

# Smart Thermostats and HVAC System

## Consent to Participate

### Purpose of the Survey

This survey is being conducted to understand participants' knowledge and perceptions of different Internet of Things (IoT) devices and application domains, as well as their awareness of related privacy and security concerns.

### Data Being Collected

We will ask for basic demographic information (such as age range and region) along with your responses to the main survey questions.

### Voluntary Participation

Your participation is completely voluntary. You may choose not to answer any question or exit the survey at any time.

### Anonymity and Confidentiality

Your responses will remain anonymous and confidential. No personally identifiable information will be collected or shared.

### Questions or Concerns

If you have any questions about this survey, please contact

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### Consent Statement

By clicking "**Next**" and continuing with this survey, you indicate that you are at least [*minimum age, e.g., 18 years old*], have read the above information, and **agree to participate**.

No direct personally identifiable information (PII) will be collected.

## Section: Demographic Profile

1. What is your age range?

*Mark only one oval.*

- ☐ Under 18
- ☐ 18 - 24
- ☐ 25 - 34
- ☐ 35 - 44
- ☐ 45 - 54
- ☐ 55 - 64
- ☐ 65 or older

2. Which geographical area do you reside in?

*Mark only one oval.*

- ☐ North America
- ☐ South America
- ☐ Europe
- ☐ Africa
- ☐ Asia
- ☐ Australia/Oceania
- ☐ Middle East
- ☐ Other: \_\_\_\_\_

**Section: Awareness and Understanding**

3. Q1. What is your understanding of the term "**Internet of Things (IoT)**"?

*Mark only one oval.*

- ☐ Devices connected to the internet that collect and share data
- ☐ A network of computers communicating via a centralized server
- ☐ A system of physical devices without internet connectivity
- ☐ Not sure

4. Q2. What is your understanding of **Cyber-Physical Systems (CPS)**?

*Mark only one oval.*

- ☐ Systems where physical processes are controlled or monitored by computer-based algorithms
- ☐ Computers that simulate physical processes without any real-world data
- ☐ Devices that only communicate between each other locally
- ☐ Not sure

5. Q3 . What types of data do you think **IoT** and **CPS** devices typically collect? (*Select all that apply*)

*Check all that apply.*

- ☐ Personal identifiers (name, address, etc.)
- ☐ Location data
- ☐ Health and fitness data
- ☐ Environmental data (temperature, humidity, etc.)
- ☐ Behavioral data (habits, patterns)
- ☐ Other: \_\_\_\_\_

6. Q4. How do you think data collected by **IoT** and **CPS** devices is used? (*Select all that apply*)

*Check all that apply.*

- ☐ To improve device functionality and performance
- ☐ To share with third parties for advertising or marketing purposes
- ☐ To enhance user experience by personalizing services
- ☐ I don't know

**Section: Privacy Perceptions**

7. Q5. What privacy concerns, if any, do you have regarding **IoT** and **CPS** devices?  
(Select all that apply)

*Check all that apply.*

- ☐ Data being shared without consent
- ☐ Security risks of unauthorized data access or breaches
- ☐ Loss of personal control over collected data
- ☐ Unclear data storage practices or retention
- ☐ Other: \_\_\_\_\_

8. Q6. Do you think **IoT** and **CPS** devices should inform users about what data is being collected and how it is used?

*Mark only one oval.*

- ☐ Yes, always
- ☐ Yes, but it should depend on the device or context
- ☐ No, it's not necessary for users to be informed
- ☐ Not sure

9. Q7. How concerned are you about the security of your personal data when using **IoT** and **CPS** devices?

*Mark only one oval.*

- ☐ Very concerned
- ☐ Somewhat concerned
- ☐ Not concerned at all
- ☐ Not sure

10. Q8. What measures do you believe should be taken to protect privacy in **IoT** and **CPS** systems? (Select all that apply)

*Check all that apply.*

- ☐ Encryption of data during transmission or storage
- ☐ User control over what data is stored or collected
- ☐ User authentication for accessing devices or data
- ☐ Regular software updates/patches for vulnerabilities
- ☐ Strict access controls and auditing of data usage
- ☐ I don't know

11. Q9. What does **GDPR** stand for?

*Mark only one oval.*

- ☐ General Data Protection Regulation
- ☐ Global Digital Privacy Rules
- ☐ Government Data Privacy Regulation
- ☐ Not sure

12. Q10. What does **HIPAA** protect?

*Mark only one oval.*

- ☐ Medical and health-related information
- ☐ Home security footage
- ☐ Financial account details
- ☐ Not sure

13. Q11. Are you aware of any regulations or standards protecting privacy in **IoT** and **CPS** systems (e.g., GDPR, HIPAA)?

