A Demonstration of ToonTalk where Children Build Programs by Demonstration in a Game World

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Abstract

Desktop ToonTalk was first released twenty years ago and was successfully used by children as young as 3 to construct computer programs. Uniquely these programs are constructed by demonstration using game elements such as robots, birds, trucks, boxes, and magic wands. The user's avatar inhabits a town where computations can be created and executed in an animated manner.

ToonTalk Reborn is a re-conceptualization of ToonTalk for the web. It runs in any modern browser without any plugins. The move to become a web-based tool for web programming has resulted in much being gained and lost.

Author Keywords
Computer programming; programming languages; programming languages for children; programming by demonstration; animated programming; concurrent constraint programming;

ACM Classification Keywords
D.1.7 Visual Programming; D.2.6 Programming Environments; D.3.2 Language Classifications, Constraint and logic languages

Introduction

The desktop implementation of ToonTalk [1] was launched in 1997. It is a programming environment which looks and feels like a video game. Computational abstractions of the concurrent constraint programming [8] computation model are mapped to playful concretizations. Robots represent program fragments, birds and nests represent communication channels, boxes represent data structures, houses represent processes, and so on. Children construct programs by training robots by demonstration [2]. A child can travel around a virtual city and see program executions by watching robots run.

The advantages of running in a browser are many including zero installation, platform independence, user familiarity, seamless access to cloud services, and reduced security concerns [5]. In designing ToonTalk Reborn the entire system was re-conceptualized and re-implemented to run in browsers [4]. The web version of ToonTalk can be a way for children to make interactive web pages.

While the current design of ToonTalk Reborn provides child-friendly access to browser events and CSS element properties it has lost usability by pre-literate children. It is also much less game-like and playful than the desktop version. The desktop version is used by tens of thousands of children, including pre-school children [7]. ToonTalk Reborn is still in beta and has had very little use by children.

One may question the need for yet another programming language for children when Scratch [6] is immensely popular and has a vibrant community behind it. Familiarity with only one programming language can yield only a limited understanding of computation. ToonTalk has a completely different underlying computation model and completely different ways of expressing, executing, and debugging programs. Furthermore ToonTalk is unique in supporting exact child-engineered arithmetic [3].

Desktop ToonTalk and ToonTalk Reborn are both freely available as is their source code. Visit toontalk.com and github.com/ToonTalk for more details.

Program creation and execution in both ToonTalk versions will be demonstrated. Publishing interactive web pages in ToonTalk Reborn will be demonstrated.

