

Undergraduate Thesis Prospectus

Managing Anxiety through Mobile Application Training Suites

(technical research project in Computer Science)

Mobile Phones and Relationships

(STS research project)

by

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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General Research Problem

How do mobile phones change human behavior? Wireless technology surrounds us. According to the Cellular Telecommunications Industry Association, “there are more than 400 million connections in America, equal to 1.2 wireless devices for every person in the country”, and “the number of smartphones in active use grew 31% from 2014 to 2017” (CTIA 2019). Such connectivity suggests we are closer to friends and family than ever before, but how true is this? A quick YouTube or Google search reveals recommendations to put your phone down to connect deeply with love ones. As smartphones proliferate, will they isolate or unite us?

Managing Anxiety through Mobile Application Training Suites

How can a mobile application training suite relieve the user’s anxiety? Our capstone team will be working on this project under Professor Ahmed Ibrahim of the Computer Science Department. We will work with MindTrails, a UVA research initiative, to create an application that can collect data from the user’s phone through accelerometers, GPS, and heart rate sensors. This data will be used in addition to the existing data collected by MindTrails to create trainings that prepare the user to better handle their anxiety. MindTrails provides cognitive bias modification interventions in order to relieve a patient’s anxiety. According to MindTrails, cognitive bias is the tendency to “pay attention to, remember, and interpret things differently when processing information tied to your emotional responses” (MindTrails, 2019). By setting up a suite with small training sessions, participants can change their cognitive biases to help prevent

anxious thoughts. The American Psychological Association analyzed the effectiveness of short training sessions on anxiety and found that “after just eight 15-minute sessions... 72 percent of patients in the treatment group no longer met diagnostic criteria for social anxiety disorder, compared with 11 percent of patients in the control group” (Weir, 2011).

Currently, MindTrails offers their training sessions through a website platform. While the MindTrails team has had success with getting users to register for the study, they have faced problems retaining users until the end of the study. They have tried to fix this by sending email and text reminders and by offering gift card rewards for completing multiple sessions. While this has moderately increased returning users, it does not keep enough participants to warrant the cost of the gift cards. Another problem that MindTrails has faced is meeting the user’s needs during spikes in anxiety or stress. Accessibility to the website in these situations is not always perfect, as participants may not have access to a web-enabled device or Wi-Fi network. Due to the structure of the MindTrails training suite, having a constant access to sessions is key to the overall success of the program.

Application Design

In order to solve these problems, our capstone team has been tasked with creating a cross-platform mobile application for MindTrails. The goal of this app is to better address the problems of user retention and session accessibility that MindTrails currently faces. The retention rate can be improved through system notifications that remind the user of their available sessions. These notifications would lead the user directly to their current sessions. This would improve upon the current process that requires the user to

check for an email or text message, log into the website, and then navigate to the desired sessions. The app will resolve accessibility problems by storing the user's current working sessions locally, allowing them constant access to MindTrails in the absence of an Internet connection.

Application Requirements

Gathering requirements is essential for the overall success of our project, as the requirements we gather will determine the work done within the time frame of the capstone project. Quality requirements are important to ensure that we resolve the problems that originally created the desire for a mobile MindTrails app. Since MindTrails personnel will maintain the app after our capstone project completes, it is important that our build is aligned with the overall goals and skills of the MindTrails development team. Our requirements are broken into three sections: minimum, desired, and optional.

Minimum Requirements: Functionality required by the end of the Fall 2019 semester

- Authenticate users using login information
- Perform any tasks available on the website within the mobile application
 - Be able to complete questionnaires
 - Be able to complete quizzes
 - Be able to complete training
- Give users reminders for available training modules
- Cross-platform availability (iOS and Android)
- Have user information remain private and secure

Desired Requirements: Functionality required by the end of the Spring 2020 semester

- Notify users when an intervention may occur
- Have access to training and intervention sessions without Internet connection and sync information with the cloud upon reconnecting to the Internet
- Have the application read mobile sensor data (GPS, accelerometer)
- Optimize the user experience for mobile platforms
- Optimize screen layout for both portrait and landscape views
- Utilize the same API endpoints to supply data to both web and mobile platforms
- Utilize the Sensus API to collect sensor data

Optional Requirements: Functionality that is wanted, but not required

- Integrate with wearable technology
- Login using fingerprint or face ID (on applicable devices)
- Give users the option to manually sync progress between web and mobile platforms

Mobile Phones and Relationships

How do critics and defenders of phones as a medium of interpersonal relationships advance their respective agendas? Phones have transformed human interaction. AT&T's old slogan was "Reach out and touch someone" (Jago, 2015), suggesting that telecom enhances personal relationships. However, Thomas Insel, a psychiatrist and neuroscientist, contends that smartphones can diminish attention span, impair relationships, and harm mental health (Insel, 2018). Some groups argue that phones are essential for relationships, while others contend that phones impair our interpersonal skills and are highly addictive.

Przybylski and Weinstein (2012) concluded that the mere presence of a phone interferes with feelings of closeness and connections and impair conversations. They found a strong mind-to-phone connection. “Phubbing” is a new term for snubbing others through mobile phone distractions. David and Roberts (2017) concluded that phubbed individuals perceive social exclusion that leads them to seek attention from their phones, so as to feel included. They found that phones serve as substitutes for actual interpersonal skills.

The International Telecommunication Union (ITU) is committed to the coordination of telecommunication operations and services throughout the world. ITU contends it is “committed to connecting the world.” Furthermore, ITU notes that in 2018 “51.2 percent of the global population, or 3.9 billion people” are using the internet (ICT Statistics 2018). According to CTIA, 93% of surveyed consumers believe wireless messaging is a trusted communications environment and 89% of people always have their smartphone within arm’s reach (CTIA 2019).

Due to the mass of the telecommunication companies and their associations, critics of phones are marginalized. Only semi-organized groups emerge, such as Simon Sinek and his followers. Sinek and his videos are widely referenced online. His most popular videos have from 47k to 11M views. They include titles such as “How Do Cell Phones Impact our Relationships,” “Addiction to Technology is Ruining Lives,” and “This is Why [Millennials] Don’t Succeed” Sinek compares alcohol abuse to cell phones. He contends that notifications on our phones trigger the release of dopamine, the neurotransmitter responsible for pleasure. Hence many people check for notifications frequently because a lack of notifications can cause stress, many people carry their phone

in their hands and put it on a table nearby (AEALearningOnlineLive 2015). According to Sinek, such practices damage interpersonal relationships. He warns that in a meeting a phone on the table, signals that others present are not the most important people to the phone user. Sinek states that real relationships are formed during downtimes, in meetings and classes, that are now being filled with phone browsing. His advice for cell phones and relationships is to put the phone away completely to show someone you care.

Phone users who feel addicted can turn to Net Addiction Anon. Its members “work together... to inform, connect and educate families and individuals who may be suffering with addiction, specifically to digital devices and the internet” (Peck 2019). Net Addiction Anon claims that internet addiction due to cell phones turns family dinners into silent rituals, causes people on the street to collide, and leads people who claim not to be addicted to take the device everywhere (Peck 2019). Net Addiction Anon claims that tech companies purposefully addict users for profit.

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