

Research Task / Overview

- Currently research is being conducted by the BESI Research team for the empowerment for caregivers of persons with dementia.
- BESI is a complex, cybersociophysical system requiring a multilayered modeling to support design.
- Neural Network Modeling (NNM) may be a valuable artificial intelligence tool with innumerable applications.
- NNM combined with the principles of systems engineering with respect to the current BESI system has potential to Maximize the overall efficiency of the system.

Data & Analysis

- The BESI model for empowering caregivers of persons with dementia is proving to be an effective tool in serving an ever increasing population of the people directly and indirectly effected with dementia.
- Samples of the population have seen their need and have become participants in the research.
- Feed back from the dyad participants as well as data collected via sensors in the dyad provide valuable information in regard to installation parameters and technical issues, respectively.
- The complexity of the BESI system involves a host of different disciplines (interdisciplinary).

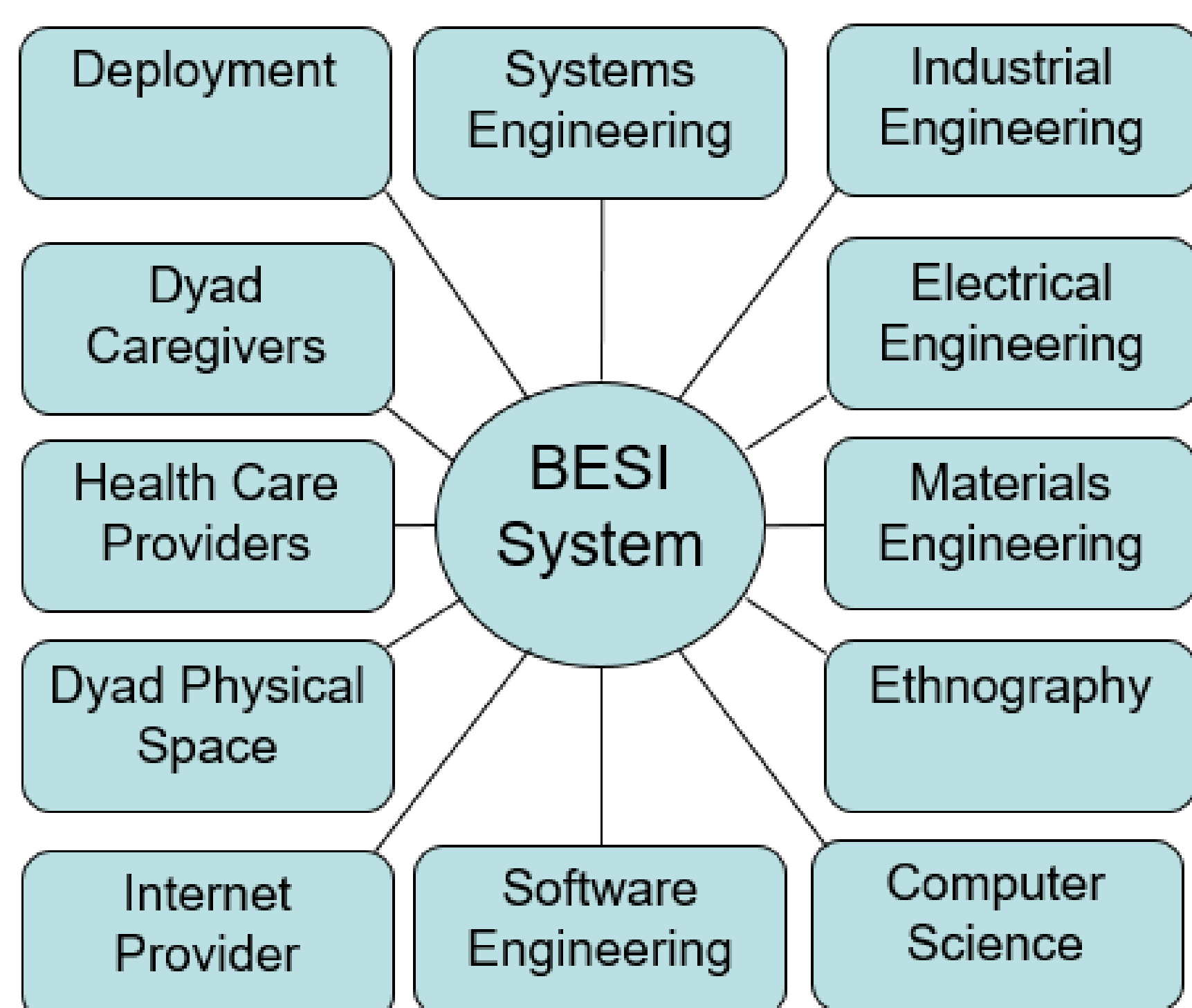


Figure 1: Diagram of some of the parameters incorporated within the BESI System

- A need for the application of Systems Engineering principles has been noted in order to optimize the current BESI System.

Goals & Objectives

- Increase end user satisfaction and acceptance of the BESI System
- Reduce human error in design, implementation, and deployment of the BESI System.
- Maximize the efficiency of the BESI System with respect to reducing caregiver burden due to agitation of person(s) with dementia.

Acknowledgements

- This research is funded by National Science Foundation and National Institutes of Health, Award IIS-1418422.
- Appreciation to NCAT, UVA, and Carilion Clinic Center for Healthy Aging research teams.

Methodology

- Construct an exhaustive list of parameters involved in the BESI system (i.e. expertise of research team, human factors involved, constraints, protocols, etc.)
- Develop an annotation table for all parameters and symbols that may represent parameters.
- Model prototype phase dyads (phase 2) with NNM in order to improve the BESI system for full field deployment (phase 3).

