

Remote Reality via Orbdduino

The web controlled robotic arm

<http://orbdduino.com/>

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What is Orbdduino?

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

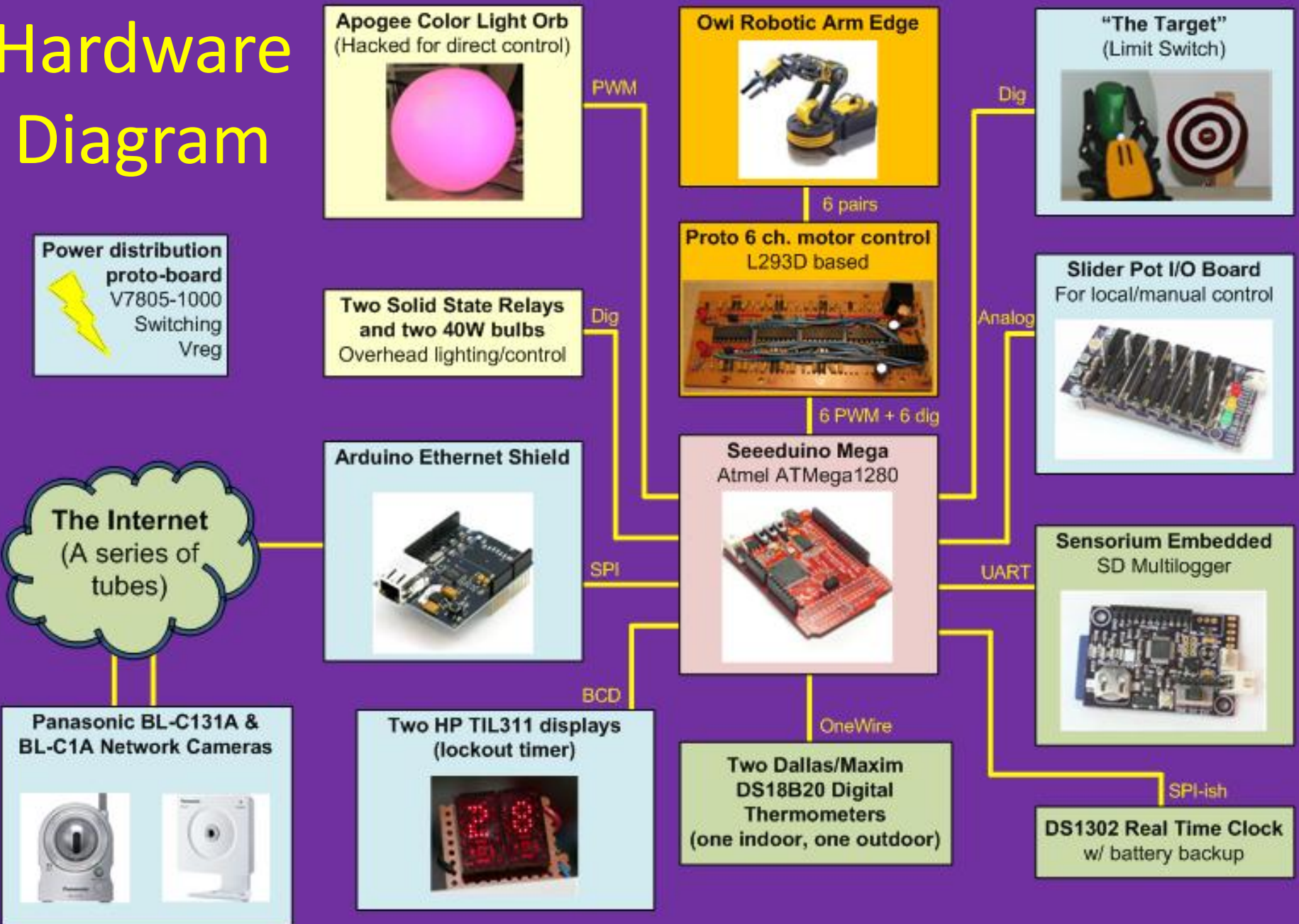


A brief history

- ~2008: Walters' Rubber Ducky
- Feb 2010: Orbdduino 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)



Owi Robotic Arm Edge



"The Target"
(Limit Switch)



