

# Exploring the Use of Robots for Gathering Customer Feedback in the Hospitality Industry

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## ABSTRACT

Gathering customer feedback is important for service industries. We believe service robots present a promising channel for collecting such feedback as they are already interacting with customers. To better understand this potential feedback collection use case for the robots, we first aim to understand the deeper needs of the users in a service industry. To this end, we conducted need finding interviews with five hotel employees who have been using a delivery service robot. We share our findings from the interviews which capture the underlying motivations for collecting feedback and the factors influencing robot usage in hotels. We then present our design implications to encourage the community to continue to explore the feedback collection use case for service robots.

## CCS CONCEPTS

• **Human-centered computing** → *User centered design*;

## KEYWORDS

Service robots, need-finding, hotel technology, customer relationship management

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## 1 INTRODUCTION

We live in the age of empowered customers. Gathering customer feedback remains as important as ever for service industries. These industries have long amassed guest feedback to measure customer satisfaction, loyalty, and efforts. Collected feedback helps these industries to monitor service quality, make necessary improvements, and ultimately stay ahead of the competition.

In this paper, we take a first step in exploring the use of service robots to collect customer feedback. We believe that robots can contribute meaningfully to this function since they can act as neutral “middlemen” between customers and service providers. In addition, a robots’ actions are programmable and consistent, which

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makes it possible to tune its interactive behaviors to meet hotel requirements (e.g. to maintain brand standards). Past HRI work also shows a robots’ ability to handle and even elicit engagements in the wild [2, 3, 5, 8, 9]. In fact, today’s service robots already interact with people *intentionally*, e.g. by performing steps in a primary task workflow, and *unintentionally*, e.g. by unexpectedly encountering curious customers.

Our initial goals in investigating this use case are to gain an understanding of the fundamental needs of the hotel personnel and the potential constraints for using robots in hotel environments. To achieve our goals, we employed a *need finding*, a product design tool now being adopted by robotics community [6, 7]. We conducted semi-structured interviews with administrative staff at five hotels that had a Relay robot for guest room delivery. We present the findings from our interviews and hotel tours as well as the design implications we extracted from these findings. We do not claim that our study design and findings are generalizable. However, we present them to start a dialogue and encourage further explorations of this use case, or the identification of new use cases for robot-based social data collection.

## 2 APPROACH

We began our investigation in the hospitality industry because customer feedback is imperative in this sector. Further, it is one of the few industries already using service robots.

### 2.1 The Relay Robot

Savioke Relay<sup>1</sup> is an autonomous mobile robot that delivers small items from the front desk to guest rooms in hotels. The robot is approximately 3 feet tall and weighs 100 pounds, has a lockable interior bin, and displays a touchscreen mounted facing forward. The robot stays in its docking station and charges its battery when not in use. Upon receiving a delivery request, the front desk clerk loads the robot’s bin and sends it to the specified location. The robot travels to the guest’s room by traversing hallways, doorways, and elevators while avoiding obstacles and people. When it reaches the destination room, it phones the room to notify the guest of its presence, and it opens its lid when the guest opens the room door. Once the guest retrieves the item, it interacts with the guest to confirm the pickup and returns to its docking station. Hotel staff interacts with Relay through a web application to send a delivery, monitor the robot’s status, and download a delivery history. As of January 2018, Savioke deployed Relay robots in 70 hotels<sup>2</sup>.

<sup>1</sup>[www.savioke.com](http://www.savioke.com)

<sup>2</sup>[spectrum.ieee.org/view-from-the-valley/robotics/industrial-robots/ces-2018-delivery-robots-are-fulltime-employees-at-a-las-vegas-hotel](https://spectrum.ieee.org/view-from-the-valley/robotics/industrial-robots/ces-2018-delivery-robots-are-fulltime-employees-at-a-las-vegas-hotel)

Although the Relay robot was designed for a specific application, we choose to work with it because it can be considered a general-purpose mobile robot and consists of parts (for example, a mobile base and touchscreen) common to other autonomous indoor robots, such as those from Vecna, Cobalt Robotics, and Fellow Robots<sup>3</sup>.

## 2.2 Participants

We selected a total of five participants who have an administrative job for the five hotels that had been using a Relay robot. To capture the various perspectives, we chose participants with different positions in the hotel, with the hotels varying in scale and location (Table 1). We intentionally chose participants with firsthand experience interacting with a robot at their workplace; these participants did not have technical jobs because we wanted to avoid interviewing people who have completely unrealistic expectations or are too pessimistic about the robot abilities [6].

