"It's kind of like an extra screen for my phone" Understanding Everyday Uses of Consumer Smart Watches

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Abstract
The CHI, Ubicomp, and UIST communities have been studying watch-based interactions for many years. While much of this work has been technical or focused on interaction techniques in the lab, now smart watch devices are available directly to consumers from a variety of manufacturers. However, little has been studied as to why people adopt these devices and the real-world problems that they are solving in their lives. We set out to explore current smart watch use in an interview-based study of five diverse participants. We will use data from this study to help design and develop new smart watch applications.

Introduction
Smart watches, devices that pair with a smart phone and provide notifications often with additional applications on the watch, are now readily available from many manufacturers. Consumer interest is growing with new devices hitting the market at a rapid pace.

While smart watch interaction has been a topic of study in the CHI community, and especially at forums such as ISWC, little has been explored about consumer motivations for selecting and using today's

commercially available smart watches. What applications drive their purchase decisions and what keeps them using the devices from day to day? What are the main pain points of using a smart watch and what are the social implications of owning and using one around others?

We set out to answer these questions through an initial interview-based study with five diverse smart watch owners. The findings from this work can be beneficial for anyone developing smart watch devices or applications.

Related Work

Smart watches have been a topic of study in the CHI, UIST, and Ubicomp communities for decades (e.g. [5]). However, many of these papers focus on creating novel hardware or interaction techniques that are frequently not evaluated in everyday life. These papers do not give us a sense of why a consumer would buy one of these devices or what they would do with it on a daily basis.

Ashbrook et al. studied the time it took participants to remove phones from their pockets or purses and the likelihood that they would miss a phone call because of this time [1]. Having easy access to calls and notifications is a common benefit of today's smart watches.

Smith [7] and Martin [6] both discuss the importance of fashion and device styling in consumer acceptance of wearables. As both of these papers deal with previous generations of devices, we wanted to know to what extent today's early adopters of Android and Linux-based smart watches were influenced by the design and which aspects of the design mattered most to them.

Looking at watch-based interactions, Ashbrook et al. explored round watch-screen interactions and explicitly looked at error rates for selection tasks [2]. Chen et al. explored tasks that can be performed using watches and smartphones together [3]. Lee and Starner explored the ability of people to discern different vibration patterns on the wrist for different types of notifications [4].

While many of these technologies and interaction paradigms made it into commercial smart watches, little can be gleaned about why people actually choose to use these devices from this literature.

Method

We recruited five diverse users from the San Francisco Bay Area to visit our lab and participate in a one-hour semi-structured interview focusing on their use of their smart watch. Interviews took place between October and December in 2014. Our study included two female and three male participants, with ages ranging from 18 to 51. Only two of the five participants worked in technology-focused job roles. All participants purchased their own device and had been using it for four months or longer. They used a variety of devices, from Android Wear devices to Samsung watches or Pebbles, as shown in Table 1.

The interview focused on several themes around how they use their watch in their daily lives. Researchers asked to see specific applications or notifications on the device to understand how it worked, and how the participant thought that it worked. Other themes

focused on likes and dislikes of their device and how they acquired it. Participants were compensated for their time.

	Age and Gender	Occupation	Device Type
P1	41 (F)	Financial Officer	Samsung Galaxy Gear
P2	51 (M)	Software Sales	Pebble
P3	41 (F)	K-12 Teacher	Samsung Galaxy Gear
P4	18 (M)	College Student	Pebble
P5	38 (M)	IT Consultant	Moto 360

Table 1. Participant demographics.

All data from interviews was transcribed and prepared for a grounded theory-based affinity analysis. Individual quotes from participants comprised the item level of analysis and themes grew inductively as the analysis progressed.

Findings

Our affinity analysis yielded data about several aspects of the smart watch experience. We learned about how users decided to acquire their devices, how they set them up, how they use them, and issues they face. Themes emerged inductively through a grounded theory based affinity method using exact quotes from users as the items of analysis. Each subsection below is a high level theme from this analysis with paragraphs exploring many of the subthemes that emerged. All sub-themes were supported by multiple participants.

Purchase Considerations and Customization

All participants in our study wore a traditional watch prior to their smart watch purchase, ranging from "one of those retro-looking LCD watches" (P4) to an expensive Alpina Regulator (P2). Several considerations factored into their ultimate choice of smart watch, including price, compatibility with existing smartphone and aesthetics.

Smart watch owners often discussed the lack of stylish options available on the market. One important feature was a design that could "pass as a watch" in everyday interactions, and didn't look like "some horrible wrist communicator thing, [like] Dick Tracy" (P5) or "a big monster on my hand" (P1). For this reason, participants looked for watches whose design felt "subdued" and "neutral," and whose color wouldn't draw extra attention to the watch.

Having a smart watch whose design would be appropriate for both casual and business events was also an important factor, though several participants did not feel like their watch would be appropriate to wear in certain formal contexts. Pebble owners discussed feeling disappointed initially with the plastic casing of the watch, since "it seems a little cheap" (P2) and would "look bad with suits" (P4). Similarly, P1 did not feel her Samsung Galaxy Gear was always appropriate: "This is more like a casual kind of personal thing, but if it's serious like in a business setting, I would definitely not use my watch."

