Metrics & Test Methods for Human-Robot Teaming

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Robotics

Thank you!

These are unprecedented times. We couldn't have done this without your participation and support!

Repeatability and Reproducibility

- Reproducibility crisis:
  - Scientific studies are difficult or impossible to replicate or reproduce
  - Impacting social and life sciences the most, but is now impacting engineering as a whole[1], robotics in particular[2]
- Repeatability in HRI research is particularly problematic
  - HRI as a field consists of a diverse cadre of specialized disciplines (sociologists, psychologies, roboticists, elderly care professionals, etc.)
  - The emerging research is focused on advancing theory
  - The rate of new research makes it difficult to perform the due diligence in demonstrating the legitimacy of results

[1] M. Hutson, "Artificial intelligence faces reproducibility crisis," vol. 359, no. 6377, pp. 725–726, 2018.
[2] F. Bonsignorio, S. Redfield, and A.P. del Pobil. "Taking Reproducible Research in Robotics to the Mainstream: Building on the IEEE RAM R-Articles." http://www.reproduciblerobioticsresearch.org/icra2019workshoprrr
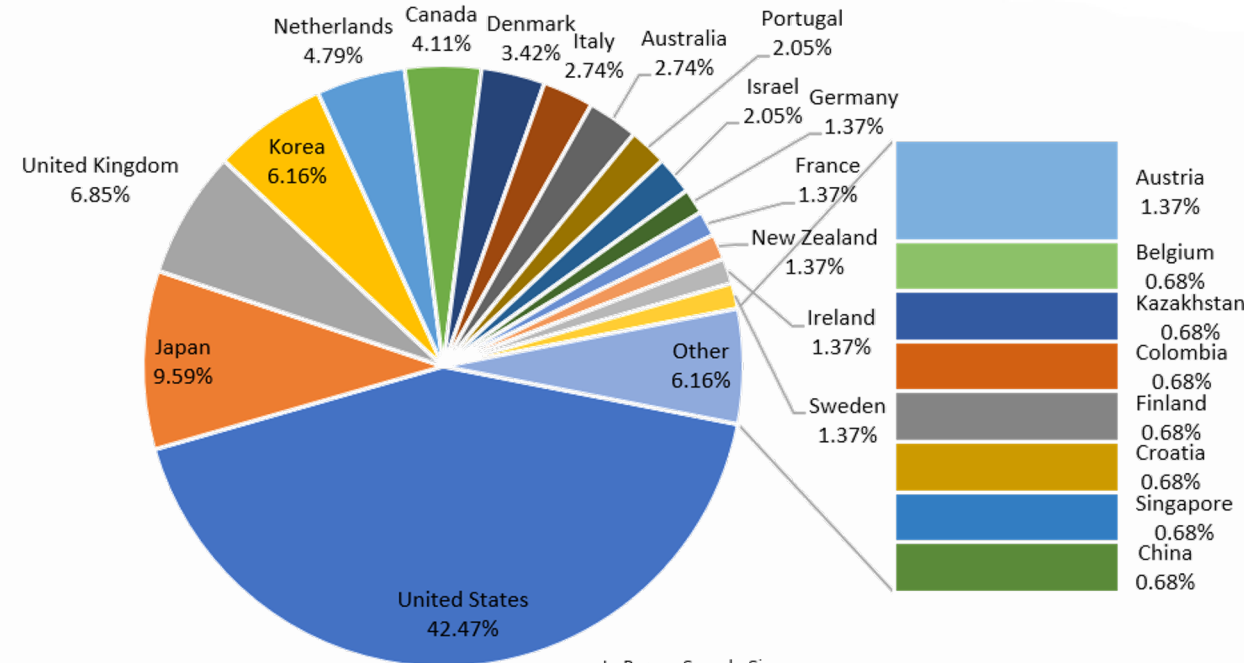
2019 ACM/IEEE HRI Conference

