3. Theoretical/Conceptual Framework: In this section, the student should elaborate upon the theoretical and/or conceptual positions and concerns that will frame the thesis. Typically, this section advances a proposition, or a “school of thought,” concerning the nature of architecture. It is best to advance this proposition by actively referring to existing academic and/or professional theoretical and conceptual positions concerning architecture. Such references should mostly be drawn from the field of architecture, but may also be drawn from other fields. Students do not have to singularly “subscribe” to a particular school of thought, but may actively bring their own ideas into constructive dialogue with those of others. vations for project. Consequently, the student should carefully consider this section, and discuss it extensively with their Adviser, prior to submission. In the same spirit, the student should anticipate re-visiting and possibly modifying this framework as the thesis develops.

Please note that the Theoretical/Conceptual Framework must not be too brief—a single paragraph is seldom adequate. A complete statement may run a full page or more (double-spaced.)

**Thesis Statement:**

There is a dire need for housing across the United States. In Seattle, the city government is beginning to test the use of accessory dwelling units, or ADUs. The construction of ADUs increases housing supply and density, which in turn lowers housing prices. A tool named ADUniverse was created as a joint project between the Seattle Planning Commission and the University of Washington Data Science for Social Good program, in which homeowners can simply enter their address and easily see cost/profit estimates, as well as potential construction issues based on zoning. Potential ADU owners were asked in an official 2019 survey to name the most important features that would make them consider going through with the build. The two primary concerns were cost and sustainability. This research is intended to augment ADUniverse by simulating a range of typical detached ADU designs using a genetic algorithm to optimize energy use intensity (EUI) dependent on placement, size, and other features of apertures. Use of the traditional EnergyPlus simulation package is limiting when conducting optimization due to time constraints; therefore, the goal is to train a machine learning model to calculate EUI faster and with the same accuracy by using a dataset of traditional EnergyPlus results. This model can be incorporated into the ADUniverse web app to allow homeowners to determine income estimates more accurately, as well as serve as a case study into the efficacy of ADUs on increasing housing availability.

**Theoretical/Conceptual Framework:**

Building simulation help improve building performance, yet results are difficult to scale. Machine learning tools and big data are becoming a part of the architect’s toolkit at an ever-increasing pace. One such program, *cove.tool*, increases performance and sustainability while also lowering costs(Ahuja and Chopson 2020). The data-rich architectural tool can eliminate costly later design decisions, while finding the most efficient decisions regarding energy use at an early stage. Simulating each individual accessory dwelling unit requires exact knowledge beforehand of the design, whereas a machine learning model can output accurate energy use readings while adjusting design parameters on the fly. Typical simulation workflows, usually utilizing the United States Department of Energy’s EnergyPlus suite, are too time consuming and exact input specific to be effective for end-user evaluation of data. Use of a machine learning model offers the benefit of front-loading the time and data investment into training the model, but thereafter each result is output at a much greater rate.

**Bibliography:**

Ahuja, Sandeep, and Patrick Chopson. 2020. “Automation and Machine Learning in Architecture: A New Agenda for Performance-Driven Design.” *Architectural Design* 90 (2): 104–11.