
“Check out where I am!”: Location-Sharing Motivations, Preferences, and Practices

Sameer Patil

Indiana University
Bloomington, Indiana, USA.
patil@indiana.edu

Apu Kapadia

Indiana University
Bloomington, Indiana, USA
kapadia@indiana.edu

Greg Norcie

Indiana University
Bloomington, Indiana, USA
gnorcie@indiana.edu

Adam J. Lee

University of Pittsburgh
Pittsburgh, PA
adamlee@cs.pitt.edu

Abstract

Rapid growth in the usage of location-aware mobile phones has enabled Location Sharing Services (LSS) to gain mainstream adoption. Integration with social networking services has further accelerated LSS usage. We conducted an online study (N = 401) to uncover the impact of recent changes in the underlying social and technological landscape on the preferences and practices of LSS users in the US. We found that the main motivations for location sharing were to connect with one's social circle, to project an interesting image of oneself, and to receive rewards offered for “checking in.” Respondents overwhelmingly preferred sharing location only upon explicit action. More than 25% of the respondents recalled at least one instance of regret over having shared location. These findings highlight the tension between the utility of location sharing and concerns with invasions of privacy. Empowering users to resolve this tension effectively can potentially drive further growth in adoption and utility of LSS.

Author Keywords

Location sharing services; privacy; check-in

ACM Classification Keywords

H.4.m [Information Systems Applications]: Miscellaneous;

Copyright is held by the author/owner(s).
CHI'12, May 5–10, 2012, Austin, Texas, USA.
ACM 978-1-4503-1016-1/12/05.

Introduction and Related Work

Location is a key piece of contextual information and has been a major focus of attention in context-aware computing. Until recently, the infrastructure and mobile technologies for enabling location detection and sharing have been too expensive for general use. As a result, systems and services with location-based interactive functionalities were typically limited in scope and purpose (e.g., to enable collaborators within an organization to locate each other [7] or to detect and alert friends if they opportunistically happen to be near each other). Moreover, the specialized nature of these systems meant that their user bases largely comprised tech-savvy early adopters.

In the past few years, mainstream adoption of smartphones and online social networking services have led to growing usage of functionalities that allow one to share location with others. Such Location Sharing Services (LSS) typically operate in: (i) an “always on” mode in which location is monitored and broadcast continually with no explicit user action, (ii) a “check-in” mode in which the user shares his or her location with an explicit action (e.g., by pushing a “check-in here” button), or (iii) some combination of these modes. Initially, popular LSS were standalone systems meant solely for location sharing (e.g., Dodgeball, Foursquare, etc.). Nowadays, however, LSS features are increasingly integrated within a larger interactive service like online social networking (e.g., Facebook Places).

Much of the existing research on location sharing was conducted prior to the advent of smartphones and social networking sites (e.g., [3]). Therefore, there is a need to revisit preferences and practices of LSS users. Some studies examining the latest generation of LSS have

indeed begun to emerge, although many of these works have focused on standalone LSS [4, 5]. Moreover, these studies have typically utilized small samples of tech-savvy early adopters and/or students. We present a study that aims to overcome these limitations. More specifically, we investigated why people choose to share their location via LSS and which sharing features and modes they preferred. Given the well-documented concerns with user privacy in the context of location sharing (e.g., [1, 2]) and the tendency of certain users to make regrettable disclosures in social networking systems [8], we sought to explore design opportunities for enhancing LSS privacy-sensitivity.

Method

We used an online questionnaire to investigate the motivations, preferences, and practices of LSS users. In particular, we asked about motivations for using LSS, the features of LSS used, and experiences and comfort with these features. To explore the impact of individual privacy attitudes, we included the short form of the Internet Users' Information Privacy Concerns (IUIPC) scale [6].