- An evaluation of the proceedings of the 2019 ACM/IEEE International Conference on Human-Robot Interaction as an incomplete snapshot of modern HRI research
  - 14 topical session themes, including:
    - Emotion
    - Trust and Privacy
    - Collaborating & Competing
    - Groups
  - Papers accepted and reviewed:
    - 49 full papers
    - 5 alt.HRI papers
    - 77 Late-Breaking Reports (LBRs)
    - 19 HRI Pioneers papers

ACM/IEEE International Conference on Human-Robot Interaction
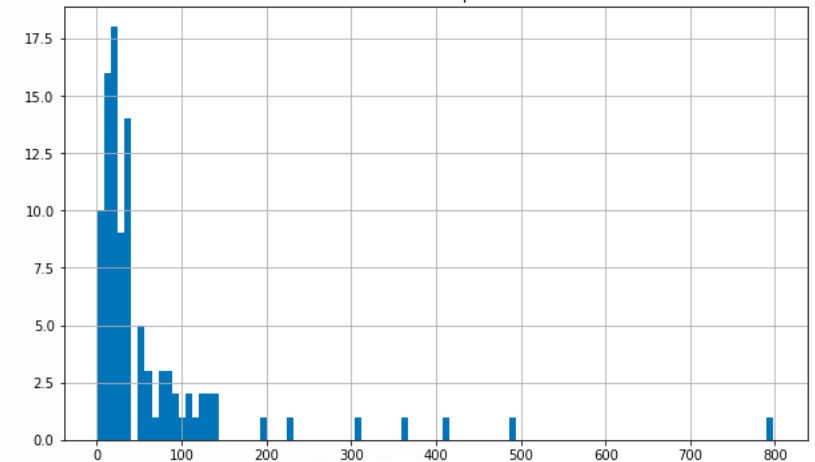
March 11-14, 2019

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Some Basic Statistics

- Who are the contributors?
  - 82.9% academia
  - 3.4% research institutions
  - 1.4% industry
  - 12.3% academia + other

- 101 in-person trials: [1, 791], n = 65 avg (σ = 110)
  - 26 (1-16) participants
  - 27 (17-32) participants
  - 14 (33-48) participants
  - 12 (49-80) participants
  - 8 (81-112) participants
  - 8 (113-200) participants
  - 6 (200+) participants

- 15 online trials: [15, 4608], n = 80 avg (σ = 1426).
  - 5 (1-150) participants
  - 5 (151-400) participants
  - 3 (401-850) participants
  - 2 (3000+) participants

