Poster Abstract: Sensing People's Time Management Behaviors: A Study Using Wearable Devices

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ABSTRACT

Nowadays, people spend more and more time with their smartphones. They want to make good use of smartphones to achieve an efficient time management. However, many people fail to control the time spent on smartphones effectively and end up with a low task completion rate. We design a time management APP targeted to analyze the time management task completion. In this way, a clear picture of the reasons for a low task completion rate is drawn by us, which could be very useful to help people better manage their time and complete their tasks.

CCS CONCEPTS

• **Human-centered computing** → **Ubiquitous and mobile computing design and evaluation methods**;

KEYWORDS

Human-centered Computing, Sensing Time Management, Wearble Devices

1 INTRODUCTION

In recent years, smartphones are widely used in people's life. Unfortunately, due to the existence of phone calls, SMS, Email and mobile APPs' updates, notifications pop up from time to time [4]. It is difficult for people to concentrate on one task for a long time, which may lead to a low task completion rate. Therefore, time management is necessary. When people work with the aid of technological tools, the ones with proper time management strategies may be less influenced by the negative impact of these technological tools [1]. Apart from having much more concentration and efficiency during school or working time, people with better time management capabilities live a more efficient life and encounter less emotional problems [3].

Because of the significant benefits of time management, we desire to sense and understand people's time management behaviors. To
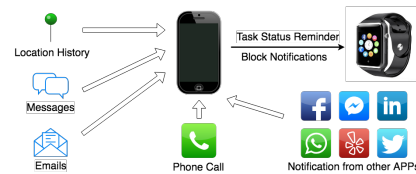
Figure 1: System Design

be specific, the key point of time management behaviors is the task completion. In [2], the software recorded the task completion of projects in corporation. Apart from recording the task completion, we also wonder the potential factors affecting task completion and provide the suggestions about the enhancement of task completion rate. Therefore, in this paper, we design a novel application for time management and record the task completion and different influencial factors.

In this paper, we use a wearable device (a smartwatch) as an important component of our experiment. Nowadays, wearable devices outstand and become widely used because of its lightweight, usefulness and fashion, etc. According to the statistics from the International Data Corporation Worldwide Quarterly Wearable Device Tracker, in 2017, the total wearable device shipments reached 115.4 million units. On the smartwatch, we block all the notifications from the smartphone to separate it from the smartwatch and provide users a relatively independent and quiet working environment. Only the pre-scheduled task status can be viewed on the smartwatch. Therefore, we can track the users' time management behaviors without the disturbance from smartphones.

To the best of our knowledge, there are few time management applications on smartwatches that fully support and record users' task completion. This paper presents the first attempt to collect and analyze users' patterns about using smartphones. This allows a collective understanding of users' task completion rate and how it is influenced by smartphones.

2 SYSTEM OVERVIEW

As is shown in Fig. 1, our system consists of two parts: the smartphone part and the watch part. The smartphone is responsible for the configuration and execution of the APP. Fig. 1 demonstrates that our APP collects the location history and notifications. The sources of notifications include phone calls, SMS, Email and mobile APPs. Meanwhile, the watch receives the task completion status, i.e. "Working" and "Resting", from the smartphone. Once our time management APP is running on the watch and it is under the "Working" status, all other notifications from the smartphone are blocked. Only the status of task completion is displayed. In this way, the watch provides a "quiet environment" with less disturbances, which is separated from the smartphone.
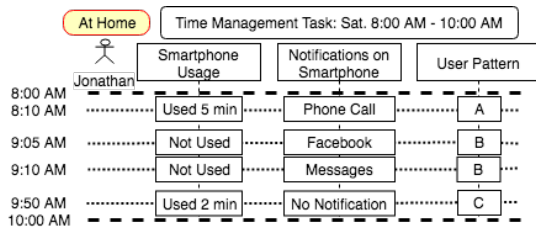
Figure 2: Usage Scenario

With our APP, users can set the time management task every day. Fig. 2 displays a typical scenario of our user. Our user, Jonathan, sets a time management task to work from 8 a.m. to 10 a.m. on Saturday. Our assumption is that users stay away from the smartphone during tasks. Therefore, during this two-hour task, Jonathan only sees the hint of "Working" on the watch, and the watch cannot receive any notifications from smartphone. However, his smartphone beeps or rings and pops up several notifications from different sources, including phone calls, SMS, Email, etc. He may be distracted by these beeps or rings, so that he uses the smartphone to check what happens. There is also the case that he feels boring while working, so he reaches out for smartphone for some fun. The three kinds of user patterns in Fig. 2 are concluded as below.

(A) After the ringing or popping up of some notifications, Jonathan is attracted by the smartphone and spends some time on it.
(B) Although there are some notifications popping up on the smartphone, Jonathan still concentrate on working.
(C) Although there is no notification popping up on the smartphone, Jonathan is still distracted by the smartphone.

Each user of the APP has several scenarios like this every day. For these user patterns, we record whether the user uses the smartphone, duration of usage and the corresponding notification information.

3 THE PROPOSED ANALYSIS

With the system and the APP, we propose to analyze the potential factors affecting task completion:

- **Smartphone-related Factors** Obtaining users' consent, our APP records the notifications and the usage history of other APPs on the smartphone. We find the low task completion rate has something to do with these factors. Therefore, the impact of smartphone notifications on people's task completion rate could be better understood.
- **Task-related Factors** Since we keep the record of the pattern of task completion during the working hours set by users, we analyze the pattern to answer the following questions, "Which time period of a plan will people's attention be less concentrated?", "Do people with a better task completion history tend to create more tasks in the future?".
- **External Factors** The time of the task, location and users' occupation can influence task completion. In working days and working places, people usually have a higher task completion rate. We want to know that whether people prefer to block time on weekdays compared to weekends or holidays and whether people plan to have more working tasks during daytime rather than nighttime. We also wonder whether the

Rank	Factors	Category
1	Category of APP (social networking, business, games ...)	S
2	Progress of the current task	T
3	Location (home, working place ...)	E
4	Time (time of a day, holiday or not ...)	E
5	Task completion history	T
6	Type of notification (ring, beep ...)	S
7	Users' occupation (students, professionals ...)	E

Table 1: Factors Affecting Task Completion (S: Smartphone-related Factors, T: Task-related Factors, E: External Factors)

task completion rate is related to people's occupation and location, and, if related, to what extent.

To study these potential factors, we design an 1 minute online survey, e.g., asking a smartphone user what factors influence task completion and the importance level of each factor. Our survey is advertised via WeChat platform and covers 93 participants, of whom 88% are from China. For the results of this online survey, Table 1 displays the ranking of different factors. Our participants thought that the category of APP has the greatest impact, followed by the progress of the current task and locaiton.

4 CONCLUSIONS & FUTURE WORK

This time management APP is used to better understand people's task completion. We expect that, with this time management APP, reasons for low task completion rate are analyzed according to the time usage patterns.

For future work, we propose to deliver our APP to a set of users, collecting more users' information and APP usage history. Additionally, based on the data collected by the APP, we plan to customize the suggestions to each user. We desire to provide our users with the recommendation for settings of the smartphone and task planning. In this way, the time management APP will be enhanced accordingly to help people manage their time better.

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