We sought participation with an announcement in the “Et cetera jobs” category of the online classifieds site Craigslist. For breadth, we posted to the Craigslist sites for 12 cities covering a wide geographical area of the US. We screened potential respondents to limit participation to adults (18 years and older) who reported having used LSS. In order to minimize the impact of cultural factors, we also ensured that respondents had lived in the US for at least 5 years. We further chose to limit participation of those in the 18–22 age group (i.e., the typical age range of undergraduates) to no more than 35% of the sample. This allowed us to capture responses from a broader spectrum of the population unlike prior work that typically drew participation from student populations. Respondents

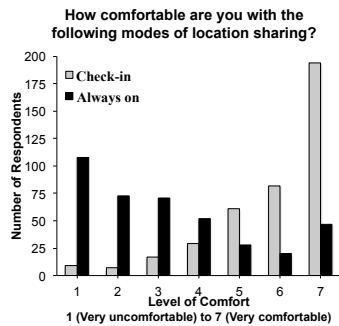


Figure 1: Levels of Comfort with the Two Modes of Location Sharing

were entered into a drawing for one of ten rewards of \$25. To check for attentive participation, we included eight verification questions interspersed inconspicuously among other questions. These required respondents to perform basic mathematical operations (e.g., “Please choose the answer equal to seven minus two.”). Before beginning data analysis, we excluded the responses of those who did not correctly answer all eight verification questions. We also set browser cookies to disallow multiple submissions from the same respondent.

Overall, we received 401 valid responses from 233 (58%) females and 168 (42%) males. The respondents covered a wide age range spanning 18 to 67 years, with fewer than 10% in the 18–22 range ($N = 33$). However, the sample is skewed toward the lower age of the range with a median age of 30 and a mean of 33. Nearly 80% of the respondents ($N = 317$) reported being LSS users for more than 8 months. Close to 90% of the respondents ($N = 353$) used a smartphone and a large percentage of these indicated using it for more than an hour each day ($N = 300$) and using it for LSS ($N = 330$). Almost 94% of the respondents ($N = 376$) had attended at least some college, with 62% ($N = 249$) having completed at least an undergraduate degree. The following section presents salient findings regarding preferences and practices when using LSS.

Findings

Only about 13% of the respondents ($N = 54$) indicated that they used a dedicated, standalone LSS. In contrast, nearly 76% of respondents ($N = 303$) reported using an LSS embedded within a larger social networking or microblogging service. A further 11% ($N = 43$) used both embedded as well as standalone services almost equally.

Notably, respondents exhibited contrasting levels of comfort—on a 1–7 Likert scale—with the two common location-sharing modes (see Figure 1). While the level of comfort with the “check-in” mode was high (Mean: 5.9, Median: 6), the opposite was the case for the “always on” mode (Mean: 3.2, Median: 3). A Wilcoxon rank sum test with continuity correction confirmed that this difference was statistically significant ($p < 0.001$). At the same time, the two levels of comfort were positively correlated with each other ($r = 0.22$, $p < 0.001$). Moreover, each of the two levels also showed a statistically significant positive correlation ($r = 0.4$, $p < 0.001$) with the level of comfort for third parties sharing one’s location with others (e.g., by the “tagging” feature of LSS). These correlations suggest the presence of a baseline level of comfort with LSS in general, regardless of mode.

Further, the level of comfort with the “always on” mode was positively correlated with age ($r = 0.11$, $p < 0.05$) and negatively correlated with privacy concern measured by the IUIPC ($r = -0.15$, $p < 0.01$). Interestingly, the level of comfort with the “always on” mode was higher among those who reported having children (mean = 3.59) compared with those without children (mean = 2.99). Welch’s two sample t-test indicated that the difference was statistically significant ($p < 0.01$). The level of comfort with the “check-in” mode, however, did not exhibit these associations.

Reason for sharing location	N	%
I wanted to tell my friends that I liked the place.	231	57.6%
I like to keep my social circle informed of where I am.	199	49.6%
I wanted to record and remember that I had visited this place.	168	41.9%
I was visiting a different city and wanted local friends to know that I was around.	165	41.2%
I wanted to appear cool and interesting by sharing where I was.	161	41.2%
I wanted people to join me at the location.	151	37.6%
I wanted geographically distant friends/family to feel that they were part of my day-to-day activities.	140	34.9%
I was at a political/social/artistic event and wanted to promote it.	94	23.4%
I was offered a coupon or some other financial incentive.	79	19.7%

Table 1: Common Reasons for Sharing Location using LSS

Respondents indicated a variety of motivations for sharing location. Table 1 provides the number and percentage of respondents who chose each of the several common motivations that we provided (it was possible to select more than one), sorted in descending order. Interestingly, the table indicates that the most important motive for sharing location was interacting and connecting with one's social circle by sharing a positive experience. Self-interest, such as keeping contacts informed of one's location, appeared to be the second most important motive.