**Table 1: Participants in the interviews and description of the hotels they are affiliated with.**

Participant Job Title (Participant ID)	Date Relay Was Introduced	Number of Hotel Rooms	Location
General Manager (P1)	7/1/2015	62	SF Bay Area
Director of Operations (P2)	3/2/2015	172	SF Bay Area
General Manager (P3)	4/1/2017	175	SF Bay Area
General Manager (P4)	8/25/2015	231	SF Bay Area
Guest Satisfaction Manager (P5)	7/1/2015	304	Los Angeles

## 2.3 Procedure

We decided to conduct need finding interviews. Need finding is a technique for interviewing potential users to discover their fundamental needs [1]. In our case, even though we have a specific use case in mind, i.e. customer feedback collection, the need finding protocol was well suited for our study goals of collecting more in-depth information.

We interviewed the participants regarding existing methods for collecting customer feedback and current usages of the Relay robot at their hotel. The interviews were conducted at a place in the hotels where the participants felt comfortable, except P4 with whom we had a phone interview due to the location of the hotel. Each interview was structured as follows (see Appendix for the actual interview protocol we used in our study):

- (1) **Introduction** of the interviewer, the purpose of the study, followed by consent for voice recording.
- (2) **Warm-up questions** about the participants, such as their roles at the hotel, their favorite part of their jobs, and how long they have been in the hospitality industry.
- (3) **Current practices for collecting customer feedback**, including whether participants have tried technology-based solutions, and how guest feedback is used. Probing questions include asking about pain points and asking for reasons behind comments (i.e. “Why?” questions).

- (4) **Participants’ experiences with Relay** and their observations regarding customers interacting with the robot.
- (5) **Participants’ opinions on collecting guest feedback with Relay**.
- (6) **Tour** of the hotel.
- (7) **Wrap-up**; a final question and answer session.

Throughout the interview, participants were encouraged to lead the conversation and were asked about memorable incidents if applicable. The interviews lasted between 30 minutes and 2 hours.

Note that our interview protocol includes a step for directly asking the interviewees about using the robots to collect feedback (5). This is not a conventionally done in need finding interviews. However, we included this question because we wanted to learn participants’ perspectives and potential constraints for this use case.

## 3 FINDINGS

The recordings from the interviews were transcribed by the first author. We then conducted an inductive content analysis on the transcriptions and organized the participants’ responses into the following themes: Existing Guest Feedback Collection Methods (Sec. 3.1), Service Recovery Strategies (Sec. 3.2), Factors influencing Robot Usage (Sec. 3.3), Participant Comments on Collecting Guest Feedback via Robots (Sec. 3.4).

### 3.1 Existing Guest Feedback Collection Methods

All participants reported that they used the brand-required, post-stay survey and accessed TripAdvisor<sup>4</sup> to learn what their guests thought about their hotel experience. Another commonly mentioned feedback collection method was having the hotel staff directly ask guests about their stay at likely points of interaction, such as when guests came to the front desk to ask a question or to checkout. P2, P4, and P5 mentioned that they train their staff members to elicit feedback from guests whenever an opportunity arises. P4 further reported that their staff members must ask whether a guest needs anything before closing a conversation as a part of their brand standard.

Two participants shared their experience with a more recent, mobile phone-based instant messaging solution for communicating with guests<sup>5</sup>. P5 noted that the real-time aspect of the solution helped them to identify a few unhappy guest before they checked out. One downside P5 mentioned was the difficulty of informing guests about the availability of this service. P2 mentioned the messaging solution helped them better understand their guests’ needs; however, it greatly increased front desk staff’s workload, so eventually the hotel stopped using it. Both participants mentioned that today’s guests prefer using a mobile phone to having a face-to-face conversation, which was the main reason their hotel tried the mobile-based solution.

<sup>3</sup>www.vecna.com, www.cobaltrobotics.com, www.fellowrobots.com

<sup>4</sup>www.tripadvisor.com

<sup>5</sup>www.benbria.com, www.kipsu.com

### 3.2 Service Recovery Strategies

Although we asked how the hotels gather guest feedback, the participants also explained their service recovery strategies, that is, strategies for returning dissatisfied customers to a state of service satisfaction. P2 reported that they respond to all the guests who participated in the post-stay survey. P3 and P5 reported that they respond to negative feedback directly on TripAdvisor to reduce the risk of losing future customers. P5 further explained their strategies to follow up on guest complaints based on guest type and problem severity. Other examples of recovery strategies include giving guests a 10% discount on their bills or offering a free dinner at the hotel's restaurant.

