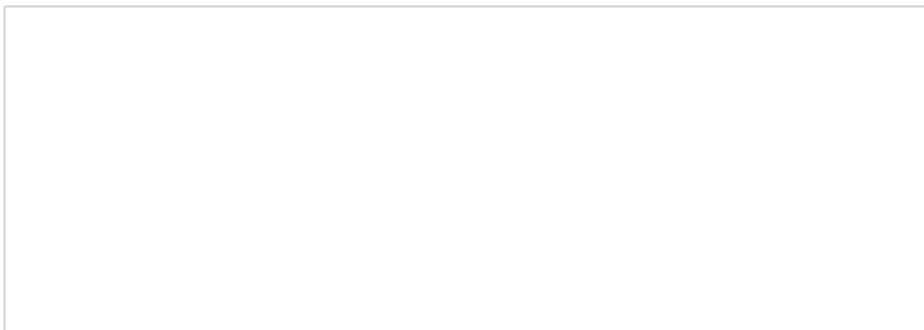
What makes you unsure?

For this specific task, do you think it's **impossible** to complete the task by using the interface provided?

○ Yes, I think it's impossible for anyone to complete the task with the interface.
○ Yes, I think it's impossible for most people to complete the task with the interface.
○ No, I think it's hard, but possible, for most people to complete the task.
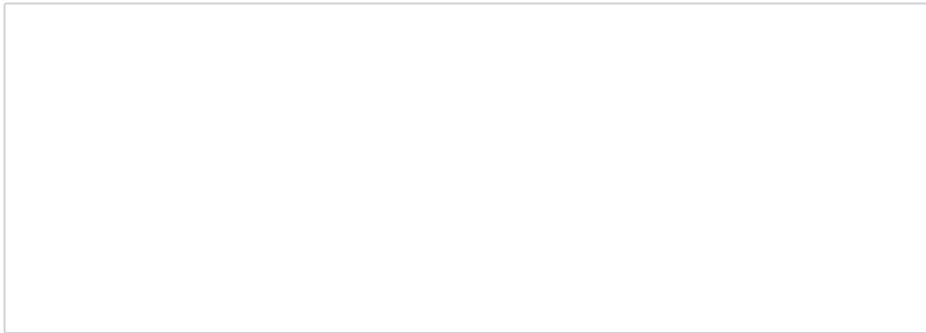○ No, I think it's easy for most people to complete the task.
○ I'm not sure.

Why do you think it's **impossible** for **anyone** or **most people** to complete this specific task?

Why do you think it's **possible** for **most people** to complete this specific task, but you don't agree that you complete the task successfully?

Why do you feel unsure about whether it's possible or impossible to complete the task by using the interface provided?

General Evaluation

You have completed all seven tasks. We will finish the study with a few more questions.

In the following part, we are going to show you 10 statements. Please indicate if you agree with the statement or not based on your personal experience with using the interface we designed.

I think that I would like to use this system frequently.

○ Strongly agree
○ Somewhat agree
○ Neither agree nor disagree
○ Somewhat disagree
○ Strongly disagree

I found the system unnecessarily complex.

○ Strongly agree
○ Somewhat agree
○ Neither agree nor disagree
○ Somewhat disagree
○ Strongly disagree

I thought the system was easy to use.

○ Strongly agree
○ Somewhat agree
○ Neither agree nor disagree
○ Somewhat disagree
○ Strongly disagree

I think that I would need the support of a technical person to be able to use this system.

○ Strongly agree
○ Somewhat agree
○ Neither agree nor disagree
○ Somewhat disagree
○ Strongly disagree

I found the various functions in this system were well integrated.

○ Strongly agree
○ Somewhat agree
○ Neither agree nor disagree
○ Somewhat disagree
○ Strongly disagree

I thought there was too much inconsistency in this system.

○ Strongly agree
○ Somewhat agree
○ Neither agree nor disagree
○ Somewhat disagree
○ Strongly disagree

I would imagine that most people would learn to use this system very quickly.

○ Strongly agree
○ Somewhat agree
○ Neither agree nor disagree
○ Somewhat disagree
○ Strongly disagree

I found the system very cumbersome to use.

○ Strongly agree
○ Somewhat agree
○ Neither agree nor disagree
○ Somewhat disagree
○ Strongly disagree

I felt very confident using the system.

○ Strongly agree
○ Somewhat agree
○ Neither agree nor disagree
○ Somewhat disagree
○ Strongly disagree

I needed to learn a lot of things before I could get going with this system.

○ Strongly agree
○ Somewhat agree
○ Neither agree nor disagree
○ Somewhat disagree
○ Strongly disagree

Demographics

With what gender do you identify?

○ Male
○ Female
○ Non-binary
○ Other
○ Prefer not to say

What is your age?

○ 18 - 24
○ 25 - 34
○ 35 - 44
○ 45 - 54
○ 55 - 64
○ 65 - 74
○ 75 or older
○ Prefer not to say

What is the highest degree or level of school you have completed?

○ Less than high school
○ High school graduate
○ Some college
○ 2 year degree
○ 4 year degree
○ Professional degree
○ Doctorate
○ Prefer not to say

Are you majoring in, hold a degree in, or have held a job in any of the following fields: computer science, computer engineering, information technology, or a related field?

○ Yes
○ No
○ Prefer not to say

How knowledgeable are you to programming?

○ I'm an expert in programming.
○ I'm familiar with programming, but not in professional level.
○ I can program, but I'm not familiar with it.
○ I know a little about programming, but it's very difficult for me to program.
○ I don't have any programming experience.

How familiar are you with the website IFTTT (ifttt.com)?

○ Extremely familiar
○ Very familiar
○ Moderately familiar
○ Slightly familiar
○ Not familiar at all

Feedback

If you have any further feedback, questions, comments, concerns, or anything else you want to tell us about the survey, please leave a comment below. (Optional)

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