

EN1-06: Simple Robotics

October 5th, 2016



Schedule

- Give tires to Julia/Duc
- In the News
- Human Factors GIM
- Recruiting Mechanical Help
- Assignment 4: Robotic Magic Trick

Dronesurfing



<https://www.youtube.com/watch?v=BuRf6r0LuL8>

Dutch Police Buy Four Eagle Chicks for Anti-Drone Flying Squad



<http://spectrum.ieee.org/automaton/robotics/drones/dutch-police-buy-four-sea-eagle-chicks-for-antidrone-hit-squad/>

Human Factors/Engineering Psychology GIM

Human Factors/Engineering Psychology is: the study of how humans behave physically and psychologically in relation to particular environments, products, or services, and the application of that study through design.

We are having a **General Interest Meeting for the Human Factors Engineering/Engineering Psychology Program** this **Wed, Oct 5 at 8 PM in 574 Boston Ave (CLIC), Room 204.**

This meeting is for all students in the SOE and A&S undergraduate programs, either majoring or minoring in HF/ENP, students considering a major or minor in HF/ENP, HCI Certificate and MS students.

We will review: degree requirements, course schedules, elective options, internships, study abroad, 5th year programs, options for HCI, certificate students, the thesis and non-thesis MS degrees, and more...

We'll also hear from the Tufts Human Factors & Ergonomics Society leadership.

Session will be run by the head of undergraduate Human Factors, Prof Dan Hannon. Questions? Contact Ronna ten Brink (Tufts University Class of 2017, Human Factors + Computer Science) at Ronna.ten_Brink@tufts.edu.

John Brown Nose Event

Thursday, October 6th at 6:30pm

Sean O'Reilly is the founder and president of 3D Printsmith LLC, Brighton, MA, an engineering contract and consulting company for 3D Scanning, 3D printing and additive manufacturing solutions since 2011. Mr. O'Reilly is a Plastics Engineer, with over 20 yrs experience in materials and process development for industries including aerospace and energy engineering. Prior to founding 3D Printsmith LLC, Mr. O'Reilly worked in Project Engineering for QinetiQ N.A. (Waltham MA), Foster-Miller Inc., (Waltham MA) & Fiber Innovations Inc., (Walpole MA). Mr. O'Reilly enjoys helping clients explore 3D scanning & additive manufacturing for artistic, restoration, engineering, medical & industrial applications. He has presented on 3D scanning / 3D printing to the Society of Manufacturing Engineers, (Texas Conference, Oct. 2011) and the Boston Consultants Network (CNET). He was Keynote speaker at Emerald Physicians Group Conference, ("VivaPalooza" Hyannis, MA, Sept. 2012) and is also a repeat guest lecturer on 3D printing at MIT for the Medical Design Group 2.75.

<http://www.3dprintsmith.com/>

A PRESENTATION AND DISCUSSION WITH:

- » Rika Smith McNally, Conservator
- » Sean O'Reilly, Engineer & Founder of 3D Printsmith LLC

MODERATED BY:

- » Christian Whitworth, Art History MA 17
- » Laura McDonald, Collection Registrar

John Brown propelled the abolitionist movement and the beginning of the Civil War. The marble bust of Brown, which became an icon for his insurrection, is now on view at the Tufts University Art Gallery. Come learn about the bust's history in the permanent collection, its re-discovery, and its restoration. Find out how 3D printing, scanning, and engineering are offering unique solutions to art restoration and museum exhibition.



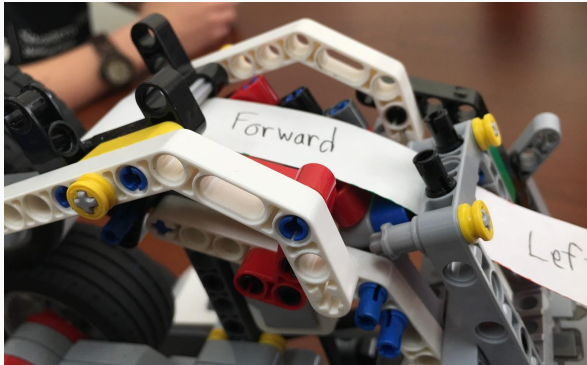
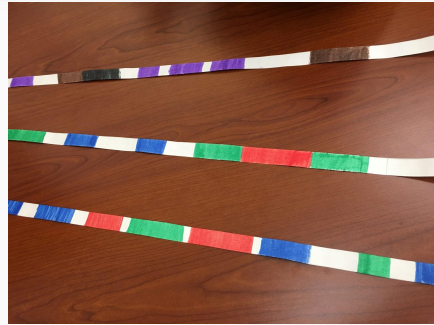
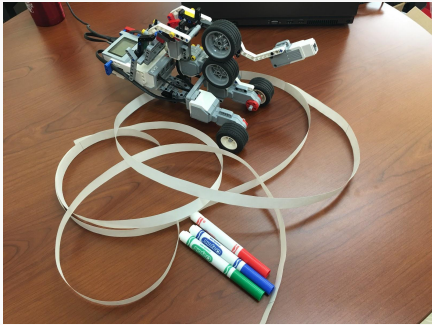
JOHN BROWN'S NOSE:

