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The Goddard Project

Cassandra Lyn DeNunzio
University of New Hampshire

Robert Galli
University of New Hampshire

Andrew Felicetti
University of New Hampshire

Samuel Cordeiro
University of New Hampshire

Kevin Tierney
University of New Hampshire

See next page for additional authors

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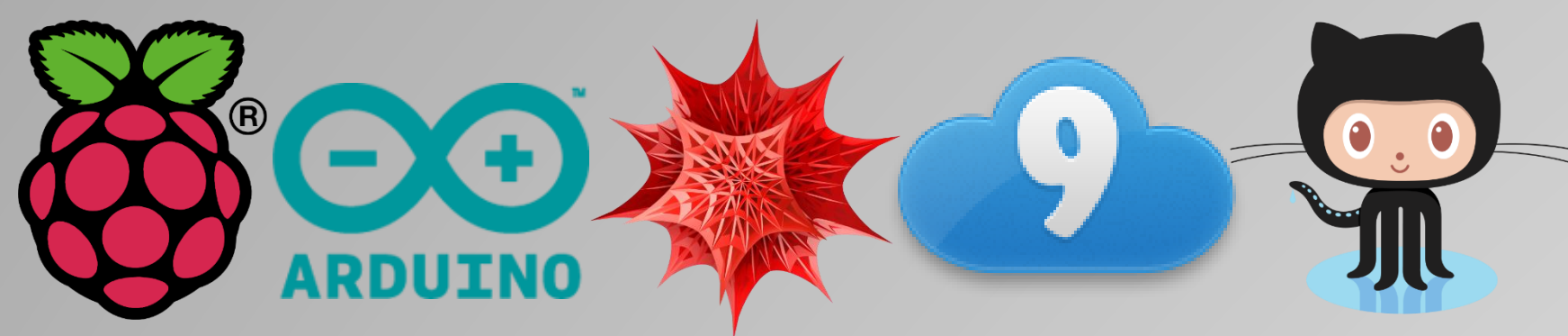
Authors

Cassandra Lyn DeNunzio, Robert Galli, Andrew Felicetti, Samuel Cordeiro, Kevin Tierney, and Cameron Perl

THE GODDARD PROJECT

Team members: Cassandra DeNunzio, Robert Galli, Andrew Felicetti, Kevin Tierney, Cameron Perl, Samuel Cordeiro
Project Advisor: W. Thomas Miller III

University of New Hampshire

Synopsis

The goal of this project was to design and build a robotic dog modeled after Goddard from the 2001 television series, *The Adventures of Jimmy Neutron Boy Genius*. Sheet metal was used for the body of the robot in order to keep the frame lightweight. Goddard travels on two wheels powered by electric motors and two caster wheels. The robot utilizes a Raspberry Pi as its master device and an Arduino Uno in order to control the robot. Essentially, Goddard acts and behaves like an ordinary dog from barking, to finding his dog bone, to being a great companion and friend. In addition, Goddard also has access to the extensive knowledge of the Wolfram Alpha database and can be controlled using voice commands or over a wireless internet network using a keypad (shown below and to the left).
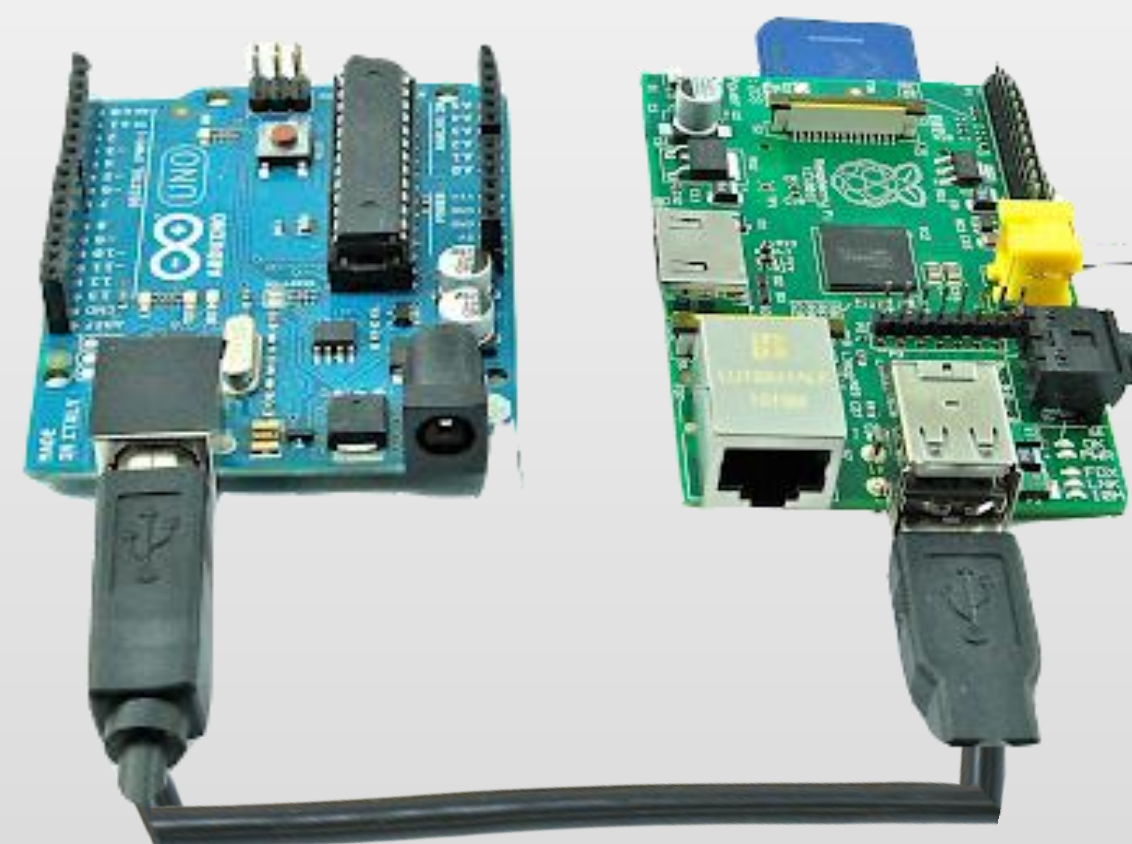
Keypad

