SMITH COLLEGE
IRB RESEARCH PROPOSAL FORM

PI:
Project #:
(IRB use only)

DOCUMENTATION OF REVIEW AND APPROVAL OF RESEARCH PROJECT INVOLVING HUMAN PARTICIPANTS

(Proposal form updated 8-6-14)

Project Title: *Theoretical Models of Human-Machine Interaction*

Date Research is to begin: *15 May 2016*

Date the collection of data is to end (anticipated): *May 2017*

Date you will conclude the analysis of data (anticipated): *May 2018*

Principal Investigator(s): *R. Jordan Crouser* **Affiliation:** *Smith Collge*

Dept: *SDS* **Ext:** *4036* **Home phone:** *(413)222-0907* **Email:** *jcrouser@smith.edu* **Non-Smith Email:** *jordan.crouser@gmail.com*

Faculty Adviser (required for all student research):

Person performing the work if different than above:

Affiliation: **Dept:** **Ext:** **Email:**

Home phone: **Email:**

As the signature below testifies, the principal investigator is pledged to conform to the following: As one engaged in investigation utilizing human subjects, I acknowledge the rights and welfare of the participants involved. I acknowledge my responsibility as an investigator to secure the informed consent of the participants by explaining the procedures, in so far as possible, and by describing the risks as weighed against the potential benefits of the investigation. I assure the Committee that all procedures performed under the project will be conducted in accordance with those Federal regulations and College policies which govern research involving human subjects. **Any deviation from the project (e.g., change in principal investigator, research methodology, subject recruitment procedures, etc.) will be submitted to the Committee in the form of a change of protocol for its approval prior to implementation. The P.I. agrees to report all protocol deviations or adverse events IMMEDIATELY to the IRB.**

PRINCIPAL INVESTIGATOR: *R. Jordan Crouser* _____ *6 April 2016*
(typed name) (signature) (date)

The Faculty Adviser's signature on the Research Proposal confirms that they have supervised the composition of the proposal and they approve of the research proposal as submitted.

FACULTY ADVISER: _____
(typed name) (signature) (date)

(For Committee Use)

REVIEW STATUS: Exempt ☐ Expedited ☐ Full ☐ Not Approved ☐

This proposal for the use of human participants has been reviewed and approved by Smith College Institutional Review Board.

_____
Chair, Smith College IRB Date

_____

Member, Smith College IRB Date

SMITH COLLEGE
IRB RESEARCH PROPOSAL FORM

PI:
Project #:
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DESCRIPTION OF RESEARCH PROJECT INVOLVING HUMAN PARTICIPANTS

TYPE OF PROJECT:
☒ Faculty Research (if grant funded, provide the following information)
Source: USDOE Grant #:277961
☐ Faculty-supervised student research (if so, choose one of the following)
☐ Course-related research ☐ Special Studies, Honors or other independent research
☐ Non-Smith-affiliated research
☐ Administrative/Institutional research
☐ Research proposing to use Smith participants that has been approved by another IRB.
(Attach copy of complete IRB submission and letter of approval from other institution. Skip to the Co-investigators and Training section at the end of this form).

SUMMARY: Briefly summarize (approx. one paragraph) the purpose of the research and planned use of human participants in terms understandable to a lay person.

In order to understand how to balance human and machine effort in analytic environments, we need to establish mechanisms by which we can quantify and reason about the computation being done by both parties. Our proposed approach is twofold:

(1) [NO HUMAN SUBJECTS] We begin by exploring the impact of imposing various limiting factors on existing theoretical frameworks for measuring human work using simple modeling and simulation techniques. This will provide a basis for comparison with traditional computational models, as well as generate a "tunable" testbed for future adaptations to the model.

