

# Tinkering with Turtles

*An Overview of NetLogo's Extensions API*

Forrest Stonedahl, Daniel Kornhauser, Eric Russell, Craig Brozefsky,  
Esther Verreau, Seth Tisue, Uri Wilensky  
Center for Connected Learning and Computer-Based Modeling  
Northwestern University, Evanston, Illinois, U.S.A.

**Corresponding author:** Forrest Stonedahl  
EECS Tech Institute C359  
2145 Sheridan Rd  
Evanston IL 60208

**Email:** *forrest@northwestern.edu*

**Preferred presentation:** Oral

# Abstract

NetLogo [4] is a multi-agent modeling language and environment that continually strives toward a central design goal (shared with the original Logo programming language) to be both “low threshold” (easy for beginners to learn) and “no ceiling” (such that experts do not feel limited) [3]. A key aspect of the “no ceiling” goal is the extensibility of the language.

The NetLogo Extensions API provides facilities for programmers to extend the NetLogo language by creating user-defined language primitives. NetLogo extensions may be written in Java (or any other language compatible with the JVM). While the NetLogo Extensions API has quietly existed for several years, recent changes have increased its functionality. Additionally, several new example extensions have been created, or are under current development, which showcase some of the possibilities.

In this presentation, we demonstrate how to create an extension and offer a brief overview of the mechanics of the Extensions API. Additionally, we survey various extensions that have been or are currently being built, either by our research group or members of the NetLogo user community. This overview provides multiple use cases for the Extensions API. The extensions discussed address:

- new data types to NetLogo (arrays, hash tables)
- improved tools for NetLogo model development (profiler)
- communication with other software (GIS, VRML / X3D, JUNG)
- communication with hardware (robotics, webcams, joysticks/controllers)
- project-specific needs (urban modeling [1], evolution of CA rules [2])
- multimedia (sound, color palettes, images )

Finally, we offer perspectives on the current limitations of NetLogo’s extensions facilities, directions for future work, and how the Extensions API could lead to an increasingly modular architecture for NetLogo.

# References

- [1] LECHNER, T., REN, P., WATSON, B., BROZEFSKY, C., AND WILENSKY, U. Procedural modeling of urban land use. *International Conference on Computer Graphics and Interactive Techniques* (2006).
- [2] SONDAHL, F., AND RAND, W. Evolution of non-uniform cellular automata using a genetic algorithm: diversity and computation. In *Proceedings of GECCO '07* (New York, NY, USA, 2007), ACM, pp. 1531–1531.
- [3] TISUE, S., AND WILENSKY, U. NetLogo: Design and implementation of a multi-agent modeling environment. *Swarmfest 2004* (2004).
- [4] WILENSKY, U. *NetLogo*. Center for Connected Learning and Computer-based Modeling, Northwestern University, Evanston, IL, (1999).