

Consent Form: Social Behavioral

Title of research study: Human-in-the-Loop Data Collection Using Wearable Sensors and Mobile Devices for Machine Learning Algorithm Design

Investigator: Dr. Hassan Ghasemzadeh, Associate Professor in the College of Health Solutions at Arizona State University

Why am I being invited to take part in a research study?

You are being asked to take part in a research study carried out by Dr. Hassan Ghasemzadeh and his research assistants, Abdullah Mamun and Asiful Arefeen. This form explains the research study and your role in it if you decide to join the study. Please read the form carefully, taking as much time as you need. Ask the researcher to explain anything you don't understand. You can decide not to join the study. If you join the study, you can change your mind later or quit at any time. Participation may be discontinued at any time, and there will be no penalty or loss of services or benefits if you decide to not take part in the study or quit later. This study has been approved for human subject participation by the Arizona State University Institutional Review Board.

Why is this research being done?

This research study aims to collect sensor data that will be used to develop machine learning algorithms. We want to collect data from a set of typical activities of daily living. The data collected in this study will be fully de-identified. You are being asked to take part because you are eligible to participate in this experiment. You will be considered eligible if you 1) are 18 years of age or older, 2) speak English, 3) have the desire to participate in data collection, and 4) have an Android smartphone with data plan. You are not eligible to participate if 1) you have severe cognitive, hearing, visual, or mobility impairment that would impact your ability to complete study procedures. We will collect data from 20 individuals in this study.

How long will the research last?

We expect that individuals will spend 7 days participating in the proposed activities.

How many people will be studied?

We expect about 20 people will participate in this research study.

What happens if I say yes, I want to be in this research?

You are free to decide whether you wish to participate in this study. You can also opt-out at any time during the study. If you decide to participate, you will need to do keep your smartphone with you (pocket/purse) and optionally carry a wearable camera with you for as much as possible for a week. You will need to install our app for collecting sensor data from your smartphone, which will be sent to our server. Our app will not access your smartphone camera, microphone, or browsing activities. You can do all kinds of regular daily activities. In addition, you will be requested up to 10 times per day through our app to submit what activities you were doing at certain moments of the day. According to our calculation, one survey should not take more than 3 minutes. So, the 10 surveys should not take more than 30 minutes.

We will conduct one assessment at the baseline using the testmybrain (testmybrain.org) platform. This one-time baseline cognitive assessment will focus on cognitive domains relevant to the users' ability to provide accurate behavioral labels (i.e., attention, self-monitoring, memory, vocabulary, and executive functioning) and takes approximately 30 minutes to complete. We will ask some basic demographic information (age, gender, weight, height, and race/ethnicity). The sensor signals of your body movements will be collected from the sensors present in the smartphone. Your heartrate, skin conductance, and skin temperature will be collected using the Empatica E4 wristband. The wearable camera will capture the images of your surrounding in a regular interval. All the data will be encrypted before storing on the server. No human other than you will look at the images collected by the wearable camera. You can turn ON/OFF the data collection from the smartphone or the wearable camera any time you want. You will need to stop by our lab at the ASU Health Futures Center (HFC) every other day for swapping your Empatica E4 device during the 7-day data collection period. An alternative arrangement of meeting at the ASU Tempe campus can be made if you are unable to come to our lab at the HFC building.

At the end of the study, we will give each participant an Amazon gift card worth up to \$100 depending on the contribution as a gesture of our gratitude.

It will be a \$100 gift card if you

- i) complete all 7 days, and for that period
- ii) wear the Empatica E4 device and allow smartphone data collection through our app for at least 10 hours a day, and
- iii) complete the prompts shown up on the app asking your activities and emotional state at least 8 times a day.

For any day when the conditions **ii** and **iii** are not fulfilled, \$10 will be deducted from the value of the gift card. For example, if you complete 5 days fulfilling conditions **ii** and **iii**, and wish not to continue this study, your gift card will be worth \$80.

We need high-quality and labeled data. So, if a participant is willing and able to record their activities and complete the emotional state surveys at least 16 times a day while allowing Empatica and Smartphone data collection for at least 10 hours a day, they will complete their study in 5 days instead of 7 days, and they will receive a \$100 gift card.

What happens if I say yes, but I change my mind later?

You can leave the research at any time. It will not be held against you.

Is there any way being in this study could be bad for me?

The potential risks from taking part in this study are physical discomfort, emotional discomfort, time inconvenience, and fatigue caused by logging your physical and emotional status in the mobile app for 7 days. The risk to privacy and breach of confidentiality are minimal because images captured by the camera are encrypted while stored. Efforts will be made to minimize the risk of breach during the temporary decryption of the images for training machine learning models. Apart from that, they will only be decrypted on the smartphone you carry (i.e., only you can see the pictures in order to help you remember what you were doing in the past). Captured images can contain non-assented people, especially those who are not in public, but only you can see the image and no other human (i.e., the images will not be looked at by the study team). You can ask that the test be discontinued, and you can withdraw from the study at any time. There may be some unanticipated discomforts or risks in addition to those stated above, but every precaution will be taken to assure your personal safety and to minimize

any discomforts. If you are injured during the study, you should contact the primary investigator as soon as possible by email at Hassan.Ghasemzadeh@asu.edu or by phone (972) 259-7816.

Will being in this study help me in any way?

This study will not benefit the participants.

What happens to the information collected for the research?

Your personal information (Name, email address, and phone number) will be kept in a locked office and stored separately from the data collected in this study. Once you have completed the study, your contact information will be destroyed. Sensor data will be temporarily stored on smartphone. Sensitive data such as location coordinates and images will be encrypted, and all data will be sent to a secure server for storage. Sensor data will be used in our analysis and training machine learning algorithms. In some cases, we may use the images for training or calibration of the machine learning models but our research team will not look at the images.

The data for this study will be kept confidential to the extent allowed by federal and state law. Any information used for scientific publication will be used without disclosure of personally identifying data. Research findings will be reported for groups of participants and not specifically for individuals. All data will be coded and entered into a computer database without reference to name or other identifying information. The original demographic data will be kept in locked offices.

Individually identifiable information (e.g., names, email address, and phone number) will be destroyed at the end of the data collection. The encrypted images and location data will be stored for one year after completion of the study on a password protected computer. These data will be destroyed after one year from completion of the study. We will keep fully anonymized sensor data (e.g., inertial, gravity, heart rate, epidermal activity, skin temperature) as well as cognitive assessment data, user-reported behavior, and emotional labels indefinitely. The data will be shared with the community for public use.

What else do I need to know?

This research is being funded in part by National Science Foundation (NSF).

Who can I talk to?

If you have questions, concerns, or complaints, talk to Abdullah Mamun at (425) 615-4157 or Hassan Ghasemzadeh at (972) 259-7816.

This research has been reviewed and approved by the Social Behavioral IRB. You may talk to them at (480) 965-6788 or by email at research.integrity@asu.edu if:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You have questions about your rights as a research participant.
- You want to get information or provide input about this research.

Signature Block for Capable Adult

Your signature documents your permission to take part in this research.

Signature of participant

Date

Printed name of participant

Signature of person obtaining consent

Date

Printed name of person obtaining consent