(2) We will conduct a low-risk web-based experiment USING HUMAN SUBJECTS via Amazon Mechanical Turk in which various components of a streaming analysis task are manipulated (stream volume, sampling rate, etc.). Participants will be asked to monitor and categorize various data displayed though an interactive visualization, and their performance on these tasks will be measured. We will then compare participants' performance with that predicted by the model in (1). These measurements will help us to tune the model's parameters to more effectively describe human behavior during analytical tasks.

PARTICIPANTS: ***If you are only observing public behavior, skip to question d in this section.***
a).How many participants will be involved in the research?

Approximately 400

b.)List specific eligibility requirements for participants (or describe screening procedures), including those criteria that would exclude otherwise acceptable participants. For example, if your study uses only male or female participants, explain why. ***If using data from a secondary de-identified source only, skip to question e in this section.***

- Participants must have signed up for the Mechanical Turk service. Must be 18 years or older according to the terms of service.
- Participants must be able to comfortably communicate in written English.
- Participants must have 20/20 color vision or corrected vision to 20/20.

c.)How will participants be recruited? (attach any flyers, letters, announcements, etc that will be used to recruit participants)

Subjects will find the study as one of many tasks available for them to work on through the Mechanical Turk website. There will be no further recruiting.

d.) Is there any formal relationship between researcher and participant (e.g. teacher/student, superintendent/principal/teacher, employer/employee, etc.) that might lead to the perception of coercion? If so, identify options to participation.

NO

e.) Does your study focus specifically on any of the following vulnerable participant populations? (If so, please check the appropriate box(es):
☐ minors (under age 18 – specify age range)
☐ prisoners
☐ pregnant women & fetuses
☐ persons with physical disabilities
☐ persons with mental disabilities
☐ economically or educationally disadvantaged
☐ other, please specify:

If any of the above are to be participants in this research project, state the necessity for doing so. Please indicate the approximate age range of the minors to be involved. Participants under age 18 require the participant's assent and written consent from a parent or legal guardian.

RESEARCH METHODS:
☐ Interview, Focus Group or Non-Anonymous Questionnaire
☒ Anonymous Questionnaire
☐ Observation of public behavior
☐ Analysis of de-identified data collected elsewhere
Where did this data come from originally?
Did this original research get IRB approval?
Skip to BENEFITS section.
☐ Other

a.) Please describe the procedure to be followed in your research (e.g. what participants will do). Describe the nature of the interaction between the researcher and the participants. Include, if appropriate, a description of the ways in which different subjects or groups of participants will receive different treatment.

After selecting the study task from the Mechanical Turk website, participants will be asked to complete the electronic consent form. The subjects will be given unlimited time to read the form and decide whether or not to participate. The experiment will not continue until the subject has checked the box labeled "I have read and understood the above" and pressed the "Agree" button.

Once they are done, they will be asked to read instructions on the main portion of the experiment. These instructions will be available for their reference throughout the experiment. The participant will be presented with an interactive visualization of an

artificial streaming dataset. They will be permitted to interact with the visualization for as long as necessary to familiarize themselves with the environment. When they are finished, they will be asked to click a button labeled "Start", and the experiment will begin.

Using the interactive visualization, they will be asked to complete a sequence of simple analysis tasks in response to various events in the data. The stream speed and difficulty of the task will be variable, and participants will be rewarded for task completion; they will receive $0.10 for every correct response, and a bonus of $0.25 for correctly completing all tasks. Once all analysis tasks have been completed, participants will be given a demographic survey and a short preference questionnaire on the visualization.

Upon completing the survey and questionnaire, the study will end.

b.) How many times will you meet/interact with the participants? ***If you are only observing public behavior, skip to question d in this section.***

We will not interact directly with any of the participants. Each participant may complete the HIT once.

c.) How much total time will be required of each participant?

Approximately 30 minutes

d.) Where are the performance sites for this research (i.e. where it will it take place)?