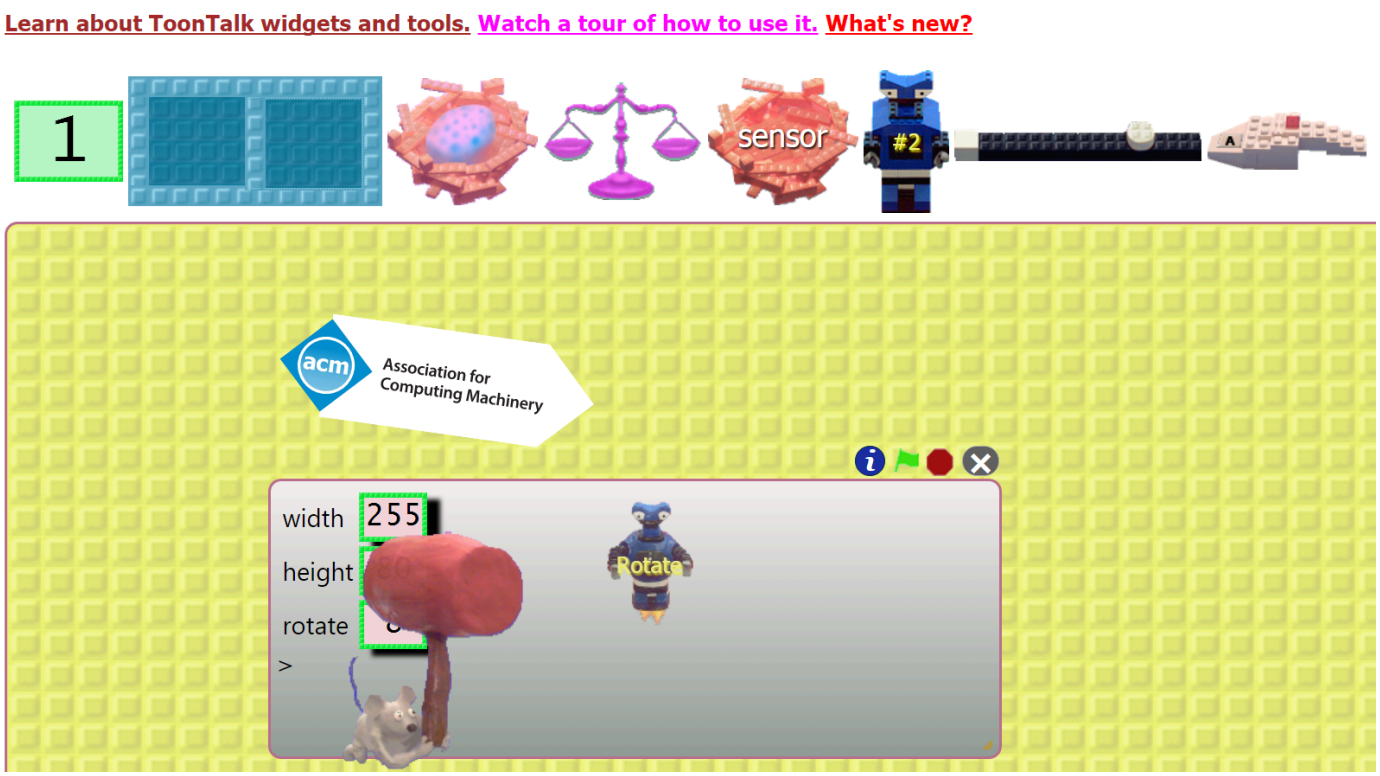

Figure 1: A screen shot of a robot trained to rotate the ACM Logo in ToonTalk Reborn by repeatedly adding 1 to the rotation property.

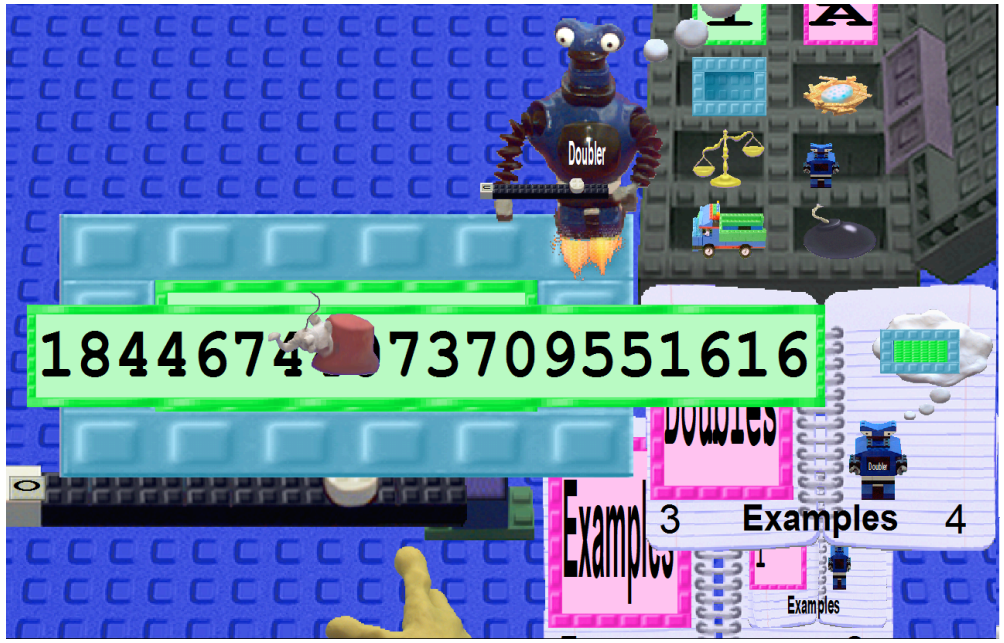

Figure 2: A screen shot from the desktop version of ToonTalk where a robot has been trained to repeatedly double a number.

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