HOW 3D SCANNING IS CHANGING THE FACE OF CONSERVATION

THURSDAY, OCTOBER 6, 6:30PM

TUFTS UNIVERSITY ART GALLERY @ AIDEKMAN ART CENTER

Paper-Program Robot: Recruiting Mechanical Help



Assignment 4: Robotic Magic Trick

Project 4: Robotic Magic Trick

EN1-06 Fall 2016

Project (in-class demonstration/video presentation) due on Monday, October 17th, 2016

Documentation (description, images, videos, code, etc) due to website by Mon (10/17) by 9pm

Project Description: Create a robotic magic trick (either performed by the robot or performed by you and facilitated by the robot).

Hardware and Programming: You will use your LEGO MINDSTORMS EV3 Kit as well as any other materials needed for achieving the effect. You will program your robot in LabVIEW.

Assignment: You can work in pairs or groups of four (your choice); the complexity of the robot/project should reflect the size of your group (and this being a “two week” long project). For this assignment the goal is to perform a magic trick leveraging the LEGO MINDSTORMS EV3, either having the robot perform the magic trick (e.g. autonomously) or having you (the human) perform the magic trick facilitated by some robotic mechanism. The trick only needs to work once, and from a particular angle (you will be submitting a video recording of the trick; it does *not* need to be performed live). In addition to the video of the trick being performed, you need to submit a second video documenting/demonstrating the mechanism (yes, revealing the “trick,” which of course a true magician would never do!).

Disappearing Objects

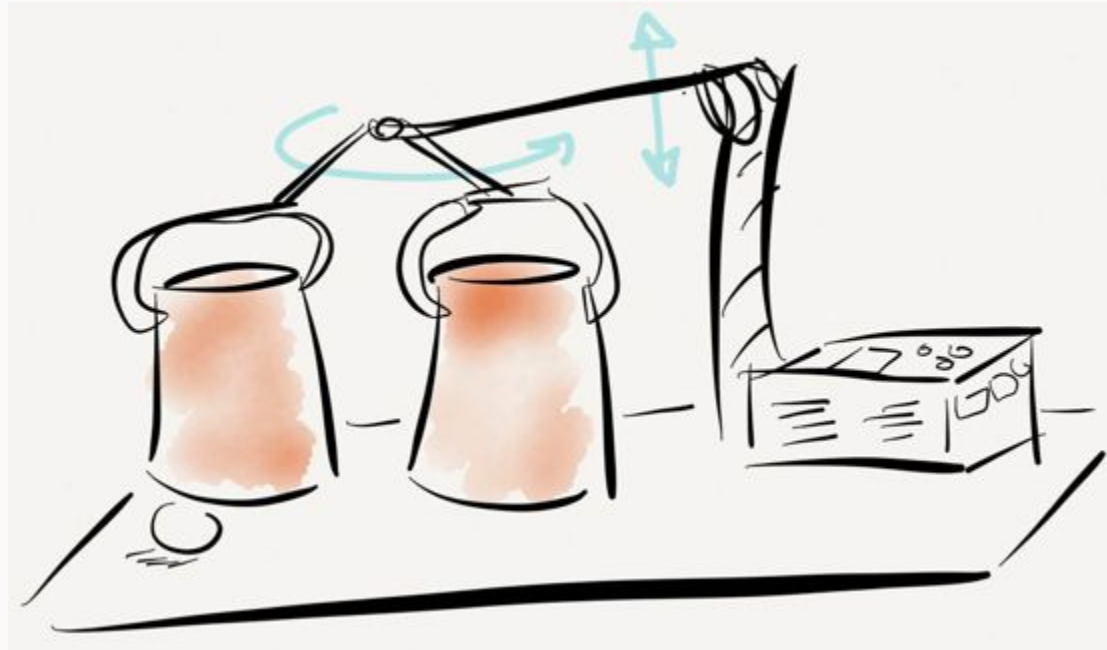


(this is with a foam ball, but can also do similar with other objects)