As this study is completed online, we have no control over the physical location of the subjects when they participate.

e.) If you are conducting surveys, attach a copy of the survey instrument to this proposal. If you are conducting individual interviews or focus groups, including ethnographies and oral histories, attach, or list here, a list of interview questions. If the interview format is not yet specified or you are conducting unstructured interviews, please attach, or list here, a list of specific topics to be discussed.

INFORMED CONSENT: ***If you are only observing public behavior, SKIP to next section.***

a.) What categories of consent documentation will you be obtaining from your participants?

- ☐ Written Participant Consent
- ☐ Written Parental/Guardian Consent
- ☐ Participant Assent (under age 18)
- ☒ Unsigned Consent (for use with anonymous questionnaires)

If you will not be obtaining written consent, you will need a waiver from the IRB. If this is the case, please check the appropriate box below and explain why you are obtaining oral consent (e.g. participant is under the age of 7, this is a phone interview, there are literacy issues, having a consent document could pose some risk to participants) or forgoing consent (e.g. anonymous survey with no risk) as an alternative to written consent.

- ☐ Oral Consent (please explain below)
- ☒ 'Click' Consent for an on-line survey with minimal risk
- ☐ I will not be documenting consent (please explain below)

b.) Please attach copies of any consent documents. If you intend to obtain oral consent, attach the consent script and participant/witness signature sheet.

COLLECTION/RETENTION OF INFORMATION:

a.) Describe the method(s) of recording participant responses (e.g. audiotape, videotape, written notes, surveys, etc.) you will be using.

Data on the participant's interactions with the interactive visualization will be recorded (mouse movement, button clicks, etc.), as well as their responses to follow-up questions. This will be used in evaluating the effect of modification of the variables being controlled.

b.) Where and for how long will these materials will be stored? Please describe the precautions being taken to ensure the security and safety of the materials.

The data will be kept for 3 years, and will be stored on a password-protected computer. No personally-identifiable information will be collected during the course of this study.

c.) When/how will they be disposed of when the research is completed?

Electronic data will be erased at the completion of this research project.

d.) Will the recordings of participant responses be coded for subsequent analysis? ***SKIP to next section if you are only observing public behavior.***

NO

e.) Where and for how long will the coded data be stored? Please describe the precautions being taken to ensure the security and safety of the materials.

CONFIDENTIALITY:

a.) What assurances will be given to participants about the information collected? (select only one)
☒ (1) Anonymity is assured (data cannot be linked to participants' identities)
☐ (2) Confidentiality is assured (Names and identifying information are protected, i.e. stored separately from data)
☐ (3) Neither Anonymity or Confidentiality is assured

b.) If you checked (2) above, describe methods that will be taken to protect confidentiality.

c.) If you checked (3) above, explain why confidentiality is not assured.

d.) If you checked (3), describe measures taken to assure participants understand how their information will be used. Describe and attach any written or permissions releases that will be requested from participants.

RISKS:

a.) Could participating in this study cause participants physical harm? If so, what steps will be taken to protect them?

There are no known physical risks for taking part.

b.) Could participating in this study cause participants to feel uncomfortable or distressed? If so, what steps will be taken to protect them?

There are no known risks of discomfort or distress for taking part.

c.) Are there any other risks associated with participation (e.g. financial, social, legal, etc.)? Please describe the measures being taken to mitigate these additional risks.

There are no known other risks for taking part.

d.) Are any of the risks associated with participation in this study (e.g. physical, psychological, financial, social, legal, etc.) greater than what participants would encounter in their normal day-to-day lives?

NO

COMPENSATION: ***SKIP to next section if you are only observing public behavior.***
Please describe any cash or in-kind payments that participants will receive for participating in this research (please see instructions on the "Tool Box" section of the website regarding cash payments and reimbursements).

Participants will receive $1 for participating in the study, $0.10 for each correct response, and a bonus of $0.25 for correctly identifying all patterns. The maximum possible amount is $2.50. Mechanical Turk automatically handles the distribution of this money.

