**Artificial Intelligence in the Arts, Humanities, and Engineering:**

**Interdisciplinary Collaborations**

**Title:** Communicating Resource Management and Environmental Policy Making Through the Lens of an Interactive Real-Time Strategy (RTS) Game

* Games are highly accessible and can attract a large and diverse audience
* Games have long been used as tools for educating
* Games are also tools for driving change and have the capacity to be high impact

AI research in real-time strategy (RTS) games has a rich history that extends back as far as 2001 where the Association for the Advancement of Artificial Intelligence recognized RTS games as an excellent model for AI research. Our proposal seeks to apply machine learning to an interactive RTS game that will leverage existing data on land management to derive AI algorithms and create true-to-life scenarios that players can interact with to help communicate the effects of policy making that have an environmental impact.

For example, modern agronomy, plant breeding, agrochemicals such as pesticides and fertilizers, and technological developments have sharply increased crop yields, but cause ecological and environmental damage including depletion of aquifers, deforestation, antibiotic resistance, and other agricultural pollution. This same environmental degradation including biodiversity loss, desertification, soil degradation, and global warming can actually cause decreases in crop yield.

With funding, we will create an interactive RTS game that illuminates the complexity of difficult-to-see interactions between humans and their environment, giving it the capacity to be both high impact and highly accessible. Furthermore, the RTS framework we design can be used to help communicate other interactions where resource management is critical. Other areas of research for future collaborations may include:

* Environmental Justice
* Agriculture
* Natural Resources
* Animal Husbandry
* Fish and Wildlife Management

Existing coursework in the Interdisciplinary Game Studies Minor would be leveraged to support this proposal, in particular the 3-course Game Design sequence DSN3104/4104/4154. All three classes attract most of their students from both Arts & Sciences and Engineering and have the potential to engage them in interdisciplinary faculty research across multiple colleges.

**Timeline:**

Spring 2023

* Workshops and speaker series on Game Design and AI given throughout the semester. Potential speakers include:  
  + **Stone Librande** – a frequent speaker at the Game Developers Conference where he has given several talks and workshops on game design. With 25+ years of experience, he was the lead designer of *Diablo III* and Creative Director of *Spore* and *Sim City* at Electronic Arts.
  + **Katie Salen** – author, game designer, and educator, Salen has taught game design at multiple universities including DePaul University, University of Texas, Parsons School of Design, New York University, and Rhode Island School of Design.
  + **Eric Zimmerman** – author, game designer, and educator, Zimmerman has taught game design at multiple universities including MIT and School of Visual Arts, hosts the annual Game Design Challenge at GDC, and is the founding faculty of the NYU Game Center.
* During this semester, our team will also collect existing data on land management, ecological degradation and environmental policy making. We will then utilize machine learning to design AI algorithms that reveal patterns and intersections within this data and use these algorithms to create game mechanics and an analog prototype that players can interact with.

Summer 2023

* Present findings at Origins Game Fair, in Columbus Ohio. Origins is one of the largest gaming conventions in North America, with attendance exceeding 20,000 pre-pandemic.
* Begin migrating the analog prototype to a digital RTS format.

Autumn 2023 – Spring 2024

* Fund one GRA in Engineering. Fund one GRA in Design.
* Complete the game and disseminate findings at various conferences such as Games for Change, GDC, SIGGRAPH, and IEEE.
* Develop framework for future permutations of resource management RTS games to be designed at Ohio State.

**Contributing Faculty**

Assistant Professor Scott Swearingen (**Dept. Of Design**), an award-winning game designer with over 20 years of experience in academia and industry including work at Electronic Arts and MAXIS.

Associate Professor Kyoung Swearingen (**Dept. Of Design**), an award-winning visual storyteller with over 20 years of experience in both academia and industry including work at Pixar Animation Studios.

Assistant Professor Parinaz Naghizadeh (**Dept. Of ISE and ECE**), has research interests in human-AI interaction loops, network science, and multi-agent learning and decision making.

Associate Professor Roger Crawfis (**Dept. Of CSE**), has research interests in game technologies, procedural content for games, scientific visualization, computer graphics, and image-based rendering.

**Budget**

Round 1 funding would support the workshops and speaker series in Spring of 2023. Round 2 funding would support 2 GRA’s (Design and Engineering) and dissemination.