For Example: <https://www.youtube.com/watch?v=JMEvyvf1Q7w>

Robot Concept: Robotic hands (with misdirection?) make an object disappear

Cups and Balls

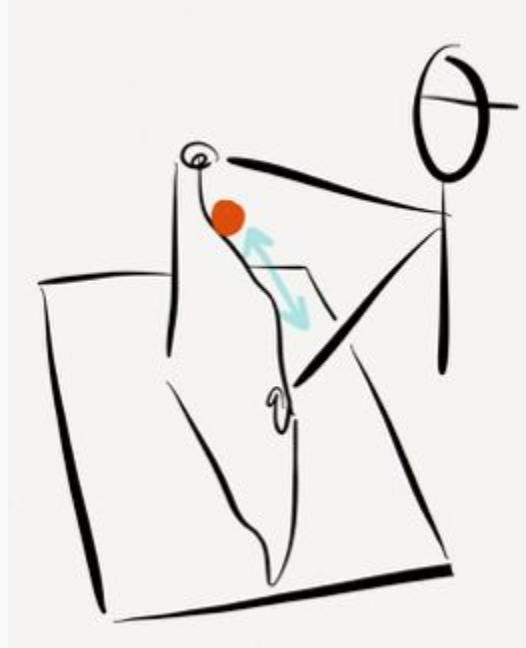


For Example: <https://www.youtube.com/watch?v=8osRaFTgHo>

Robot Concept: Robot mixes up cups, lifts to reveal ball has disappeared/moved to new location/etc.

Ball and Handkerchief

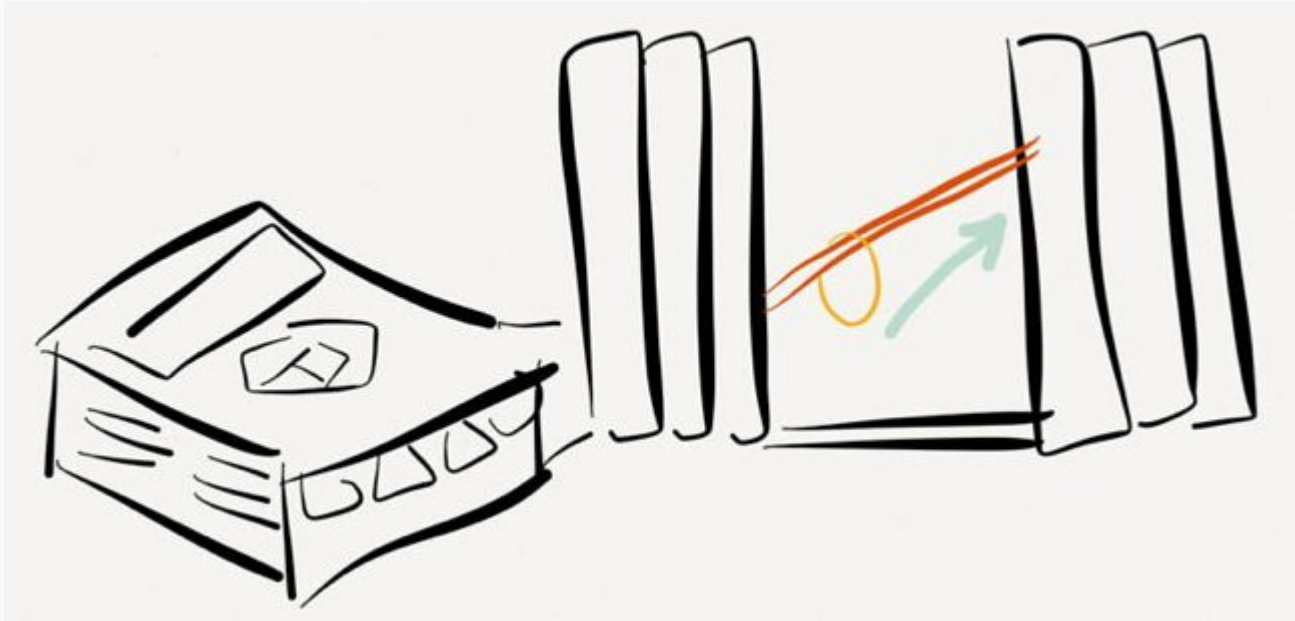
(aka "magic zombie ball" if googling)



