



OFFICE OF THE VICE CHANCELLOR FOR RESEARCH

Office for the Protection of Research Subjects
805 W. Pennsylvania Ave., MC-095
Urbana, IL 61801-4822

Notice of Approval: New Submission

April 17, 2019

Principal Investigator	Michael Bailey
CC	Joshua Reynolds, Joshua Mason, Zane Ma, Paul Murley, Deepak Kumar
Protocol Title	<i>Analysis of Two-Factor Authentication Adoption Records</i>
Protocol Number	19697
Funding Source	Funded
Review Type	Exempt 4
Status	Active
Risk Determination	No more than minimal risk
Approval Date	April 17, 2019
Closure Date	April 16, 2024

This letter authorizes the use of human subjects in the above protocol. The University of Illinois at Urbana-Champaign Institutional Review Board (IRB) has reviewed and approved the research study as described.

The Principal Investigator of this study is responsible for:

- Conducting research in a manner consistent with the requirements of the University and federal regulations found at 45 CFR 46.
- Using the approved consent documents, with the footer, from this approved package.
- Requesting approval from the IRB prior to implementing modifications.
- Notifying OPRS of any problems involving human subjects, including unanticipated events, participant complaints, or protocol deviations.
- Notifying OPRS of the completion of the study.

IRB Number: 19697

Human Subjects Research – Exempt Form

Guidelines for completing this research protocol:

- Please submit typed applications via email. Handwritten forms and hard copy forms will not be accepted.
- For items and questions that do not apply to the research, indicate as “not applicable.”
- Provide information for all other items clearly and avoid using discipline-specific jargon.
- Please only include text in the provided boxes. The text boxes will expand as they are typed in to accommodate large amounts of text.
- Ensure that your research qualifies as exempt. Exempt categories of research can be viewed [here](#). If the proposed research does not qualify in any of these categories, please complete and submit the [Protocol Form](#).

Before submitting this application, ensure that the following have been completed.

- Exempt Form is complete.
- Relevant CITI modules have been completed for all members of the research team at www.citiprogram.org.
- Informed consent/assent/parental permission document(s) are provided.
- Recruitment materials are provided.
- Research materials (e.g. surveys, interview guides, etc.) are provided.
- Any relevant letters of support are provided.

Instructions on the exempt review process and guidance to submitting applications, can be found on the OPRS [website](#). You may also contact OPRS by email at irb@illinois.edu or phone at 217-333-2670.

Submit completed applications via email to: irb@illinois.edu.

OFFICE FOR THE PROTECTION OF RESEARCH SUBJECTS		UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN	
805 West Pennsylvania Avenue, MC-095, Urbana, IL 61801	T 217-333-2670	irb@illinois.edu	www.irb.illinois.edu Revised: 12/3/18

Exempt Form

Section 1: PRINCIPAL INVESTIGATOR (PI)

The Illinois Campus Administrative Manual allows assistant, associate, and full professors to act as PI. Other individuals may serve as PI after obtaining approval from the necessary party.			
Last Name: Bailey	First Name: Michael	Degree(s): PhD	
Dept. or Unit: ECE/CS/ITI/CSL	Office Address: 444 CSL		
Street Address: 1308 W Main St.	City: Urbana	State: IL	Zip Code: 61801
Phone: 217-244-8830	E-mail: mdbailey@illinois.edu		
Urbana-Champaign Campus Status: Non-visiting member of (Mark One) <input checked="" type="checkbox"/> Faculty <input type="checkbox"/> Academic Professional/Staff (<i>Student Investigators cannot serve as PI</i>)			
Training <input checked="" type="checkbox"/> Required CITI Training, Date of Completion (valid within the last 3 years), 2/16/18 <input type="checkbox"/> Additional training, Date of Completion,			

Section 2. RESEARCH TEAM

2A. Are there other investigators engaged in the research? <input checked="" type="checkbox"/> Yes (include a Research Team Form) <input type="checkbox"/> No
2B. If yes, are any of the researchers not affiliated with Illinois? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Section 3. PROTOCOL TITLE

Analysis of Two-Factor Authentication Adoption Records
--

Section 4. FUNDING INFORMATION

4A. Is your research funded? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If no, is there a pending funding decision? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
4B. If either of the above were answered yes, please indicate the funding agency: Michael Bailey's ECE ICR
4C. A copy of the funding proposal is included: <input type="checkbox"/> Yes