We were interested in knowing whether external rewards could be used effectively to promote the use of LSS. When asked whether they had shared location in order to receive a reward of some form, nearly 38% (N = 151) of the respondents reported doing so. A discount was the most commonly received reward (N = 93), followed by free goods (N = 71) and free services (N = 27). Table 1, however, suggests that such rewards rank lower in comparison with the other two motives mentioned above. Further, those who shared location for rewards were slightly less concerned about privacy (IUIPC mean score

of 5.75 vs 5.95 with a non-paired Wilcoxon rank sum test with continuity correction statistically significant at $p < 0.05$). We also noted that a larger percentage of males responded to such incentives: 73% of males reported doing so while the corresponding percentage for females was 52%. However, Pearson's Chi-square test revealed that the difference was not statistically significant.

The use of LSS did sometimes lead to unexpected consequences. More than a quarter (26%) of our respondents (N = 105) had experienced regret over a previous decision to share their location. On a 1-7 scale, with 7 indicating the deepest regret, the level of regret fell somewhere in the middle (Mean = 4.44, Median: 4). Open-ended responses indicated that two common reasons for regrets were: (i) being discovered in a location different from where one was expected to be, and (ii) being located by individuals whom one wished to avoid.

Discussion and Implications

The wide age range of our sample suggests that the location-sharing user base has moved beyond tech-savvy early adopters. The wider adoption appears to be enabled by two major factors: (i) growth in the number of smartphone owners, and (ii) embedding of LSS within larger services like social networking that have become an integral part of everyday interactive practices. Our respondents showed an overwhelming inclination toward using LSS integrated within a larger interactive platform. In addition to increased convenience and efficiency, an integrated solution also serves to contextualize the location-sharing act by leveraging connections to overall interactive practices on the host platform. This can enhance the richness and significance of the location information in comparison to decontextualized standalone LSS. Therefore, we suggest that design effort be focused

on enhancing LSS integration with commonly used interactive systems.

Our data also highlights that conveying a physical location is not the primary user motive in itself. It serves as a means toward achieving a higher-level interactive goal such as sharing a positive experience at a place or “appearing cool.” In this regard, designers could consider offering and enhancing LSS features in a manner that serves the larger goals of connecting with people, promoting oneself, and receiving location-relevant benefits. It is also noteworthy that we found no statistically significant gender differences regarding responding to external rewards. Traditional brick-and-mortar marketing efforts are increasingly geared toward females.¹ Our findings suggest that location-based incentives could also engage males equally, if not more, thereby opening up further opportunities for LSS providers to enhance their effectiveness as a location-relevant bridge between users and advertisers.

The data also strikes a couple of notes of caution regarding potential concerns with LSS. Firstly, LSS users are less inclined to favor modes in which location is being recorded and shared constantly and without explicit action for each disclosure. At the same time, the data hints that there may be certain subgroups (e.g., parents) for whom such modes might be preferable and appealing. It may also be the case that an “always on” mode of location sharing is desirable in certain situations (e.g., while commuting). This suggests that LSS modes need to be designed carefully to accommodate these special needs. In particular, it seems crucial to explore effective ways to define and manage access—based on audience, one’s

¹Marketing to women, *The Economist*. <http://www.economist.com/node/13278440>

location as well as specific times or situations—for the “always on” mode of location disclosure. The “temporary location sharing” feature offered by LSS providers like Glympse is an example of such a feature. Secondly, a sizable proportion of LSS users experienced regret at having shared location. Designers could explore techniques to minimize the likelihood of common causes of regret. For instance, conflict-detection features could warn a user if he or she is about to share a location different from where he or she is expected to be. Expected locations could be gathered from the user’s calendar and/or inferred from past routines. Similarly, more effective feedback and visibility of the audience for the shared location information could avoid location disclosure to undesired audiences.