Power distribution proto-board
V7805-1000
Switching
Vreg



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

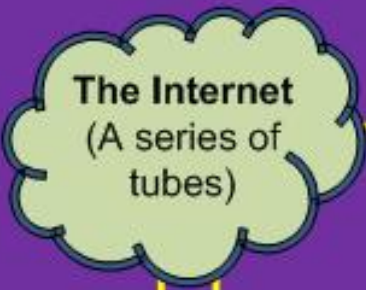
Proto 6 ch. motor control
L293D based



Slider Pot I/O Board
For local/manual control



The Internet
(A series of tubes)



Arduino Ethernet Shield



Seeeduino Mega
Atmel ATmega1280



Sensorium Embedded SD Multilogger



Panasonic BL-C131A & BL-C1A Network Cameras



Two HP TIL311 displays
(lockout timer)



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

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

The screenshot shows the Orbdduino website interface. At the top, there's a browser window with the URL 'orbdduino.com'. Below the browser, there's a chat window with a message log and input fields for 'Nickname' and 'Message'. The main content area includes an 'Updates' section with a welcome message dated 9/30/2011, a 'Links' section with social media links and navigation buttons for 'Technical Details', 'User Statistics', and 'History of Orbdduino', and a 'Press and hold the Target' challenge. The central control panel is divided into several sections: 'Robotic Arm Commands' with a grid of icons for Pincher, Spotlight, Wrist, Elbow, Shoulder, and Base; 'Orb Commands' with options to 'Turn Orb Off' and 'Start Random Color Flow', and a color selection interface with 'Instant color' (Red, Green, Blue, Yellow, Cyan, Magenta) and 'Mix your own color' (input fields for Red, Green, Blue, and a 0-255 slider); 'Main Scene Lights' with 'On' and 'Off' buttons; and 'Orbduino Response' showing a green box with the message: 'You remain locked in, 45 sec timer restarted. Arm Movement: arme=-230. Arm Movement: arme=-230'. There's also a 'Read Back Temperature information' link. On the right side, there's a Carrington College advertisement and logo. At the bottom, there's a 'Contact: Trav' link and 'The Orbdduino Hall of Fame' table.

Date	Name	From	Accomplishment
12/15/2010	Anything 25 (Double A)	Nevada, USA	First person to push the target! Pushed the target (multiple times)

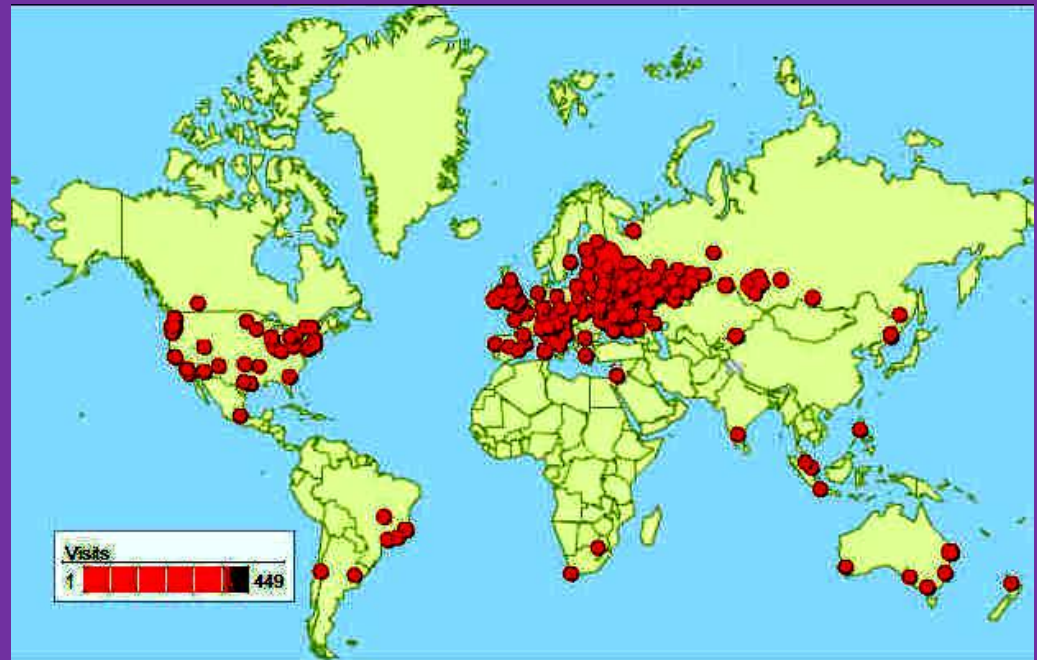
Where to go from here...

- 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)