Section 5. CONFLICTS OF INTEREST

Please indicate below whether any investigators or members of their immediate families have any of the following. If the answer to any of the following items is yes, please submit the University of Illinois approved conflict management plan. If you have any questions about conflicts of interest, contact coi@illinois.edu .
5A. Financial interest or fiduciary relationship with the research sponsor (e.g. investigator is a

consultant for the research sponsor). Yes No**5B.** Financial interest or fiduciary relationship that is related to the research (e.g. investigator owns a startup company, and the intellectual property developed in this protocol may be useful to the company). Yes No**5C.** Two or more members of the same family are acting as research team members on this protocol. Yes No**Section 6. RESEARCH SUMMARY****6A. In lay language, summarize the objective and significance of the research.**

Two factor authentication (2FA) is a recent trend in security to make it more difficult for attackers to take over user accounts. Adopting a mandatory 2FA policy is challenging and involves an institutional cost. Recent work has qualitatively described the effects on organizations and individuals of the change (see "It's not actually that horrible" Colnago et al. CHI. 2018).

We were approached by UIUC's Technology Services' security team with an offer to share the records they kept while implementing 2FA here on campus for use in our research. We plan to examine anonymized copies of UIUC's Technology Services' records of the methods they employed and the adoption rate of 2FA at UIUC. We intend to validate the observations of researchers who have reported on similar data at other institutions, as well as learn where the procedure may be improved.

The data that UIUC Technology Services has agreed to share with us consists of:

- + Anonymized records of when each graduate student, faculty member, or staff member enabled 2FA along with their gender, department, and employee type (hourly, salaried, etc).
- + Anonymized logs created when each person logs in with 2FA including whether they used the Duo app, a security key, or a SMS/phone call.
- + Records of the messaging and invitations sent out to encourage adoption
- + Anonymized survey results from 88 people who offered Technology Services some feedback
- + Anonymized transcripts of Help Desk Tickets regarding 2FA

6B. Indicate if your research includes any of the following:

- Secondary data (use of data collected for purposes other than the current research project)
- Data collected internationally (include [International Research Form](#))
- Translated documents (include [Certificate of Translation](#) and translated documents)
- Research activities will take place at Carle

6C. Letters of support from outside institutions or entities that are allowing recruitment, research, or record access at their site(s) are attached. Yes Not Applicable**Section 7. PARTICIPANTS AND RECRUITMENT****7A. What is the estimated total number of participants?** Secondary data only having to do with the approximately 38,000 faculty, staff, and students using 2FA at UIUC

Exempt Form

7B. Select all participant populations that will be recruited, either intentionally or unintentionally.**Age:**

- Adults (18+ years old)
 Minors (≤17 years old)
 Specific age range, *please specify*:

Gender:

- No targeted gender (both men and women will be recruited/included)
 Targeted gender, *please indicate*: Men/boys Women/girls Other, *please specify*:

Race/Ethnicity:

- No targeted race or ethnicity (all races and ethnicities will be recruited/included)
 Targeted race or ethnicity, *please specify*:

College Students:

- No targeted college population
 UIUC general student body
 Targeted UIUC student population, *provide the instructor or course information, name of the departmental subject pool, or other specific characteristics*:
 Students at institution(s) other than UIUC, *please specify*:

Any research with students on UIUC's campus needs to be registered with the [Office of the Dean of Students](#).

Other:

- People who are illiterate or educational disadvantaged
 People who are low-income or economically disadvantaged
 People who are non-English speaking
 Other, *please specify*:

7C. Select all recruitment procedures that will be used.

- Student subject pool, *please specify*:
 Email distribution
 MTurk, Qualtrics Panel, or similar online population
 US Mail
 Flyers
 Website ad, online announcement (e.g. eWeek), or other online recruitment
 Newspaper ad
 Verbal announcement
 Other, *please specify*:
 Not applicable (secondary data only)

Drafts or final copies of all recruitment materials are attached. Yes

7D. For each group of participants, describe the details of the recruitment process.

We will be examining secondary data only.

7E. Will subjects receive compensation or rewards before, during, or after participation?

- Yes No

If yes, provide a brief description of compensation or rewards.

Section 8. RESEARCH PROCEDURES**8A. Select all research methods and/or data sources that apply.**

- Surveys or questionnaires, *select all that apply*: Paper Telephone Online
- Interviews
- Focus groups
- Field work or ethnography
- Standardized written, oral, or visual tests
- Taste or smell testing
- Intervention or experimental manipulation
- Recording audio and/or video and/or taking photographs
- Materials that have already been collected or already exist, *specify source of data*:

Anonymized UIUC Technology Services records of two-factor adoption.