*Mark only one oval.*

- ☐ Yes, I am aware of regulations like GDPR, HIPAA
- ☐ I have heard of them but don't know much about them
- ☐ No, I am not familiar with them
- ☐ Other: \_\_\_\_\_

## Information on GDPR and HIPAA

### What is GDPR?

→ A law in Europe that protects people's personal data and privacy.

### Why is GDPR important?

→ It makes sure companies don't misuse or share your personal information without permission.

### What kind of data does GDPR protect?

→ Your name, email, phone number, address, photos, and even your location.

### Can a company collect your data without asking?

→ No. Under GDPR, they must ask for your clear permission first.

### Can you ask a company to delete your data?

→ Yes. It's called the "right to be forgotten."

### What is HIPAA?

→ A U.S. law that protects your health information and privacy.

### What kind of information does HIPAA protect?

→ Your medical records, test results, doctor visits, and health insurance details.

### Can your doctor share your health information with anyone?

→ No. They must keep it private unless you say it's okay.

### Why is HIPAA important?

→ It keeps your personal health details safe from being misused or leaked.

### Can you see your own medical records?

→ Yes. HIPAA gives you the right to view and get copies of them. GDPR (General Data Protection Regulation)

14. Q12 . Would you be willing to share personal data with **IoT** and **CPS** devices if there was a clear benefit to you (e.g., better services, personalization)?

*Mark only one oval.*

- ☐ Yes, if the benefits are significant
- ☐ Yes, but I need to know how my data will be protected
- ☐ No, I prefer not to share my personal data
- ☐ Not sure

15. Q13. What would make you trust **IoT** and **CPS** devices more regarding privacy?

*Mark only one oval.*

- ☐ Transparency about data collection and usage
- ☐ Control over data sharing and access settings
- ☐ Clear privacy policies with user-friendly knowledge
- ☐ Third-party certifications or audits on security practices
- ☐ Other: \_\_\_\_\_

16. Q14. Do you think **IoT** and **CPS** technologies have a significant impact on privacy in society today?

*Mark only one oval.*

- ☐ Yes, I believe they have a significant impact
- ☐ No, I don't think they affect privacy much
- ☐ I'm not sure

17. Q15. Would you like to see more information about privacy and data usage in **IoT** and **CPS** systems?

*Mark only one oval.*

- ☐ Yes, I would appreciate more resources
- ☐ No, I feel well informed
- ☐ Not sure

### Section: Device/System Specific Questions

18. Companies may use the collected data for different purposes – some to improve your experience, and others for business or marketing. Based on what you know, how do you think this collected data is typically used? (e.g., service improvement, targeted ads, sharing with utilities, selling to third parties, etc.)

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19. Q16. Which types of data are you **comfortable** sharing with IoT manufacturers or third parties regarding **Smart Thermostats**? (Select all that apply)

*Check all that apply.*

- ☐ Indoor temperature readings: Recorded by temperature sensors.
- ☐ Humidity levels: Data from humidity sensors.
- ☐ Occupancy status: Presence detection using occupancy sensors.
- ☐ Proximity-based activation logs: When thermostat adjustments occur due to nearby presence.
- ☐ Energy consumption trends: Historical energy usage for heating/cooling.
- ☐ Remote control usage logs: Records of manual adjustments made via apps or remote control.