Say a command or tap the controls below!

help	status	sleep	stop
come	dance	dj	bump
wag	bark	growl	roam

@unhgoddard

Keypad designed to send commands to the robot.

Microcontroller Configuration

Arduino Uno (left) and Raspberry Pi (right). USB Serial Communication with the Raspberry Pi acting as a master device.

Project Related Research

- Linux
- Node.js
- Object Oriented Programming
- Open Source/Creative Commons
- Version Control/Coding in Teams
- Speech Recognition
- Speech Synthesis
- Artificial Intelligence
- Arduino
- Serial Communication
- Sensor Networks
- Control Systems
- Welding Techniques

Mission

The mission of The Goddard Project was to research, design, and experiment with electronics, mechanics, software design and artificial intelligence to produce a clever, fun, and loveable companion.

Comparison of real-life Goddard built by the Goddard Project team (left) with cartoon Goddard from *The Adventures of Jimmy Neutron Boy Genius* (top right).

Commands

- Bark (plays an mp3 of Goddard's bark)
- Bump (plays instrumental hip hop while bobbing head)
- Come (Goddard finds his bone)
- Dance (plays music while moving around)
- DJ (plays music)
- Growl (plays an mp3 of Goddard's growl)
- Help (Displays a list of commands that Goddard understands)
- Who, What, Where, When, Why (queries Wolfram Alpha)
- Kill (stops audio)
- Kiss (plays an mp3 of a kiss)
- Move (manual movement)
- Roam (autonomous mode)
- Say and speak (allows Goddard to verbally communicate)
- Scold (plays mp3 of a whimper and Goddard puts head down)
- Sleep (Goddard snores and puts head down)
- Tweet (tweets to Twitter)
- Wag (tail wag)
- Wake (wakes up from sleep)

Electronics

- **Raspberry Pi**: Acts as the interface between user and Goddard while intelligently commanding the robot
- **Pi Hub**: Delivers power to the Arduino and facilitates serial communication between the Arduino and Raspberry Pi
- **Arduino Uno**: Used to control the mechanical actions of Goddard and monitors the sensor network
- **29:1 Metal Gearmotors**: Provides Goddard with the ability to move
- **Dual MC33926 Motor Driver Carrier**: Regulates current and governs the performance of the metal gearmotors
- **Maxbotix Ultrasonic Rangefinder**: Offers directional awareness
- **Pololu IR Beacon Transceiver Pair**: Allows Goddard to locate his dog bone using infrared technology
- **Power HD Micro-Servo**: Controls the movement of Goddard's tail
- **Power HD Standard Servo**: Manipulates Goddard's head and neck
- **Pololu 38 kHz IR Proximity Sensor**: Detects human interaction
- **12 V, 9500 mAH Ni-MH Rechargeable Battery**: Powers each electronic component in Goddard

System Block Diagram