Week 2: Purpose Statement

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TIM-7245: Directed Constructive Research

June 27, 2021

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# Purpose Statement

This constructive design research project defines and implements an Elderly Care Smarthome Operating System (ECSOS). The ECSOS will provide central core services for bringing world-class assisting living care into a resident’s home, such as identity management, patient action tracking, consistent Cyber-Physical control plane, and privacy functions. While this specific project examines elderly care, the implications are generalizable to other scenarios. Those scenarios encompass childcare (babysitting), school safety systems, and virtual office secretary situations, to name a few.

Building these capabilities requires tooling spanning networking, sensors, embedded systems, and real-time video processing (Elloumi et al., 2020; Das et al., 2019). This research will leverage industry-standard tooling (e.g., JavaScript, Apache Spark, and Tensorflow). In addition, specific aspects necessitate custom code that enhances existing open-source software (e.g., IoT control interfaces and Python libraries). Together, these different technologies culminate into an elegant solution that monitors, predicts, and responds in real-time to patient needs.

Next, a case study will assess the solution’s effectiveness against alternative approaches (e.g., wearables). This phase requires installing WiFi cameras and collecting example footage. Finally, the study participants will give qualitative feedback (e.g., 1-5 star scores) on prediction accuracy. Their responses combine with various statistical metrics (e.g., number of predictions) to produce a holistic system assessment.

# References

Das, S., Dai, R., Koperski, M., Minciullo, L., Garattoni, L., Bremond, F., & Francesca, G. (2019). Toyota Smarthome: Real-World Activities of Daily Living. *International Conference on Computer Vision* (pp. 833-842). Seoul, Korea: IEEE. doi:10.1109/ICCV.2019.00092

Elloumi, K., Ayako, N., Mehaffar, H., & Abid, D. (2020). Towards an Integration of “SmartHome” Technology in Education: Realization of a didactic platform. *International Multi-Conference on Systems* (pp. 338-342). Virtual: IEEE. doi:10.1109/SSD49366.2020.9364238