- [HIPAA-protected data](#)
- [FERPA-protected data](#)
- [GDPR-protected data](#)
- Other, *please specify*:

8B. List all testing instruments, surveys, interview guides, etc. that will be used in this research.

Secondary data only

Drafts or final copies of all research materials are attached. Yes**8C. List all locations where research will take place.**

n/a

8D. List approximate study dates. n/a**9E. What is the duration of participants' involvement?** n/a**8F. How many times will participants engage in research activities?** n/a**8G. Narratively describe the research procedures in the order in which they will be conducted.**

n/a

Section 9. CONFIDENTIALITY AND PRIVACY**9A. How are participant data, records, or specimens identified when received or collected by researchers? Identifiers include, but are not limited to, name, date of birth, email address, street address, phone number, audio or video recordings, and SSN.**

- No identifiers are collected or received
- Direct identifiers
- Indirect identifiers (e.g. a code or pseudonym used to track participants);
Does the research team have access to the identity key? Yes No

9B. Select all methods used to safeguard research records during storage:

- Written consent, assent, or parental permission forms are stored separately from the data
- Data is collected or given to research team without identifiers
- Data is recorded by research team without identifiers

Exempt Form

- Direct identifiers are removed from collected data as soon as possible
- Direct identifiers are deleted and no identity key exists as soon as possible
- Participant codes or pseudonyms are used on all data and the existing identity key is stored separately from the data
- Electronic data is stored in a secure, UIUC-approved location, *please specify*
- Hard-copy data is stored in a secure location On UIUC's campus, *please specify*
- Other, *please specify*: Data will be stored long-term on password-protected lab servers in the FERPA-compliant, access-controlled UIUC Advanced Computer Building. Data will also be on password-protected computers during analysis

9C. How long will identifiable data be kept? n/a

9D. Describe provisions to protect the privacy interests of subjects. Researchers will not have access to the identity key and cannot identify participants. Researchers will provide Technology Services with scripts to wipe personal information from each data source. Technology Services employees will use these scripts to provide anonymous data to researchers.

Free-form text in Help Desk tickets may be imperfectly anonymized. Using information from the structured elements of the help desk tickets, our anonymization program identifies and either censors or encrypts the sensitive names (Help Requestors and Help Respondents) – regardless of capitalization. Further all 9-digit numbers (UINs) and email addresses are encrypted before researchers see the document. This will allow correlation with other records, while making it impossible to learn the original UINs, emails, or names. Technology Services will create the encryption key and researchers will not have access to it.

This method is imperfect. For example, a misspelled version of someone's name or a nickname would not be anonymized because it would fail to match the set of information to censor. We will delete all identifying information as soon as possible if we discovery any. If we identify a systematic failure in our system, we will create a new censoring rule and apply it to all records before continuing analysis.

9E. Describe the training and experience of all persons who will collect or have access to the data. All persons who will collect the data have experience performing academic research. The responsible primary investigator, Michael Bailey, has published over 60 academic papers, many of which involve human subjects and thus IRB approval. The secondary investigator (Joshua Reynolds) is a second-year PhD student who has been an author of two conference publications involving human subjects, for one of which he was also the secondary investigator. The other investigators are a graduate student and a research scientist collaborating with them.

Section 10. CONSENT PROCESS**10A. Indicate all that apply for the consent process.**

- Written informed consent
- Waiver of Documentation (signature) of Informed Consent
- Online consent Oral consent Unsigned Information Sheet Provided

Exempt Form

<p>Explain why a Waiver of Documentation is necessary:</p> <p><input checked="" type="checkbox"/> Waiver of Informed Consent</p> <p>Explain why a Waiver of Informed Consent is necessary: We will make a good faith effort to anonymize the free-form entries in Help Desk tickets. This will be done based on pattern matching. We cannot guarantee all identifying information will be removed. We expect there to be failures in this method. See section 9D for more details.</p>
10B. List all researchers who will obtain consent from participants. n/a
10C. Describe the informed consent process. n/a
10D. Where will consent be obtained? n/a
<p>10E. Will participants receive a copy of the consent form for their records?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No, if no, explain:</p>
<p>10F. Indicate factors that may interfere or influence the collection of voluntary informed consent.</p> <p><input type="checkbox"/> No known factors</p> <p><input type="checkbox"/> Research will involve students enrolled in a course or program taught by a member of the research team</p> <p><input type="checkbox"/> Research will involve employees whose supervisor(s) is/are recruiting participants</p> <p><input type="checkbox"/> Participants have a close relationship to the research team</p> <p><input type="checkbox"/> Other, specify any relationship that exists between the research team and participants:</p> <p>If applicable, describe the procedures to mitigate the above factors.</p>
10G. Copies of the consent form(s) are attached. <input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable

