An Instructables on Instructables

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Bit of an Outreach

- What
- Why
- How
- Examples
- Brainstorming
What is Outreach?

- Delivering your science to the broader community
What is Outreach?

- Delivering your science to the broader community
  - Whatever format speaks to you
    - Demos
    - Videos
    - Instructables
    - Freeware / Scripts
  - Increasing complexity & effort
  - NB: Showing is often enough...
What is Outreach?

- Delivering your science to the broader community
  - Whatever interests you
  - At whatever level you want
    - Brainstorming
What is Outreach?

- Delivering your science to the broader community

- Kids: Daycare and up...
- Lay Public
- Undergrads & grads
- Researchers & teachers
What is Outreach?

Delivering your science to the broader community

- Kids: Daycare and up…
- Lay Public
- Undergrads & grads
- Researchers & teachers
- Scientists

What

Public Scientists

Kids

EYU 2010
Why Do Outreach?

- **Broader Community**
  - Fosters next generation science/scientists
  - Humanizes science & scientists for the lay public
Why Do Outreach?

- Scientifically
  - Grounding & fun
  - Allows students to come into their own
Why Do Outreach?

- Funding agencies
  - Concretized broader impacts (e.g., youtube hits)

- Proposal reviews
  - Strongly positive parts of reviews
How to Do Outreach?

- **Collaborate with students**
  - Credit for projects
  - Research assistants: ~$15/hr in proposals
    - Can request funds in NSF proposals through the REU program

- **Cinematography:**
  - Most students have basic skills
  - Film students for advanced skills
    - Great for their "film reel"
How to Do Outreach?

- **Hardware:**
  - Camera / lighting costs
    - $1K for two GoPro’s & $1K for KinoFlo BarFly lights
  - Demos: Can request proposal funds to build small-scale outreach devices
  - Recording live sound is hard
    - Lots of free music available online

- **Editing:**
  - Basic: *Powerpoint* and *Keynote* can export movie files
  - Advanced: *Autodesk Smoke* free for academic usage
How to Do Outreach?

- Evaluation & Assessment:
  - Educational assessment expertise often on campus
  - SERC: Can subcontract assessment of outreach projects
    - Can SERC assessment costs within NSF proposal budget
How to Do Outreach?

- Dissemination: youtube.com/spinlabucla
How to Do Outreach?

- **Dissemination:** youtube.com/spinlabucla

- How else?
  - SERC
  - NSF RET
  - IRIS site
  - GIFT/AGU
  - NOAA Edu. site
  - FYFD site
  - ???
How to Do Outreach?

- Time / Management (!!!)

  - Weekly meeting(s) with students!!!
Outreach Examples

- Demos, Videos, Instructables, Scripts
Outre

- **Demos,**

| Table:          | Gary Glesener; gbglesener@vt.edu; formerly www.medl.ess.ucla.edu |

https://www.youtube.com/watch?v=bHAqyYMjvgg
Outreach

• **Demos**, Videos, Instructables, Scripts

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Outreach Examples

- Demos, Videos, Instructables, Scripts

- Upwelling plume movie:
  - https://youtu.be/ugc1NWG0K0s
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- This can be done with numerical and analytical model outputs as well

  - e.g., http://ian-r-rose.github.io/interactive_earth/index.html
“Hands-on”/interactive, numerical mantle physics; Ian Rose
Outreach **Examples**