Participants who start the study but do not click the "Exit" button will not get paid (this is a technical limitation of the Mechanical Turk service that only provides information about a task when it has been completed).

BENEFITS:
a.) Please describe the potential benefits for the researcher.

The researcher will benefit only through having access to additional data to study human analytical behavior.

b.) Please describe the potential or guaranteed benefits for the participants, EXCLUDING cash or in-kind payments.

There are no direct benefits to the participants.

c.) What are the potential benefits to society from this research?

The benefit to society is the advancement of knowledge about perceptual issues in visualization, which provide much-needed foundational knowledge in this field. The results will later be used to design better visualizations that can be read more easily and precisely, and thus provide more information about elections, the stock market, results of studies, etc

d.) What are the intended uses of the data?

The data will be subject to statistical analysis to uncover trends and patterns in data analysis behavior as a function of stream speed and task difficulty. Data analysis will be performed by R. Jordan Crouser at Smith College.

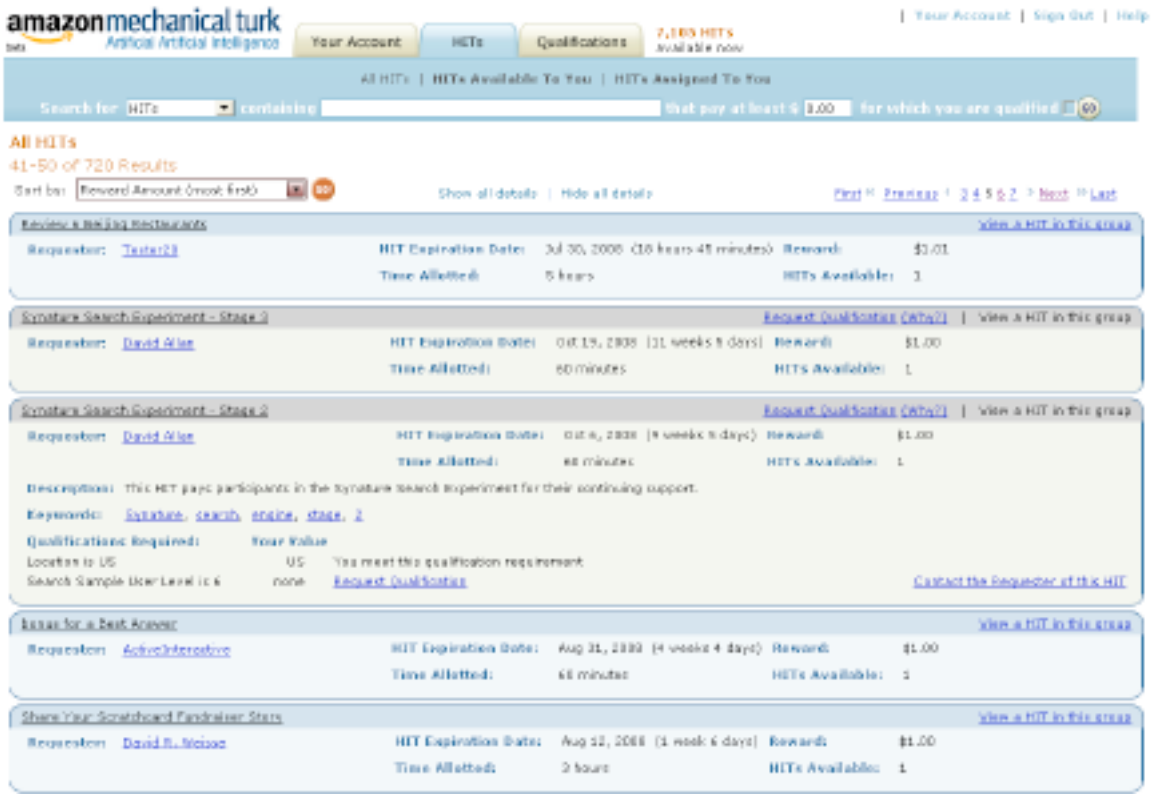
CO-INVESTIGATORS, COOPERATING DEPARTMENTS, COOPERATING INSTITUTIONS:
If you are working with/conducting your research at another institution or organization, include a letter of cooperation from that institution. If the cooperating institution is a primary data collection site, the Smith IRB will need a letter of approval from that institution's IRB. If there are multiple investigators, please indicate only one person on the Documentation of Review and Approval as the principal investigator; others should be designated as co-investigators here.