Both women in our study discussed the challenges of finding a smart watch on the market that seemed designed with women in mind. As P3 noted, "It looks like they were [all] made for a traditional man to

Figure 1. Participant smart watches. Samsung Galaxy Gear (P1, top), Moto 360 (P5, mid), Pebble (P2, bottom).

wear…it will just look like a big, huge man's watch." P1 eventually purchased a smart watch with a white and rose metal band, since it best resembled a women's "fashion" style watch.

Application Use

Viewing notifications from the phone was the most-used smart watch feature among all participants. Generally, participants pushed all notifications from the phone to the watch, without using filtering options provided by the smart watch to further limit the amount of notifications they receive. Interestingly, phone notifications often eliminated the need for a dedicated app on the watch. For example, P2 set up the Sports Center app on this iPhone to send push notifications about his favorite teams, which allowed him to follow live sports events on the watch—without the need for a dedicated application.

With respect to applications, first-party software received more use, in particular the apps related to health and fitness (e.g. pedometers and calorie counters) and navigation (e.g. GPS). Messaging on the watch regarding health behavior motivated participants to not only meet their daily health goals—"It's been more of a motivation…when my watch tells me, 'Hey, only x more steps to get your daily goal'" (P5)—but also encouraged them to continue wearing the watch so they're "getting the credit for [their] movement" (P3).

While participants downloaded third-party smart watch applications, such as Facebook, eBay and Swarm, the everyday use of these applications was limited. Participants had typically installed the same applications on both on their smart watch and smartphone—with the phone-based apps offering full functionality, and the watch applications offering only limited features that were sometimes cumbersome to operate on the watch.

Smart Watch Use in Public Settings

DRAWING ATTENTION

Participants often felt that their smart watch was still viewed as a novelty, drawing attention in public settings. Following the September 2014 announcement of the Apple Watch, participants have said attention toward their watch has increased. "I'll pull up [on the smart watch] and the screen will pop up and they'll go, 'Oh, is that… the Apple Watch' is actually what many people say, and it's—no" (P5).

Despite the increase in discussions around smart devices, participants mentioned that they rarely saw others using a smart watch, even though the San Francisco Bay Area is home to many large technology companies. As P1 mentioned, "After I bought it, I realized that, hey, not as many people have this or have heard of it."

While all participants discussed the smart watch providing them much more freedom to discretely check their phone notifications in settings in which looking at a phone would be socially unacceptable—"In a sense, it's way to make me less rude to people" (P5)—some actions, such as using voice commands, seemed awkward in a public. "If I'm in public, I feel kind of like an idiot talking to my wrist" (P5).

PRIVACY AND SURVEILLANCE

Participants often described misunderstandings they had with others due to the recording capabilities of some smart watches. As P1 described, "People always

come to me and say, 'Oh now you can secretly take pictures and videos of me.' I'm like, 'I'm not a lunatic.'" Similarly, P3 mentioned that "I show people about like how you can take pictures, and how you can record, and they're like, 'Oh yeah, oh wow, that's kind of creepy.'"

Owning and using a smart watch has also made some participants think more seriously about others' ability to record them in public. P3 says this has been "a scary eye-opener": "You probably want to be careful about what you say, or maybe think again about what you're presenting, because you don't know if someone's really going to be recording you."

In their everyday lives, these smart watch owners take some precautions to make sure any personal information displayed on the watch remains private. P2 and P4 both mentioned that their long sleeves obscure the smart watch from others. According to P2, "Usually I'm wearing long sleeves at work, so I can easy keep the watch underneath my sleeve, so in case something pops up that shouldn't—it wouldn't be an issue."

Additionally, participants did not feel the information displayed on the screen would be easily seen by those standing close to them, further easing some of their privacy concerns. P2 thought the watch's "text is generally only large enough for myself to see."

Limitations of Current Devices

The largest limitation of current smart watches, discussed by all participants, was their lack of autonomy from their smart phone counterparts. As P5 summarized, "'Smart watch' is kind of a misnomer—it's kind of more like an extra screen for my phone." Participants generally felt tethered to their phones while using the watch, often making direct references to the radius they could wander away before losing Bluetooth connectivity—and thus access to notifications and Internet connectivity.

Apart from connectivity, participants often found it necessary to switch back to the phone to perform many basic tasks, such as reading e-mail, taking photos and messaging contacts. "Granted that you have to be within 10 feet of your phone [to use the watch], you might as well use your phone, right?" (P1).

Discussion

Today's smart watches represent a first step towards widely available connected wearable devices that can provide a range of information to the user. However many of the limitations pointed out by our participants still stand in the way of smart watch applications becoming fully functional in their lives.

One major area where smart watch apps can improve is in working when apart from the main smartphone. Apps should try to opportunistically cache data when connections are available so that if a user does roam "10 feet" away from their device, they can still access that content (e.g. sports scores, news headlines, latest emails, etc.) for a specific application.

Applications should also be much more full-featured than today's current offerings. Most smart watch applications today only offer a small subset of app functionality. And as our participants stated, it's often undesirable to use this stripped-down version when your phone is likely within reach. Providing more full-featured apps and apps that can work apart from the

phone and re-sync with the network at a later time will help people to keep their phones away and spend more time interacting with the watch applications.

Finally, it is clear that fashion is still a large consideration when choosing a smart watch. But fashion applies not only to the design of the device itself but also to the applications that run on it and are often publicly visible, at least at a distance. Application designers should take as much care in designing a beautiful app that will be "worn," as device manufacturers take in designing a beautiful device.

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