20. Q17. Which types of data are you **comfortable** sharing with IoT manufacturers or third parties regarding **Smart Air Conditioners**? *(Select all that apply)*

*Check all that apply.*

- ☐ Room temperature readings: Data from built-in temperature sensors.
- ☐ Humidity measurements: Humidity sensor logs.
- ☐ CO<sub>2</sub> levels: Air quality readings from CO<sub>2</sub> sensors.
- ☐ Air quality index trends: Calculated air quality over time.
- ☐ Motion detection data: Presence detection logs.
- ☐ Energy usage history: Power consumption over time.

21. Q18. How comfortable are you with sharing your data with IoT manufacturers or third parties regarding **Smart Thermostats and HVAC Systems**?







*Mark only one oval.*

- ☐ Extremely uncomfortable
- ☐ Somewhat uncomfortable
- ☐ Neither comfortable nor uncomfortable
- ☐ Somewhat comfortable
- ☐ Extremely comfortable

## Section: Privacy Implications

### **Implications: How Smart Thermostats & HVAC Systems Use Your Data**

Smart thermostats, air conditioners, and fans don't just keep your home comfortable—they continuously monitor temperature, humidity, air quality, and your presence. This helps them optimize energy use and improve comfort, but it also means they're gathering detailed information about your home environment and habits, which can be shared or monetized.

- ◆  **Targeted Recommendations:** Prefer cooler settings? You might get ads for insulation services or cold-weather gear. Often switch to eco-mode? Expect promotions for energy-efficient appliances.
- ◆  **Data Sharing:** Temperature, occupancy, and air quality data can be shared with manufacturers, utilities, or advertisers to influence product recommendations or pricing plans.
- ◆  **Paid Features:** Detailed air quality reports, advanced scheduling, or AI-driven energy optimization may require a subscription.
- ◆  **Behavioral Profiling:** Occupancy sensors track your daily presence patterns, revealing when you're home or away.
- ◆  **Environmental Tracking:** CO<sub>2</sub>, VOC, and humidity readings contribute to environmental data that could be used for public health or building efficiency research.
- ◆  **Third-Party Access:** Data could be accessed by insurers, landlords, or even law enforcement—sometimes without clear consent.

### **What This Means for You:**

Smart HVAC systems can save energy and keep you more comfortable, but they also build a detailed profile of your home life. Review privacy settings regularly and know how temperature, air quality, and occupancy data are being stored, shared, and used.

## Section: Device/System Specific Questions after Understanding Implications

"After reading *Implications: How Smart Thermostats & HVAC Systems Use Your Data* you will be asked the same set of **Device/System Specific Questions** again.

Any changes you make will reflect how your views **shifted after learning** about these implications."

22. Q19. Which types of data are you **comfortable** sharing with IoT manufacturers or third parties regarding **Smart Thermostats**? (Select all that apply)

*Check all that apply.*

- ☐ Remote control usage logs: Records of manual adjustments made via apps or remote control.
- ☐ Energy consumption trends: Historical energy usage for heating/cooling.
- ☐ Proximity-based activation logs: When thermostat adjustments occur due to nearby presence.
- ☐ Occupancy status: Presence detection using occupancy sensors.
- ☐ Humidity levels: Data from humidity sensors.
- ☐ Indoor temperature readings: Recorded by temperature sensors.

23. Q20. Which types of data are you comfortable sharing with IoT manufacturers or third parties regarding **Smart Air Conditioners**? (Select all that apply)

*Check all that apply.*

- ☐ Energy usage history: Power consumption over time.
- ☐ Motion detection data: Presence detection logs.
- ☐ Air quality index trends: Calculated air quality over time.
- ☐ CO<sub>2</sub> levels: Air quality readings from CO<sub>2</sub> sensors.
- ☐ Humidity measurements: Humidity sensor logs.
- ☐ Room temperature readings: Data from built-in temperature sensors.

24. Q21. How comfortable are you with sharing your data with IoT manufacturers or third parties regarding **Smart Thermostats and HVAC Systems**?

*Mark only one oval.*

- ☐ Extremely uncomfortable
- ☐ Somewhat uncomfortable
- ☐ Neither comfortable nor uncomfortable
- ☐ Somewhat comfortable
- ☐ Extremely comfortable

25. Challenges? What you will be missing due to limiting these data accesses?

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