TRAINING:
All principal investigators, faculty advisors, and co-investigators are required to complete the Collaborative Institutional Training Initiative (CITI) online training course, http://www.citiprogram.org, prior to IRB approval of any research proposal. In the space provided, please list each investigator who will work or advise on this project and indicate their date of completion.

Investigator	**Date Completed**
R. Jordan Crouser	02/07/2016

Streaming Analysis Study Using the Mechanical Turk Service
Recruitment Materials

Participants will be recruited through the Amazon Mechanical Turk interface, an example of which is shown below:



Our specific HITs will contain the following information:

Title:	Streaming Analysis Experiment
Requester:	Smith College
HIT Expiration Date:	TBD, will depend on the start date of the study
Reward:	$1.00
Time Allotted:	30 minutes
HITs Available:	1
Description:	Participants will answer questions about artificial streaming data presented using data visualization techniques. A bonus of $0.10 will be awarded for each correct response, and $0.25 for correctly identifying all patterns.

Condensed Informed Consent Language with "Click Consent"

For use with *low-risk, anonymous online* surveys.

Note: this language may also be used for hard copy surveys, but the last two sentences must be omitted.

Insert your information where you see bold text.
When finished, cut and paste onto the first page of your survey.

You are being asked to be in a research study on interactive data analysis because you have selected this HIT on Amazon Mechanical Turk. The purpose of the study is to investigate how people analyze changing data using an interactive visualization. The results of this study will help improve visualizations in the future. Please read the following before agreeing to be in the study. If you agree to be in this study, you be shown a visualization of streaming data and be asked to monitor each data stream for different kinds of patterns. When you observe a pattern, you will indicate the type of pattern by pressing the corresponding key on your keyboard. Respond to each pattern as quickly and accurately as possible. After you are done with the main study, you will be asked to complete a brief questionnaire. Participation in this study should take about 15 minutes.

There are no known risks or direct benefits to you for completing this study. You will receive $1 for participating in this study. In addition, for each correct response you will receive $0.10, and you will receive a bonus of $0.25 for correctly identifying all the patterns. Your responses will be strictly anonymous. They may be used in research papers and academic presentations.

The decision to participate in this study is entirely up to you. You may refuse to take part in the study at any time without affecting your relationship with the investigators of this study or Smith College. Your decision will not result in any loss of benefits to which you are otherwise entitled. You have the right not to answer any single question, as well as to withdraw completely from the interview at any point during the process; additionally, you have the right to request that the interviewer not use any of your interview material.

You have the right to ask questions about this research study and to have those questions answered by me before, during or after the research. If you have any further questions about the study, at any time feel free to contact me, R. Jordan Crouser, (413) 585-4036, jcrouser@smith.edu. If you like, a summary of the results of the study will be sent to you. If you have any other concerns about your rights as a research participant that have not been answered, or if you have any problems or concerns that occur as a result of your participation, you may Phil Peake, Co-chair of the Smith College Institutional Review Board at (413) 585-3914. Alternatively, concerns can be reported by completing a Participant Complaint Form, which can found on the IRB website at www.smith.edu/irb/compliance.htm

By clicking below to be taken to the survey, you indicate that you have read and understood the above and volunteer to participate in this study.

