Thesis Project Portfolio

Thermo-Stasis

(Technical Report)

AI and the Pursuit of General Intelligence

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

What exactly is considered artificial intelligence(AI) technology, and what are some applications of the various research advancements in AI from the past 80 years? In this thesis project, I explore the history of AI and incorporate one sub-field of AI, fuzzy logic algorithms, into a technical project. Through the STS paper and the technical report, I will explore aspects of AI technology beyond machine learning, a field highly prioritized today for its success in products like DALL·E 2 and ChatGPT.

My STS thesis explores the history of artificial intelligence research in the context of pursuing machine intelligence, or machines capable of higher-level thinking like humans. In this paper, I argue that literature and media dating as far back as the late 1800s contribute towards the public perception of how AI technology can coexist or interact with our human society. Stories discussing the possibilities of machines with their own will shape the public perception of what AI can look like. They can look like androids from Detroit: Become Human, or highly intelligent programs like HALL 9000, with morals and directives not quite aligned to human morals. I contend that these stories compete with actual AI research developments in occupying the public perception of what AI is. I conclude the paper with a discussion on how the misperception of AI in stories vs AI in reality can affect our future relationship with AI technology. To properly incorporate AI technology into society, it is important that people learn more about what AI technology looks like in its current state, rather than what is presented to them in stories. As transformative AI applications like ChatGPT begin to show its impact on society, education on how AI can be seen in the world around us today promotes healthy discussion on the relationship between AI and humans.

My ECE Capstone project largely does not involve AI technology outside of the fuzzy logic algorithm, a technology first developed in the 1960s. The project, entitled "Thermo-Stasis", is centered around the creation of a portable temperature-regulated box. This box has applications in food safety and drug transportation, being capable of preserving food in either 40F or 135F, both recommended temperatures to deter bacterial growth. The box is capable of both heating and cooling, and can be adjusted to maintain any specified temperature within a certain temperature range. This capability renders the project useful for drug transportation, as drugs and vaccines often need to be maintained at specific temperatures for them to remain effective. The project can be split into 5 subsystems: user interface(UI) elements, power supply, microcontroller, heating/cooling elements, and the control algorithm. The UI consists of a liquid crystal display(LCD) showing the current and set temperature of the box, and two buttons for incrementing and decrementing the set temperature. The power supply consists of the battery, and the circuits required for converting the battery power into voltages and currents appropriate for every electrical component in the box. The microcontroller concerns all the coding logic required for the system to work as intended. The heating/cooling elements consist of the Peltier modules responsible for changing the temperature, as well as the heatsinks, fans, and H-bridge circuit designed to assist the Peltier modules in heating/cooling. Finally, the control algorithm consists of the temperature sensors and the fuzzy logic controller, with the sensor data being fed to the controller to adjust power to the Peltier modules and fans as needed. Upon conclusion of the project, we had a box capable of maintaining an internal temperature within 1F of the set temperature for as long as 4-5 hours between charges of the battery.