Limitations

Some limitations must be kept in mind when considering the applicability of these results to the larger US population. Although we strove for breadth and diversity when seeking respondents, the sample cannot be considered representative of all LSS users in the US. In addition to self-selection bias, the sample is also slightly gender-biased toward females and comprised mainly of individuals who are well-educated and comfortable with technology. It is also important to note that these responses come from those who have experience using LSS. Studying non-users could provide additional insights for improving LSS.

Conclusion

LSS are increasingly gaining a mainstream user base by leveraging capabilities of location-aware mobile phones and by weaving themselves as a feature within popular systems for everyday interactions. This shift—to a general user base from tech-savvy early adopters, and to a general

interactive act from sharing driven by specific purposes (like locating co-workers)—necessitates a re-examination, refinement, and extension of findings generated from studies conducted during LSS infancy. Toward this end, we reported on motivations, preferences, and practices of LSS users drawn from a diverse, general sample of the population. The findings suggest that users favor explicitly-initiated, episodic location disclosure rather than constant and automated broadcast. Reservations about the “always on” mode of LSS as well as regrets over sharing location point to opportunities for design enhancements to mitigate these negative experiences. A deeper look at the various individual, social, and economic reasons behind location sharing could enable LSS providers to improve their effectiveness at connecting users to each other as well as to location-based offers and information.

Acknowledgements

We thank Yann Le Gall and Roman Schlegel for help in questionnaire implementation, Tijana Gonja for guidance on the analysis, and Nicolas Mangano for comments on the final draft of the paper. We also thank the study participants. This research is supported by NSF grants CNS-1016603 & CNS-1017229, and US DHS grant no. 2006-CS-001-000001, under the auspices of the Institute for Information Infrastructure Protection (I3P). The contents of this paper do not necessarily reflect the views of the sponsors.

References

- [1] Benisch, M., Kelley, P., Sadeh, N., and Cranor, L. Capturing location-privacy preferences: Quantifying accuracy and user-burden tradeoffs. *Personal and Ubiquitous Computing* 15, 7 (2011), 679–694.
- [2] Brush, A. B., Krumm, J., and Scott, J. Exploring end user preferences for location obfuscation, location-based services, and the value of location. In *Proceedings of the 12th ACM international conference on Ubiquitous computing (Ubicomp '10)*, ACM (New York, NY, USA, 2010), 95–104.
- [3] Consolvo, S., Smith, I., Matthews, T., LaMarca, A., Tabert, J., and Powledge, P. Location disclosure to social relations: Why, when, & what people want to share. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '05)*, ACM (New York, NY, USA, 2005), 81–90.
- [4] Humphreys, L. Mobile social networks and social practice: A case study of Dodgeball. *Journal of Computer-Mediated Communication* 13, 1 (2008), 341–360.
- [5] Lindqvist, J., Cranshaw, J., Wiese, J., Hong, J., and Zimmerman, J. I'm the mayor of my house: Examining why people use foursquare - a social-driven location sharing application. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '11)*, ACM (New York, NY, USA, 2011), 2409–2418.
- [6] Malhotra, N. K., Kim, S. S., and Agarwal, J. Internet Users' Information Privacy Concerns (IUIPC): The construct, the scale, and a causal model. *Information Systems Research* 15 (December 2004), 336–355.
- [7] Patil, S., and Lai, J. Who gets to know what when: Configuring privacy permissions in an awareness application. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '05)*, ACM (New York, NY, USA, 2005), 101–110.
- [8] Wang, Y., Norcie, G., Komanduri, S., Acquisti, A., Leon, P. G., and Cranor, L. F. “I regretted the minute I pressed share”: A qualitative study of regrets on facebook. In *Proceedings of the Seventh Symposium on Usable Privacy and Security, SOUPS '11*, ACM (New York, NY, USA, 2011), 10:1–10:16.