Section 11. DISSEMINATION OF RESULTS

<p>11A. List proposed forms of dissemination (e.g. journal articles, thesis, academic paper, conference presentation, sharing within industry, etc.).</p> <p>Journal articles, thesis, academic papers, conferences, workshops, posters, talks, etc.</p>
<p>11B. Will any identifiers be published, shared, or otherwise disseminated? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>If yes, does the consent form explicitly ask consent for such dissemination, or otherwise inform participants that it is required in order to participate in the study? <input type="checkbox"/> Yes</p>
<p>11C. Do you intend to put de-identified data in a data repository? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>If yes, explain how data will be de-identified.</p>

Section 12. EXPECTED COMPLETION DATE

12A. What is the expected completion date of this research? December 2020
12B. Please note: Exempt protocols are given a closure date 5 years after their initial approval date, although researchers can request that the study remain open as the closure date approaches.

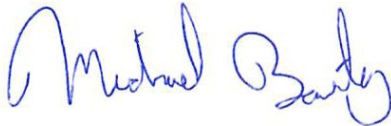
Section 13 INVESTIGATOR ASSURANCES

<p><input checked="" type="checkbox"/> I certify that the project described above, to the best of my knowledge, qualifies as an exempt study. I agree that any changes to the project will be submitted to the Office for the Protection of Research</p>
--

Exempt Form

Subjects for review prior to implementation. I realize that some changes may alter the exempt status of this project.

The original signature of the PI is required before this application may be processed (electronic signatures are acceptable).



4/9/2019

Principal Investigator

Date

Section 14. DEPARTMENTAL ASSURANCE (OPTIONAL)

If the PI is not eligible to serve as PI under the [Campus Administrative Manual](#), the applicable academic dean, institute director, or campus administrative officer indicates their approval of the researcher to act as Principal Investigator.

Applicable Authorizing Officer

Date



Research Team

For Listing Additional Researchers who are Involved in the Project

All forms must be typewritten and submitted via email to irb@illinois.edu.

When to use this form: If there are collaborating researchers participating in a research study, including those from other institutions, complete this form by listing all collaborating researchers. Include all persons who will be: 1) directly responsible for project oversight and implementation, 2) recruitment, 3) obtaining informed consent, or 4) involved in data collection, analysis of identifiable data, and/or follow-up. **Please copy and paste text fields to add additional research team members.**

Note:

- Changes made to the Principal Investigator require a revised [Protocol Form](#) and an [Amendment Form](#).
- A complete Research Team form with all research team members included needs to be submitted every time the research team is updated.

Section 1. PROTOCOL INFORMATION

1A. Principal Investigator: Michael Bailey
1B. Protocol Number:
1C. Project Title: Analysis of Two-Factor Authentication Adoption Records

Section 2. ADDITIONAL INVESTIGATORS

Full Name: Joshua Reynolds	Degree: B.S.	Dept. or Unit: CS
Professional Email: joshuar3@illinois.edu		Phone: 916-676-6076
Campus Affiliation: <input checked="" type="checkbox"/> University of Illinois at Urbana-Champaign <input type="checkbox"/> Other, <i>please specify:</i>		
Campus Status: <input type="checkbox"/> Faculty <input type="checkbox"/> Academic Professional/Staff <input checked="" type="checkbox"/> Graduate Student <input type="checkbox"/> Undergraduate Student <input type="checkbox"/> Visiting Scholar <input type="checkbox"/> Other, <i>please specify:</i>		
Training: <input checked="" type="checkbox"/> Required CITI Training, Date of Completion (valid within last 3 years): 14 Sept 2017 <input type="checkbox"/> Additional training, Date of Completion:		
<input checked="" type="checkbox"/> This researcher should be copied on OPRS and IRB correspondence.		