Some hotels emphasized the importance of getting guest feedback on-site. P2 and P5, who has experience with the mobile phone-based feedback collection methods (Sec. 3.1), elaborated on why collecting guest feedback on-site, esp. negative ones, will be helpful:

**[P2]** *Anytime we have the ability to capture the moment before they leave; that's when we can fix it. That's when we establish contact. [...] bring in the human, recover the guest, and make sure they leave as a happy customer.*

**[P5]** *[...] if after they've left, that's when they're telling me, guess what, I can't put two pillows now or I can't say "I'm gonna offer you a 10% discount." But if they can tell me while they're on property [...] I can apologize and send them two pillows and say "By the way, would you care to have dinner on us at the restaurant?" So it ties into knowing what's happening at the hotel in real time and be able to offer a solution.*

They also remarked on the irreversible impact of customer dissatisfaction:

**[P5]** *[...] after they left, they'll go on social media and let you know; which is not effective for the hotel. Because you didn't have the opportunity to fix it. Yes, you can fix it for the future but you can't fix it for that guest. [...] Everybody out there, all your potential customers are seeing this feedback.*

P3, on the other hand, focused on the importance of positive ratings. P3 believed that the robot increased the chance of garnering positive feedback from customers.

**[P3]** *It's really a novelty item, more than anything else. [...] People like it and it is functional.*

### 3.3 Factors Influencing Robot Usage

**3.3.1 Weekday/Weekend, Seasonal Influences.** While describing their experiences with the Relay robot, participants shared observations about robot usage patterns in their hotels. P1 and P2 emphasized the usage difference between weekdays and weekends. Both hotels predominantly have business travelers on weekdays and local leisure travelers on weekends. Both reported greater use of the robot on weekends by leisure travelers. They explained that weekend guests spend more time in the hotel and show more interest in the robot, e.g. by taking a photograph with it and requesting a room robot delivery for fun. P3 and P4 reported seasonal differences in usage. During summers they observed an increased number of

robot delivery requests due to increased occupancy rates (greater than 90%).

**3.3.2 Guest Type.** Although a diverse clientele routinely interacts with the Relay robot, all participants remarked on children users. P5 reported that they frequently see children hugging or following the robot. P4 shared a story of parents who visited the hotel expressly to surprise their children with the robot room delivery. In addition to children, P1 mentioned that some older adults take interest in the robot (e.g. taking a photograph with it) while others seemed leery of it. P1 also mentioned that people who work at technology companies are more interested in the robot and ask questions regarding its functionality and price. Finally, when we asked if they noticed a type of guests who do not pay much attention to the robot, P1 and P2 mentioned business travelers and people who are traveling alone.

### 3.4 Participant Comments on Collecting Guest Feedback with the Robots

Participants had mixed feedback about the idea of using the Relay robot to collect guest feedback. P2 and P5 responded positively to the idea. P2 mentioned that were the robot able to report feedback in real-time, it would be valuable for the hotel staff, who would then would be able to resolve issue before the customers check out. P5 predicted that using the robot would increase the chance of eliciting guest feedback since many guests do not report problems to avoid hurting a staff person's feelings. P5 suggested that the robot could be an effective, neutral, middle person.

**[P5]** *We would get more feedback. Because a lot of customers do not like face to face interaction. They feel, "Now I'm putting somebody down" or "I'm going to get someone in trouble." That's why we get so many hits on social media.*

P1 and P3 were skeptical about the value of guest feedback data gathered by the Relay robot. They pointed out that the robot is not capable of collecting rich feedback due to its small screen size. However, they still wanted to try because guests want more interactive robots, and feedback gathering would increase robot utilization. P4 mentioned that gathering guest feedback via the robot would not be valuable since they already have other means to collect this feedback; further, P4 noted that the hotel already extensively uses the robot for delivery tasks, so they are hesitant to add to its workload. In addition, P4 was concerned that the guests receiving the items from the robot are often children.

Participants gave some suggestions about when and how the robot should attempt to gather customer feedback. P1 suggested providing the option of completing a general satisfaction survey, through a link that would say "would you like to rate your overall stay?" after each delivery. P2 wanted the robot to conduct a short survey after delivering receipts to people in the restaurant. They also suggested having the robot hand out discount checks if they fill in the survey. P5 wanted the robot to move around in the lobby area and solicit feedback from passing guests. P5 suggested having guests report problems to the robot and rate the severity of the problem. P5 also suggested having the robot display compensation options to unhappy guests and attempt to resolve problems by itself. P3 suggested integrating TripAdvisor and the robot so

guests' positive reactions could be reflected on the hotel's profile on TripAdvisor in real-time, while the guests interacting with the robot.

