

Thesis Project Portfolio

Creating an Autonomous Chess Robot

(Technical Report)

Comparing Child Development in Urban and Rural Areas of the U.S.

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

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Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

Initially, my capstone project sought to find physical, autonomous alternatives to online games, which rose in popularity during the COVID-19 pandemic. Pursuing this, my team and I chose to design and build an autonomous chess robot. It serves as a good means of practicing chess if another human isn't available to play over the board, but one could argue this type of practice harms competitive integrity in matches where only humans are playing. Additionally, there is an environmental cost to manufacturing these robots worth considering, and the high monetary cost means it may not be accessible to everyone if produced at scale.

My STS project explores how children live in various areas of the United States. I divided these areas by "contexts": urban, suburban, and rural. I believe they affect the utility children get from our capstone project. To investigate this further, I wanted to investigate, more broadly, how children develop differently across these various contexts. To better understand the social dimensions of these contexts from an STS perspective, I chose to compare child development across these contexts by using actor-network theory. Actor-network theory can reveal which actors in a child's network have the greatest influence on their lives. This is worthwhile to understand so that we can ensure children across the U.S. develop comfortably, starting with the areas they live in.

My STS research primarily uses past literature concerned with comparing rural and urban living. This research includes a mix of qualitative and quantitative comparisons. I found that rural areas typically struggled more with healthcare shortages and public infrastructure availability than urban areas, while urban areas had a higher crime rate and higher cost of living. Children could experience an uncomfortable childhood in both areas, but often for different reasons.

Together, both projects demonstrate the importance of understanding the social groups all technology serves. While isolated rural children may have the most to gain from the autonomous chess robot, ultimately, a high cost can keep their parents from buying the robot. Similarly, to ensure children grow up comfortably, strong public infrastructure and policymaking from all levels of government stand as ways to strengthen both urban and rural communities. While roads, health facilities, schools, public transit, and such are not new technology, they can take a similar role in that they may benefit certain groups more than others. Through both projects, I've found this method of analyzing impact across different social groups is useful for both the adoption of new technologies and public infrastructure projects that use existing technologies.