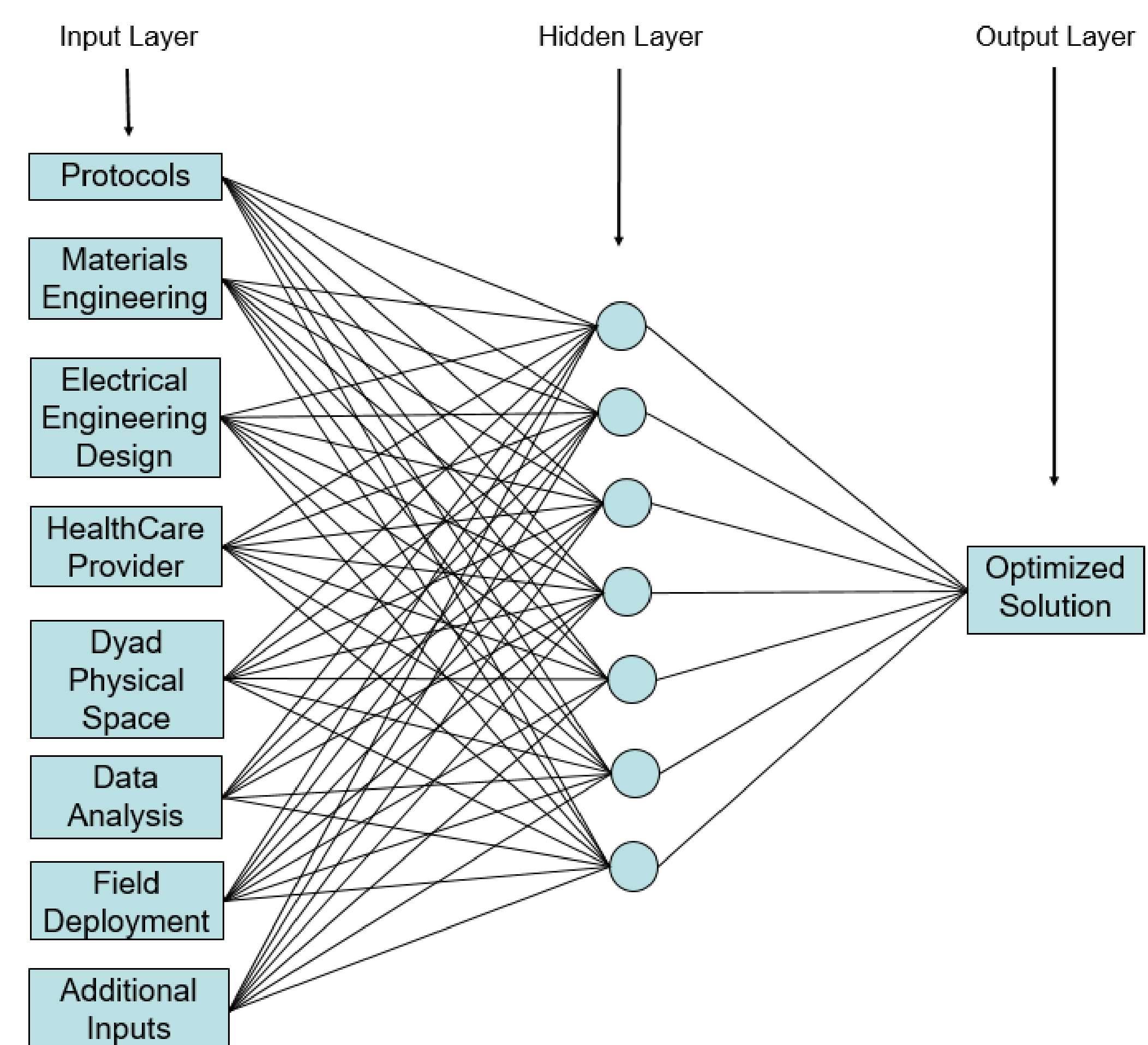


Figure 2 : Diagram of NNM containing some inputs

Future Research

- Create a Neural Network model using the MATLAB Software.
- Train the neural network to generate logical output with respect to process parameters that yield the greatest customer satisfaction and acceptance of the system by the end user/customer

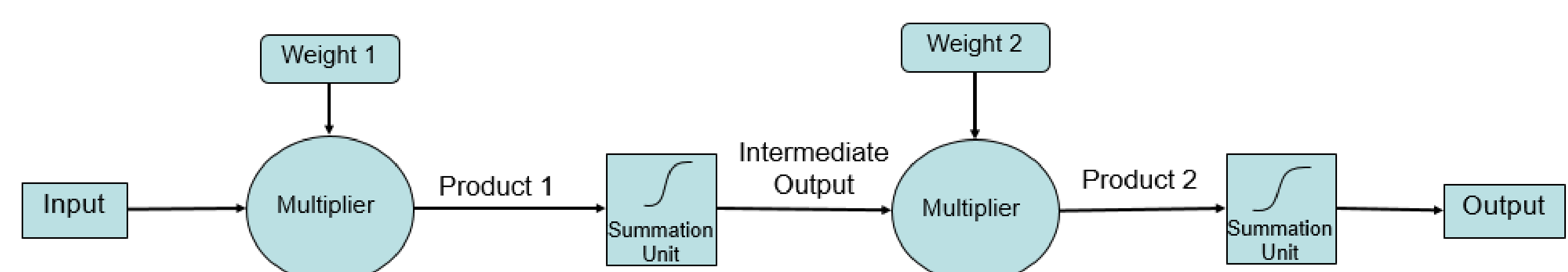


Figure 3 : Diagram of simple neural unit

Contacts/References

1. Bankole, A., Anderson, M., Smith-Jackson, T., Knight, A., Oh, K., Brantley, J., ... & Lach, J. (2012). Validation of noninvasive body sensor network technology in the detection of agitation in dementia. *American journal of Alzheimer's disease and other dementias*, 27(5), 346-354.
2. D. Shiffman, *The Nature of Code*.
3. A. J. Lopes, and R. Pineda, "Service Systems Engineering Applications," *Procedia Computer Science*, vol. 16, pp. 678-687, //, 2013.
4. M. D. G. Jiagi Gong, John Lach, "DeepMotion: A Deep Convolutional Neural Network on Inertial Body Sensors for Gait Assessment in Multiple Sclerosis."
5. C. Segalin, D. S. Cheng, and M. Cristani, "Social profiling through image understanding: Personality inference using convolutional neural networks," *Computer Vision and Image Understanding*.
6. C. C. Jay Kuo, "Understanding Convolutional Neural Networks with A Mathematical Model," *Journal of Visual Communication and Image Representation*.