My chosen project focuses on a systems approach to analyze artificial light or night, more commonly known as ALAN. From computational models, my project aims to analyze the issue of ALAN in two respects, at a social and ecological level. In other words how ALAN can be indirectly measured and influenced by society and its surrounding ecology. ALAN is one of the leading causes of light pollution and is thus of much importance to address. Through my interdisciplinary approach, I hope to treat ALAN as a complex system and analyze the socio-ecological relationships of its parts to extrapolate emergent behaviors or rules that model a safe integration of ALAN into urban landscapes. My approach involves two computational components. The first is python Mesa agent-based modeling, which will help to both visualize and analyze emergent behaviors of an ALAN social-ecological system. The final is a network theory based approach, in which I plan to use the Graphviz software in order to strengthen the results of my Mesa model and analyze the topological overlap of socio-ecological networks to eventually create rules and policies that foster greater harmony between ALAN and the societies and ecologies it affects. Currently, I have begun the process of creating my Mesa agent-based model, in which I have modeled a system of the habitat of orb-web spiders, whose reproduction and accordingly, their population has been greatly altered under the presence of ALAN. In my model, I have assigned the spiders and their prey as the prominent ecological agents, while the social agents are the plots of land representing artificial light fixtures that have disrupted the naturally occurring cycles of reproduction and predation in the area. Additionally, I am also experimenting with different ways to implement my agent-based model into a network analysis approach. I have considered several options, the first of which is bolstering my Agent Based Model through integration of an endogenous network formation, or a network without a fixed topology, which may reflect a more concrete relationship between agents and move away from

the stochastic nature of agent-based modeling. My current research focuses on the analysis techniques that by using a network based system I could employ. The analysis techniques include, eigenvector centrality(a measure of agents neighbors centrality), betweenness centrality (how often agents bridge paths between network nodes), closeness centrality (agents average distance between other nodes), clustering and degree(number of neighbors). Through these ample network based analysis techniques I will be able to extrapolate emergent behaviors and rank nodes to develop rules to mitigate the negative impacts of ALAN.

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