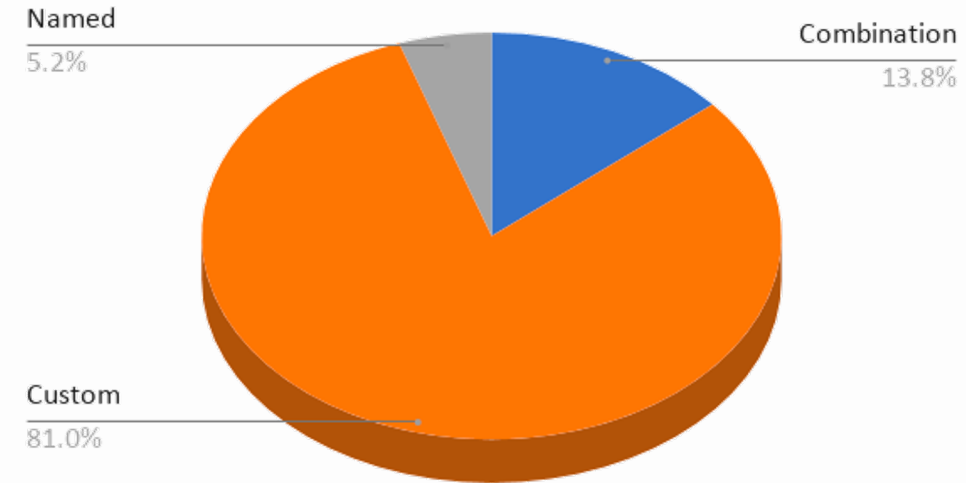

Institution's Geographical Location in HRI Studies

United States 42.47%
Japan 9.59%
United Kingdom 6.85%
Korea 6.16%
Other 6.16%
Netherlands 4.79%
Canada 4.11%
Denmark 3.42%
Italy 2.74%
Australia 2.74%
Portugal 2.05%
Israel 2.05%
Germany 1.37%
France 1.37%
New Zealand 1.37%
Ireland 1.37%
Sweden 1.37%
Austria 1.37%
Belgium 0.68%
Kazakhstan 0.68%
Colombia 0.68%
Finland 0.68%
Croatia 0.68%
Singapore 0.68%
China 0.68%
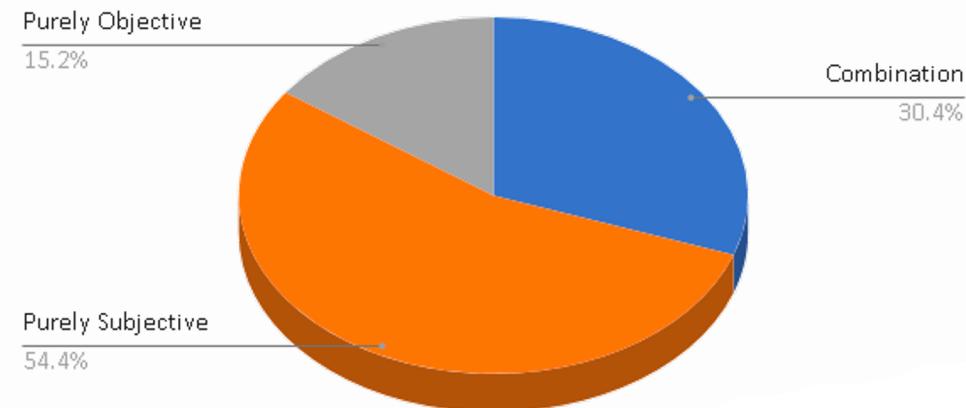

In-Person Sample Size

What are the Metrics?

- 84.8% of all studies used subjective surveys/questionnaires
  - Of these 94.8% used some form of custom survey
  - 23 named (i.e., previously defined) surveys used across 32 papers
  - 41.9% of named surveys were cited only once
- 15.2% of the studies used purely objective measures
  - Task performance, timing, and interface use constituted most of these measures

Surveys (Custom vs. Named)

Named
5.2%

Combination
13.8%

Custom
81.0%

Metrics (Subjective vs. Objective)

Purely Objective
15.2%

Combination
30.4%

Purely Subjective
54.4%

Abbreviated Schedule (EDT, GMT-4)

10:00 - Opening Remarks - Jeremy Marvel, NIST

10:10 - Contributing Author - Miruna-Adriana Clinciu

10:30 - Contributing Author - Frank Foerster

10:50 - Contributing Author - Kourosh Darvish

11:10 - Contributing Author - Rob Semmens

11:30 - Invitational Speaker - Sophie Wang, Clemson University

12:00 - Break

12:10 - Contributing Author - Andrey Rudenko

12:30 - Contributing Author - Yigit Topoglu

12:50 - Contributing Author - David St-Onge

13:10 - Contributing Author - Chittaranjan Swaminathan

13:30 - Closing Remarks

13:40 - Overflow discussion (additional presentations, etc.)

Housekeeping:
- We recommend using headsets to reduce the amount of echo, background noise, and audio feedback.
- Please mute your microphones when not engaged in the conversation, especially if when there is background noise.
- Because we are virtual and worldwide, we do not have a set schedule for meal breaks. Feel free to eat and drink during the workshop. Just remember to mute your microphones.
- The same goes for bio breaks. And we strongly recommend you do not take your electronic devices (particularly Bluetooth headphones!) with you. 😊

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