Full Name: Joshua Mason	Degree: PhD	Dept. or Unit: ECE
Professional Email: joshm@illinois.edu		Phone:
Campus Affiliation: <input checked="" type="checkbox"/> University of Illinois at Urbana-Champaign <input type="checkbox"/> Other, <i>please specify:</i>		
Campus Status: <input checked="" type="checkbox"/> Faculty <input type="checkbox"/> Academic Professional/Staff <input type="checkbox"/> Graduate Student <input type="checkbox"/> Undergraduate Student <input type="checkbox"/> Visiting Scholar <input type="checkbox"/> Other, <i>please specify:</i>		
Training:		



Office for the Protection
of Research Subjects

Research Team

<input checked="" type="checkbox"/> Required CITI Training, Date of Completion (valid within last 3 years): Mar 5 2018
<input type="checkbox"/> Additional training, Date of Completion :
<input checked="" type="checkbox"/> This researcher should be copied on OPRS and IRB correspondence.

Full Name: Deepak Kumar	Degree: B.S.	Dept. or Unit: CS
Professional Email: dkumar11@illinois.edu		Phone: 248-231-3575
Campus Affiliation:		
<input checked="" type="checkbox"/> University of Illinois at Urbana-Champaign <input type="checkbox"/> Other, <i>please specify</i> :		
Campus Status:		
<input type="checkbox"/> Faculty <input type="checkbox"/> Academic Professional/Staff <input checked="" type="checkbox"/> Graduate Student <input type="checkbox"/> Undergraduate Student		
<input type="checkbox"/> Visiting Scholar <input type="checkbox"/> Other, <i>please specify</i> :		
Training:		
<input checked="" type="checkbox"/> Required CITI Training, Date of Completion (valid within last 3 years): 4/8/19		
<input type="checkbox"/> Additional training, Date of Completion :		
<input checked="" type="checkbox"/> This researcher should be copied on OPRS and IRB correspondence.		

Full Name: Paul Murley	Degree: M.S.	Dept. or Unit: CS
Professional Email: pmurley2@illinois.edu		Phone: 512-569-4645
Campus Affiliation:		
<input checked="" type="checkbox"/> University of Illinois at Urbana-Champaign <input type="checkbox"/> Other, <i>please specify</i> :		
Campus Status:		
<input type="checkbox"/> Faculty <input type="checkbox"/> Academic Professional/Staff <input checked="" type="checkbox"/> Graduate Student <input type="checkbox"/> Undergraduate Student		
<input type="checkbox"/> Visiting Scholar <input type="checkbox"/> Other, <i>please specify</i> :		
Training:		
<input checked="" type="checkbox"/> Required CITI Training, Date of Completion (valid within last 3 years): 10/12/17		
<input type="checkbox"/> Additional training, Date of Completion :		
<input checked="" type="checkbox"/> This researcher should be copied on OPRS and IRB correspondence.		

Full Name: Zane Ma	Degree: B.S.	Dept. or Unit: CS
Professional Email: zanema2@illinois.edu		Phone: (310)-498-0016
Campus Affiliation:		
<input checked="" type="checkbox"/> University of Illinois at Urbana-Champaign <input type="checkbox"/> Other, <i>please specify</i> :		
Campus Status:		
<input type="checkbox"/> Faculty <input type="checkbox"/> Academic Professional/Staff <input checked="" type="checkbox"/> Graduate Student <input type="checkbox"/> Undergraduate Student		
<input type="checkbox"/> Visiting Scholar <input type="checkbox"/> Other, <i>please specify</i> :		
Training:		
<input checked="" type="checkbox"/> Required CITI Training, Date of Completion (valid within last 3 years): 2/9/19		
<input type="checkbox"/> Additional training, Date of Completion :		
<input checked="" type="checkbox"/> This researcher should be copied on OPRS and IRB correspondence.		

Support for 2FA Research

Barnes, Joe

Thu 4/4/2019 5:35 PM

To: Bailey, Michael Donald <mdbailey@illinois.edu>; Reynolds, Joshua Tyler <joshuar3@illinois.edu>

Cc: Judd, Taylor Allen <tjudd@illinois.edu>

University of Illinois Institutional Review Board,

Please consider this email, dated 4/4/2019, indicating that I am supportive of the Network Research Group led by Dr. Bailey at the University of Illinois using the data gathered while enrolling the UIUC campus into 2FA service. They will work with the University of Illinois Technology Services Privacy & Security team and will take on responsibility ensuring that PII and sensitive data is anonymized and not disclosed.

Thank you
Joe

Joe Barnes, CISSP
Chief Privacy & Security Officer
Technology Services
University of Illinois at Urbana-Champaign
jdbarns1@illinois.edu
217-265-6447