#### 4 DESIGN IMPLICATIONS

Our findings have the following implications for the design of a robot that will gather guest feedback in hotels.

Robots could play a role in helping hotels disseminate positive customer feedback widely. They could also help to identify dissatisfied customers while they are still on-site. To this end, robots should take advantage of being in the context of the service to encourage customers to express their opinions in the moment and on the property. They should be designed to make guests feel more comfortable giving negative feedback, acting as neutral liaisons between guests and the hotels. Robots should respond to customer feedback, possibly by attempting to recover from service failures without human intervention.

By default, interactions for gathering feedback should be short and, if possible, entertaining to accommodate the short attention spans of modern customers. Robots could leverage their status as *novelty items* to engage customers and encourage them to respond to questions. Ultimately, robots should adjust their strategies for eliciting engagements and interacting with customers based on the types of customers. For instance, robots could identify the type of a customer from initial interactions [4] to decide which questions to ask and how to most meaningfully interact with the customer.

#### 5 LIMITATIONS

We acknowledge the following limitations. First, we had a small number of participants (5). Four of five the hotels employing participants are located in the San Francisco Bay Area, a location crowded with a profusion of technology companies. This may have influenced the demographics of the hotel guests and the experiences of the interviewees. All interviewees were management-level employees at the hotels; we were not able to find staff people who used the Relay robot more than 6 months due to the high hotel staff turnover rate. While they may have a bird-eye view of their hotel, they may not be familiar with details that affect daily operations in their hotel. Finally, our study did include input from hotel guests, the group whose opinions are important to both hotels and service robot companies. We plan to conduct a follow-up study designed to access guest viewpoints in the near future.

#### 6 CONCLUSION

We presented a study designed to understand meanings of collecting customer feedback and using service robots in the hospitality industry. Our findings suggest that hotels are collecting customer feedback to maintain their positive outlooks and recover from service failures to attract future customers. We also identified the factors influencing the robot usage such as the seasonal and week-day/weekend effects and type of guests. Based on our findings, we drew design implications to guide and inspire potential solutions. We envision this initial investigation as being useful for stimulating follow-up explorations of the customer data collection use case and for sparking new and innovative service robot use cases in the hospitality industry and beyond.

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#### 7 APPENDIX: INTERVIEW GUIDE

The guide presented below is the final version. We started with a simpler protocol and modified it after each interview to incorporate the lessons learned.

##### Introduction

- Thanks for taking the time to talk with me today. My name is {author\_name} and I'm a PhD candidate in {affiliation\_name}. My research interest lies primarily in the area of Human-Robot-Interaction and hence have been studying how people work with service robots like Relay.
- Before we start, I would like to ask your permission to record this interview. I plan to analyze our conversation thoroughly and incorporate your feedback into future robot applications. We might also publish your feedback anonymously in an academic conference in future. Is it okay with you to record this interview?
- Do you have any questions before we start?

##### Warm-up

- Can you tell us a little about yourself? What is your name and your role in the hotel? What is your favorite part of your job? How many years have you been in the hospitality industry? Have you used any service robots in your workplace before Relay?

##### Current Practices for Collecting Guest Feedback

- How does the hotel collect feedback from guests today?
- How the hotel use the gathered feedback?
- Any pain points? Any memorable past incidents?
- Have you tried a terminal, mobile app, or kiosk based feedback collection system?

##### Your Experiences with Relay

- Can you tell us how Relay is being used at your hotel?
- How well does Relay work for you?
- Is there a specific event or incident that stands out in your memory when you were working with Relay or a guest encountered the robot?

- For example, have you seen guests interacting with Relay when it was (or was not) on delivery? Do you know what led up that interaction?

**Your Opinions on Collecting Guest Feedback with Relay**

- What do you think about collecting feedback data with Relay? Do you think it would be useful? Why or why not? For example,
  - Relay could forward you the result of the “How is your stay?” question it asks after the delivery.
  - Relay could ask questions like “How is your stay” and “How is your breakfast” in the dining room area.
  - Relay could ask questions like “How is your stay” in the lobby area.

**Tour**

- Could you give me a tour of your hotel to help me better understand your previous explanations?

**Wrap-up**

- Did we miss anything? Is there anything else you want to tell us?
- Thank you very much for your time. We really appreciate the insights and opinions you shared with us today.