**RESEARCH PROJECT CHARTER**

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| 1. **General Project Information** | | |
| Project Name: | | Brain Connectivity Analysis during Tactical Decision in Human Swarm Interaction |
| Date: | | Jun-27-2020 |
| Revision: | | 1.1 |
| 1. **Project Team** | | |
| Name | | Role |
| Joseph | | Lead Author |
| Hemanth | | Second Author |
| Esfahani | | Corresponding Author |
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| 1. **Project Scope Statement** | | |
| Project Purpose *Describe the need for this project* | | |
| Human swarm interaction can be modeled using shared cognitive model framework. A fundamental requirement of such a framework is the ability of interacting identities (swarm and human) to predict each other decision in order to coordinately execute a plan. Such cognitive models provide the swarms of robots an ability to coordinate with human operators without being controlled individually. Hence, predicting the human’s decision forms a fundamental aspect of cognitive models in human-swarm interaction. In this work we explore of the use of the brain connectivity bio-markers to predict the human decisions in a search and rescue mission which involves tactical decisions. | | |
| Objectives *Describe the measurable outcomes of the project* | | |
| Explore the brain connectivity metric in classifying the three stages of decision making: before, during and after decision. Such a model can be used to predict the human decision which forms a fundamental aspect of shared mental model framework for human swarm interaction. | | |
| Deliverables *High-level deliverables of the project* | | |
| 1. Connectivity analysis (as a classification problem) at three different stages of a decision 2. Connectivity analysis as a regression problem to predict what type of decision is made 3. In terms of classification: the results should include ROC curve, confusion matrix, individual difference influence, may be leave one out subject analysis. 4. The connectivity analysis can be broken in performance and decision-making aspects | | |
| Scope *List what the project will and will not address* | | |
| 1. The connectivity analysis if constrained only to few electrodes and frequency range. | | |
| Project requirements *List of requirements* *and specific details* | | |
| 1. Perform a literature review on what region or what electrodes to use. 2. Perform a data analysis of selected electrodes and frequency range. | | |
| Project Milestones *List how the project is broken over time* | | |
| 1. Perform a literature review on what region or what electrodes to use. 2. Make a final decision on which electrodes and frequency range to use. 3. Implement a data analysis pipeline and classification procedure. 4. If possible, implement a graph-based learning framework for classification of connectivity graph. 5. Start writing the introduction and method section and have a template ready. 6. Start filling up the results section with results and corresponding discussion 7. Finish in research paper checklist | | |
| Significant Assumptions *List the assumptions you are making* | | |
| 1. Data is enough to answer the research questions | | |
| Constraints *List the constraints if any* | | |
| 1. If data is not enough, we need to perform new experiments and collect data at least for static read team | | |
| External Dependencies | | |
| No external dependencies | | |
| 1. **Potential Journals** *List the journal where the present work can be submitted* | | |
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| 1. **Checklist** | | |
| Study Checklist | |  |
| Data Science Checklist | |  |
| Editing Checklist | |  |
| 1. **Notes** | | |
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| 1. **Update** | | |
| Update Number | Update Notes | |
| 1.1 | Changed the title of the work | |
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| 1. **References** | | |
| Lebiere, Christian, Florian Jentsch, and Scott Ososky. "Cognitive models of decision making processes for human-robot interaction." *International Conference on Virtual, Augmented and Mixed Reality*. Springer, Berlin, Heidelberg, 2013.  Scheutz, Matthias, Scott A. DeLoach, and Julie A. Adams. "A framework for developing and using shared mental models in human-agent teams." *Journal of Cognitive Engineering and Decision Making* 11.3 (2017): 203-224.  Musić, Selma, and Sandra Hirche. "Control sharing in human-robot team interaction." *Annual Reviews in Control* 44 (2017): 342-354. | | |