For Example: <https://www.youtube.com/watch?v=pbhDt65gmxE>

Robot Concept: Human performs the trick, and robot is controlling the ball behind curtain

Ring on a String



For Example: <https://www.youtube.com/watch?v=V3NljG-mpBg>

Robot Concept: Robot controls the trick, making the ring magically rise

Cutting (and Restoring) Rope



For Example: <https://www.youtube.com/watch?v=neC2g5mpff0>
<https://www.youtube.com/watch?v=MOIm7tV8gj0>

Robot Concept: Robot manipulates the rope and the scissors, performing the trick

Rope Tricks



For Example: https://www.youtube.com/watch?v=Oe2O75t_1IE

Robot Concept: Other than cutting, robot manipulates the rope performing the trick

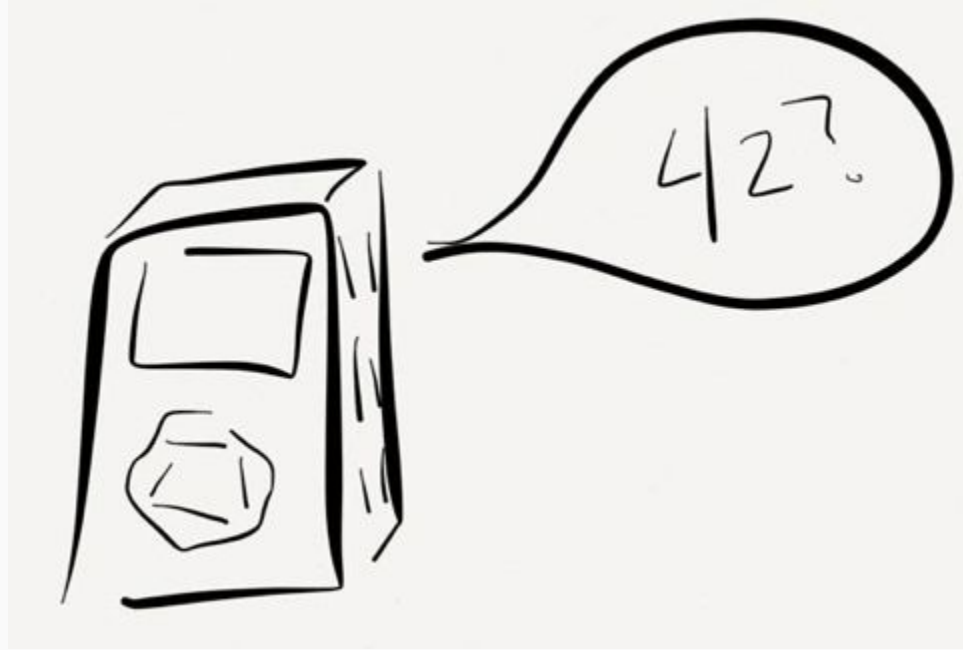
Guess the Card



For Example: (couldn't find a good example)

Robot Concept: Can robot determine the randomly (or “randomly”) selected card?

Mentalism



For Example: [http://www.wikihow.com/Read-Someone's-Mind-With-Math-\(Math-Trick\)](http://www.wikihow.com/Read-Someone's-Mind-With-Math-(Math-Trick))
https://www.youtube.com/watch?v=wyTDDJ_il1o (with cards)

Robot Concept: Can the robot make some kind of prediction?

Quick Change



For Example: <https://www.youtube.com/watch?v=PuydCas1c5c>

Robot Concept: Possible for robot to turn into a different robot (or EV3 into NXT and back?)

