Remote Reality via Orbduino

The web controlled robotic arm

http://orbduino.com/

Travis Smith 1/30/12

What is Orbduino?

A fun way to interact w/ physical objects from a remote location

A few things to play with:

- Robotic arm
  - Blocks, cylinders, toys, etc.
- Lighting:
  - General/overhead
  - Multi-color orb
  - Arm LED
- "The Target" + success indication
- Read Indoor/outdoor temperature

A brief history

- ~2008: Walters' Rubber Ducky
- Feb 2010: Orbduino 1.0 (Orb & LCD display)
- April 2010: Robotic Arm, cat taunter
- July 2010: Into the closet
- Aug 2010: Second Cam
- Dec 2010: The Target
  - "What do we do?"

Hardware Diagram

Apogee Color Light Orb
(Hacked for direct control)

PWM

Owi Robotic Arm Edge

6 pairs

"The Target"
(Limit Switch)

Dig

Power distribution proto-board
V7805-1000 Switching Vreg

Proto 6 ch. motor control
L293D based

Two Solid State Relays and two 40W bulbs
Overhead lighting/control

Dig

6 PWM + 6 dig

Slider Pot I/O Board
For local/manual control

Analog

Arduino Ethernet Shield

Seeeduino Mega
Atmel ATMega1280

The Internet
(A series of tubes)

SPI

UART

Sensorium Embedded
SD Multilogger

Panasonic BL-C131A & BL-C1A Network Cameras

BCD

Two HP TIL311 displays (lockout timer)

OneWire

Two Dallas/Maxim DS18B20 Digital Thermometers (one indoor, one outdoor)

SPI-ish

DS1302 Real Time Clock
w/ battery backup

Firmware Features

- Web Server: Parses URL requests/Parameters
  http://tnhsmith.dyndns.org:2100/ard?armp=230&...
  Sends HTTP responses
- 45 second IP Lock timer for motor control
- Logging
  - All commands/IPs, Target hits, Temperatures
- Remote administration (w/ password protection)
  - Read any log file, or most recent entries
  - Current user, general status
- General timeout/reset (lights out)
- Local/remote control modes

Web page: Bringing it all together

PHP Chat Window

Web Cam select/views

Robot/Orb/Light Commands (via dyndns)

Orbduino response window

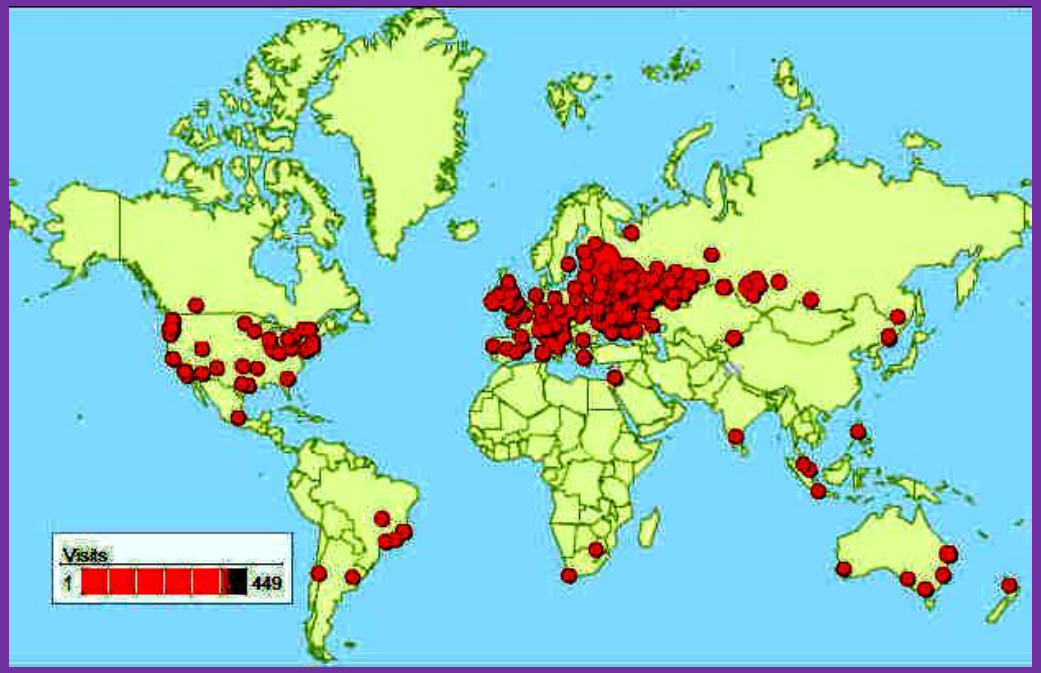
Where to go from here…

- Potential Improvements:
  - Arm Positional feedback/limits/location reset
  - Improved GUI, smoother operation
  - Camera on arm or on track around rim
    - Pan/Tilt/Zoom control
  - More interactivity
    - Touch screen monitor/paint program
    - RFID tags in objects, sensor
    - Build challenges
- Similar project ideas:
  - RC cars/toy room (larger area)
  - ~~Adult entertainment~~
  - ~~Remote Hunting~~

User Stats/Locations

- Multilingual chat log
  - Russian, Italian, Finnish, French, Portuguese, Spanish, German
- Q4 2011 Statistics
  - 5707 Visits (~63/day)
  - 4441 unique visitors
  - 95 Countries
  - All 50 states + DC
- Publications
  - Habrahabr (Russia)
  - Lega Nerd (Italy)
  - Hack ‘n Mod (US)
  - Hack A Day (US)
  - Arduino Blog
  - Other blogs

Dec 2011 hit map:



The Wide View

The End

Questions?

“Under the hood”

- Seeeduino (Arduino) Mega w/ Atmel ATmega1280 Microcontroller,
- Custom power distribution proto-board based on the V7805-1000 Switching Vreg
- Arduino Ethernet Shield
- Custom I/O proto-board (Slider pots, buttons, LEDs) for manual/local control
- Apogee Color Changing Ambient Light Orb CLB2U (Hacked for direct PWM control)
- Two Dallas/Maxim DS18B20 Digital Thermometers (one indoor, one outdoor)
- Custom 6 channel motor control board based on the L293D Quad Half-H driver
- Owi Kit Robotic Arm Edge (Hacked for direct control of direction and speed)
- Sensorium Embedded Multilogger SD data logger board.
- Two Solid State Relays for Main Lighting control
- Two HP TIL311 Hexadecimal displays for lockout timer
- DS1302 Real Time Clock w/ recharging battery backup
- Panasonic BL-C131A Wireless Network Camera (Side view)
- Panasonic BL-C1A Network Camera (Top view)