



NetsBlox: Visual Programming Environment for Teaching Distributed Programming

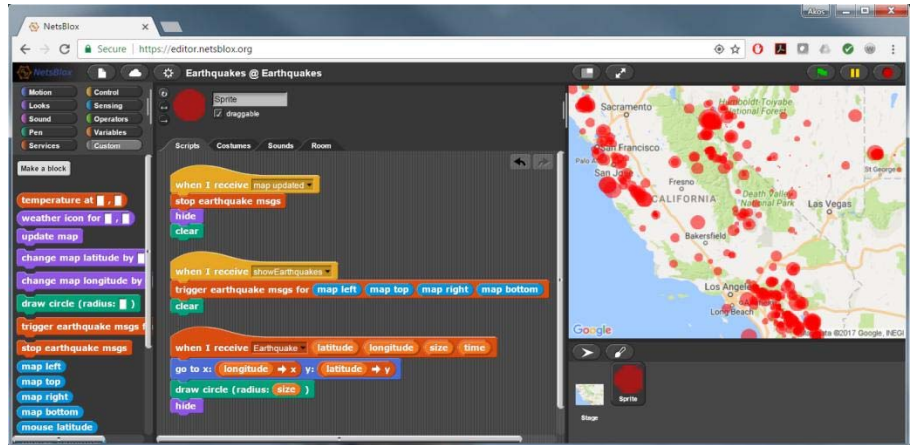
Akos Ledeczi and Brian Broll, Vanderbilt University



akos.ledeczi@vanderbilt.edu

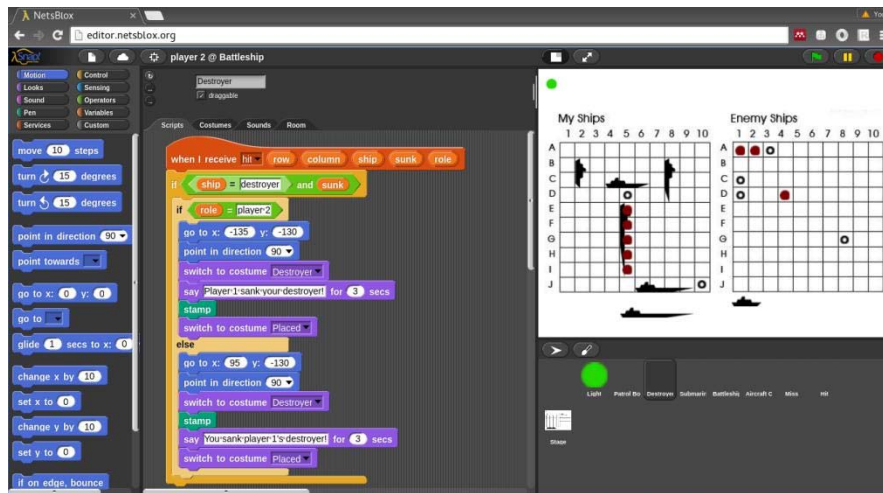
http://netsblox.org

NetsBlox is an open-source web- and cloud-based visual programming environment. Its visual notation is based on Scratch from MIT and uses the open source JavaScript code base of Snap! from Berkeley. Both of these are extremely successful tools in K12 computer science education. NetsBlox adds the capability of networking and enables distributed programming at a level accessible to young learners. This helps teach 21st century skills and makes programming more engaging.



Historical earthquake data for California

NetsBlox also enables programs running on separate computers to talk to each other. Hence, students can write multi-player games such as Tic Tac Toe or Battleship and other truly distributed programs.



2-player Battleship game

NetsBlox supports collaborative program editing similar to how Google Docs work. This opens up new ways of project-based learning, new ways of teaching as well as enables pair programming even when students are not sitting at the same table. Unlimited undo/redo is also supported.



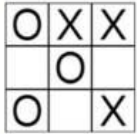
Interactive map of the sky via the Sloan Digital Sky Survey

NetsBlox opens up the internet with its vast array of public domain scientific and other data sources making it possible to create STEM projects, such as displaying seismic activity anywhere on Earth using an interactive Google Maps background. Similarly, weather, air pollution, and many other data sources such as the Open Movie Database and the Sloan Digital Sky Server are available. We are adding new services on a regular basis. The same facility can help implement more complicated multi-player games by providing server-side support.

Supported by NSF grants #1644848 and #1640199

NETSBLOX

Basic games introduce distributed programming concepts to young learners

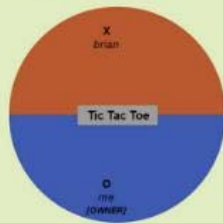


THE GAME

A simple game of Tic-Tac-Toe becomes much more complex between two players using different computers, or clients.

THE ROOM

Rooms and Roles are simplified concepts of distributing computing. Room defines the virtual network. Each project has a Room; each client is assigned a Role.

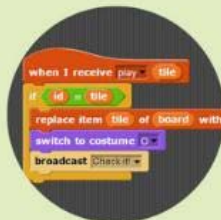


SENDING

Users can drag and drop variables on the "send msg" block. Here player O sends her move to player X in a message.

RECEIVING

Upon receiving the message with the move, player X updates her board and displays an O costume in the appropriate cell.



NETSBLOX

Basic concepts shown as visual abstractions make NetsBlox intuitive. Give it a spin. Visit <https://netsblox.org/>



<https://engineering.vanderbilt.edu/>

Access to real-time and historical web data enable engaging science projects



SERVICES

The NetsBlox server provides a set of services such as weather, air pollution, seismic activity or Google Maps that student programs can invoke to get interesting data.

DATA VISUALIZED

Data can then be used in different ways. For example, the current temperature through the US can be visualized as a heat map with just a few blocks of code.



<https://netsblox.org/>