- Demos, Videos, **Instructables**, Scripts

Katie Shurtleff
Sam Walker
Outreach **Examples**

- Demos, Videos, **Instructables**, Scripts
<table>
<thead>
<tr>
<th>Item</th>
<th>Source/Description</th>
<th>Cost</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lego Wheel</td>
<td>Lego Store, or borrowed from child’s set</td>
<td>$0.5</td>
<td></td>
</tr>
<tr>
<td>Continuous Rotation Servo Motor</td>
<td>Adafruit ID: 154</td>
<td>$12</td>
<td><a href="https://www.adafruit.com/product/154">https://www.adafruit.com/product/154</a></td>
</tr>
<tr>
<td>MatLab License</td>
<td>Matlab</td>
<td>$0.49</td>
<td>A month-long free trial is available at:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>You can also use Python to control the motor if you are more comfortable in that programming environment.</td>
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<td></td>
<td></td>
<td></td>
<td>Requires Soldering some header pins to the shield. A detailed guide on how to do this can be found at:</td>
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<td></td>
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<td></td>
<td><a href="https://learn.adafruit.com/adafruit-motor-shield-v2-for-arduino/install-headers">https://learn.adafruit.com/adafruit-motor-shield-v2-for-arduino/install-headers</a></td>
</tr>
<tr>
<td>Arduino Uno OR SparkFun RedBoard</td>
<td>Adafruit / Sparkfun (adafruit) $24 (adafruit) / $19.95 (sparkfun)</td>
<td></td>
<td><a href="https://www.adafruit.com/products/50">https://www.adafruit.com/products/50</a></td>
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<td></td>
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<td><a href="https://www.sparkfun.com/products/12757">https://www.sparkfun.com/products/12757</a></td>
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<tr>
<td>Mini USB Cable</td>
<td>Amazon</td>
<td>$5</td>
<td><a href="https://www.amazon.com/AmazonBasics/USB-2-0-Cable--Male/dp/B00NH11N5A/ref=sr_1_3?ie=UTF8&amp;odid=1465529681&amp;sr=8-3&amp;keywords=mini+usb+cable">https://www.amazon.com/AmazonBasics/USB-2-0-Cable--Male/dp/B00NH11N5A/ref=sr_1_3?ie=UTF8&amp;odid=1465529681&amp;sr=8-3&amp;keywords=mini+usb+cable</a></td>
</tr>
<tr>
<td>Chia Seeds and Food Dye</td>
<td>Amazon, Grocery Stores</td>
<td>-$1</td>
<td>(Optional, but useful for demonstrations)</td>
</tr>
</tbody>
</table>

6. Voila! A rotate-able table

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![Image of rotate-able table]

Step 5: Controlling Your Table

Play with the provided code. This code allows you to control the speed and direction (clockwise or counterclockwise) of the table, as well as how long you like it to spin.

Appendix

Clockwise Rotation Code

```python
# initialize clockwise rotation of servo motor - driven table at various speeds

# define arduino object ('usb port name', 'arduino board name', 'libraries', 'adafruit/motorshieldv2')

#define port pin

void setup()
{
  pinMode(PIN1, OUTPUT);
}

void loop()
{
  digitalWrite(PIN1, HIGH);
  delay(1000);
  digitalWrite(PIN1, LOW);
  delay(1000);
}
```

```python
# example code to control the table

# include necessary libraries

from Adafruit_MotorHAT import Adafruit_MotorHAT

# create motor hat instance

mh = Adafruit_MotorHAT()  # Specify 'usb port name' and 'arduino board name'

# define speed and direction

speed = 100  # Speed of motor (0-255)

for _ in range(10):
  mh.getMotor(1).run(Adafruit_MotorHAT.BACKWARD, speed)
  mh.getMotor(2).run(Adafruit_MotorHAT.FORWARD, speed)
  mh.getMotor(1).run(Adafruit_MotorHAT.FORWARD, speed)
  mh.getMotor(2).run(Adafruit_MotorHAT.BACKWARD, speed)

mh.getMotor(1).run(Adafruit_MotorHAT.RELEASE)
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```

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mh.getMotor(1).run(Adafruit_MotorHAT.RELEASE)
mh.getMotor(2).run(Adafruit_MotorHAT.RELEASE)
```
Outreach Examples

- Demos, Videos, Instructables, Scripts

NASA's Perpetual Ocean Data Assimilation Visualization
Outreach Examples

- Demos, Videos, Instructables, Scripts

Stationary Frame View

Numerical model too
Outreach Examples

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DigiPyRo: Digitally Rotated View

Inertial Circles

\[ r_i = \frac{V}{2\Omega} \]

Original Rotation of Camera: 0.0RPM
Additional Digital Rotation: −10.0RPM
Physical Rotation: −10.0RPM

Time: 0.0 s

Tracks particle
Predicts \( r_i \) (lines)
Outputs data
Outreach Examples

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- Writing up for Am. J. Phys.
  - Broader dissemination?...
Brainstorming

- Most interesting topic you work on?
- An idea that flummoxes students?
Thanks...