Streaming Analysis Study Using the Mechanical Turk Service
Post-Experiment Questionnaire

1. What is your age? _____

2. What is your gender (circle one)? Female Male

3. What is your highest level of education?
[ ] High school diploma
[ ] Undergraduate degree
[ ] Graduate degree
[ ] Other _____

4. How often do you use a computer?
[ ] Several times a day or more
[ ] Once or twice a day
[ ] Several times a week
[ ] Once or twice a week
[ ] Several times a month or less

5. How comfortable do you feel using a computer? (not at all) 1 2 3 4 5 (very)

6. Have you ever worked with an information visualization before? [ ] Yes [ ] No

7. What is the size of your monitor measured in diagonal length (from upper left corner to bottom right)?

System Usability

	(strongly disagree)				(strongly agree)
1. I would like to use this visualization frequently.	1	2	3	4	5
2. I found the system unnecessarily complex.	1	2	3	4	5
3. I thought the system was easy to use.	1	2	3	4	5
4. I would need the support of a technical person to be able to use this visualization.	1	2	3	4	5
5. I found the various functions in the system were well-integrated.	1	2	3	4	5
6. I thought there was too much inconsistency in this system.	1	2	3	4	5
7. I would imagine that most people would learn to use this visualization very quickly.	1	2	3	4	5
8. I found the system very cumbersome to use.	1	2	3	4	5
9. I felt very confident working with this visualization.	1	2	3	4	5
10. I needed to learn a lot of things before I could get going with this visualization.	1	2	3	4	5

System Usability Scale © Digital Equipment Corporation, 1986.

What were your overall impressions of the visualization you used?

_____

_____

_____

_____

_____

_____

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** R. Jordan Crouser (ID: 5373536)
- **Email:** jcrouser@smith.edu
- **Institution Affiliation:** Smith College (ID: 1024)
- **Phone:** 413-585-4036

- **Curriculum Group:** IRB Researchers
- **Course Learner Group:** Same as Curriculum Group
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 18628457
- **Completion Date:** 02/07/2016
- **Expiration Date:** 02/06/2020
- **Minimum Passing:** 75
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Smith College (ID: 12076)	02/05/16	No Quiz
Belmont Report and CITI Course Introduction (ID: 1127)	02/05/16	3/3 (100%)
History and Ethical Principles - SBE (ID: 490)	02/05/16	5/5 (100%)
Defining Research with Human Subjects - SBE (ID: 491)	02/07/16	5/5 (100%)
The Federal Regulations - SBE (ID: 502)	02/07/16	5/5 (100%)
Assessing Risk - SBE (ID: 503)	02/07/16	5/5 (100%)
Informed Consent - SBE (ID: 504)	02/07/16	5/5 (100%)
Privacy and Confidentiality - SBE (ID: 505)	02/07/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
Email: citisupport@miami.edu
Phone: 305-243-7970
Web: https://www.citiprogram.org

Collaborative Institutional Training Initiative at the University of Miami

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** R. Jordan Crouser (ID: 5373536)
- **Email:** jcrouser@smith.edu
- **Institution Affiliation:** Smith College (ID: 1024)
- **Phone:** 413-585-4036

- **Curriculum Group:** IRB Researchers
- **Course Learner Group:** Same as Curriculum Group
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 18628457
- **Report Date:** 04/05/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
History and Ethical Principles - SBE (ID: 490)	02/05/16	5/5 (100%)
Defining Research with Human Subjects - SBE (ID: 491)	02/07/16	5/5 (100%)
Belmont Report and CITI Course Introduction (ID: 1127)	02/05/16	3/3 (100%)
The Federal Regulations - SBE (ID: 502)	02/07/16	5/5 (100%)
Assessing Risk - SBE (ID: 503)	02/07/16	5/5 (100%)
Informed Consent - SBE (ID: 504)	02/07/16	5/5 (100%)
Privacy and Confidentiality - SBE (ID: 505)	02/07/16	5/5 (100%)
Smith College (ID: 12076)	02/05/16	No Quiz

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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Collaborative Institutional Training Initiative at the University of Miami