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14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:	17. LIMITATION OF ABSTRACT	15. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON Nhut Ho
a. REPORT UU	b. ABSTRACT UU	c. THIS PAGE UU	19b. TELEPHONE NUMBER 818-677-2187

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as of 14-Mar-2023

Agency Code: 21XD

Proposal Number: 74266RTREP

Agreement Number: W911NF-19-1-0472

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Report Date: 19-Nov-2022

Date Received: 14-Feb-2023

Final Report for Period Beginning 19-Aug-2019 and Ending 19-Aug-2022

Title: Human Swarming Teaming Platform for Research in Human Automation Trust and Reliance

Begin Performance Period: 19-Aug-2019

End Performance Period: 19-Aug-2022

Report Term: 0-Other

Submitted By: Nhut Ho

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Distribution Statement: 1-Approved for public release; distribution is unlimited.

STEM Degrees:

STEM Participants:

Major Goals: The project's goal is to acquire instrumentation to establish a human swarming teaming research platform (HSTRP) that has the capability to conduct live or simulated operations involved collaborative teamwork between human operators and a swarm of unmanned robots and vehicles. The new equipment, including unmanned aerial and ground systems, advanced operator control, intelligent interfaces, computer workstations, bio-physiological instrumentation, robots, and humanoid robots, and multi-domain sensors. The HSTRP will enable the researchers to use swarming operations as the context to research a wide range of issues related to human automation trust, such as the construct of automation transparency as a mechanism for driving trust calibration, the role of team and organizational structure on trust development, trade-off between trustworthy and trustable

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automation, novel human-machine interaction concepts, and computer-supported collaborative work for using artificial intelligence to ensure that human and machine teammates maintain awareness of each other's unique mental models.

The proposed instrumentation will in the future enable a gamut of research-related education activities, including the integration of research into undergraduate/graduate student theses and classroom case studies and projects, summer internship and career shadow programs for high school students in the PIs' and co-PIs' research lab, and for other outreach and service learning activities that aim to broaden women's and underrepresented minorities' participation in research and careers related to DoD mission.

Accomplishments: The instrumentation was successfully acquired and integrated into a human swarming teaming system that has been used by a wide range of researchers to conduct investigations into human autonomy trust issues. Please see the list of instrumentation acquired in the attached pdf.

Training Opportunities: The project was mainly focusing on acquiring the instrumentation, therefore, no training was provided.

Results Dissemination: Nothing to Report

Honors and Awards: Nothing to Report

Protocol Activity Status:

Technology Transfer: Nothing to Report

PARTICIPANTS:

Participant Type: PD/PI

Participant: nhut tan ho

Person Months Worked: 1.00

Project Contribution:

National Academy Member: N

Funding Support:

Partners

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I certify that the information in the report is complete and accurate:

Signature: Nhut Ho

Signature Date: 2/14/23 9:13PM

System Name	System Total	Item Name	Item Price	Quantity	Item Total	Total
Non-disposable UVs	\$198,918	Xfold Rigs Drone	\$17,999	2	\$35,998	\$39,418
		Mosquito HD Video Drones	\$60	5	\$300	\$300
		Hexacopter Multi-Rotor Drones	\$1,499	2	\$2,998	\$2,998
		TurtleBot 2i	\$2,696	20	\$53,919	\$53,919
		Spider Hexapod	\$714	5	\$3,572	\$3,572
		Husky	\$36,130	1	\$36,130	\$36,130
		Proximity Heat Sensors	\$19	5	\$95	\$95
		Tekmar Sensor	\$563	5	\$2,817	\$2,817
		Stereo Thermal Camera	\$174	5	\$868	\$52,644
		Sonar	\$5	10	\$54	\$59
		Gas detection	\$2,817	2	\$5,634	\$6,099
Shipping	\$868	1	\$868	\$868		
Disposable UVs	\$14,831	High power Wifi	\$976	2	\$1,952	\$2,137
		Blueooth Chip	\$13	30	\$380	\$380
		MacBook Pro 15" QuadCore Computer	\$2,799	4	\$11,196	\$12,284
		Shipping	\$30	1	\$30	\$30
Humanoid Robots	\$114,237	NAO H25 Robot	\$9,000	2	\$18,000	\$39,310
		NAO Upgrade Kit	\$6,500	3	\$19,500	\$21,294
		Pepper Robot	\$24,990	2	\$49,980	\$53,604
		Shipping	\$904	1	\$904	\$904
Advanced Operator Cor	\$143,248	Smart Board	\$16,225	2	\$32,450	\$35,547
		Smart Board Stand	\$1,724	2	\$3,448	\$1,724
		Intel RealSense	\$199	4	\$796	\$796
		Geforce Workstations	\$1,619	15	\$24,287	\$26,685
		Hololens development kit	\$3,000	2	\$6,000	\$6,570
		Sony SED-E1 glass	\$499	2	\$998	\$998
		iMotion (Data aggregation)	\$17,600	1	\$17,600	\$17,600
		EEG [32-256 channels]	\$14,480	1	\$14,480	\$14,480

fNIR	\$34,900	1	\$34,900	\$38,216
Shipping	\$698	1	\$698	\$633
				\$472,109

Supplies

Supplie Name	Unit Price	Quantity	Total (including tax)	
Camcorder, Tripod & Case	\$500	1	\$500	\$548
Voice Rcoder	\$40	4	\$160	\$175
Canon Cinema C100	\$1,999	1	\$1,999	\$2,189
Headphones	\$20	4	\$80	\$88
NVIVO Academic license	\$700	3	\$2,100	\$2,300
Tablets & case	\$3,000	6	\$18,000	\$19,710
Supplies (3D printing Disposable UVs)	\$10,000	1	\$10,000	\$10,000
Supplies (flex-PCB of Disposable UVs)	\$10,000	1	\$10,000	\$10,000
Shipping	\$500	1	\$500	\$500
				\$45,509
				\$20,479

Total **\$538,096**