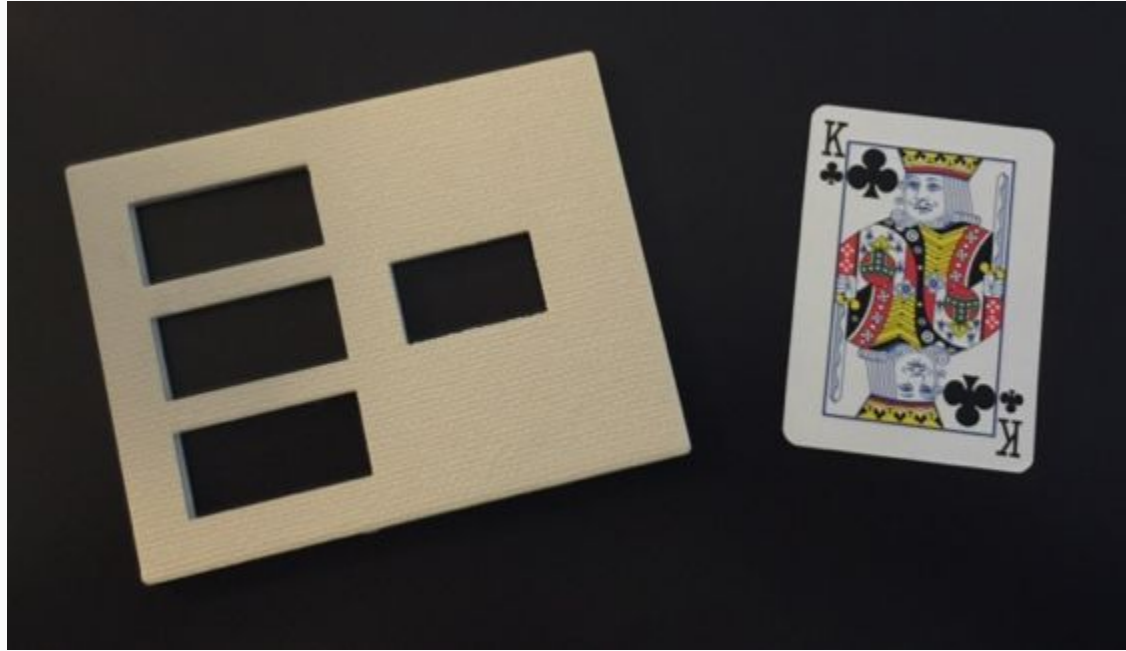
Gem Bar



For Example: n/a

Robot Concept: Robot manipulates the gem bar, performing the trick

Cut and Restored Card



For Example: n/a, although similar ticks out there(?)

Robot Concept: Robot manipulates the card, performing the trick

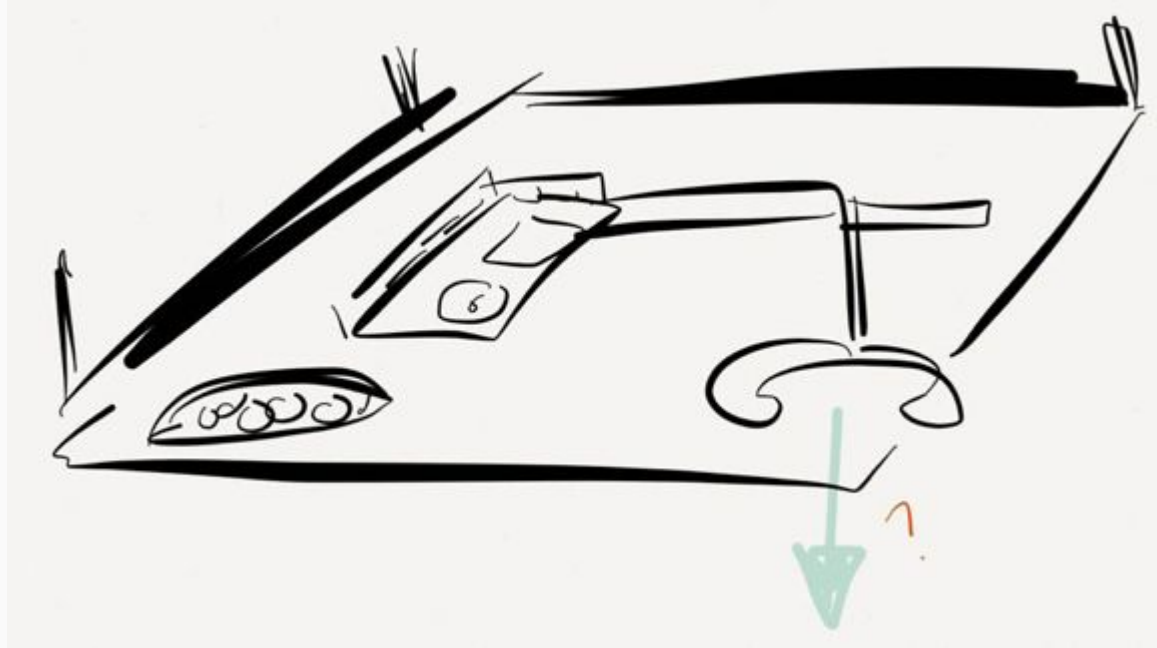
Blades/Pins on a String



For Example: Often called: “needles and thread” (if googling)

Robot Concept: Robot manipulates the string and blades/pins, performing the trick

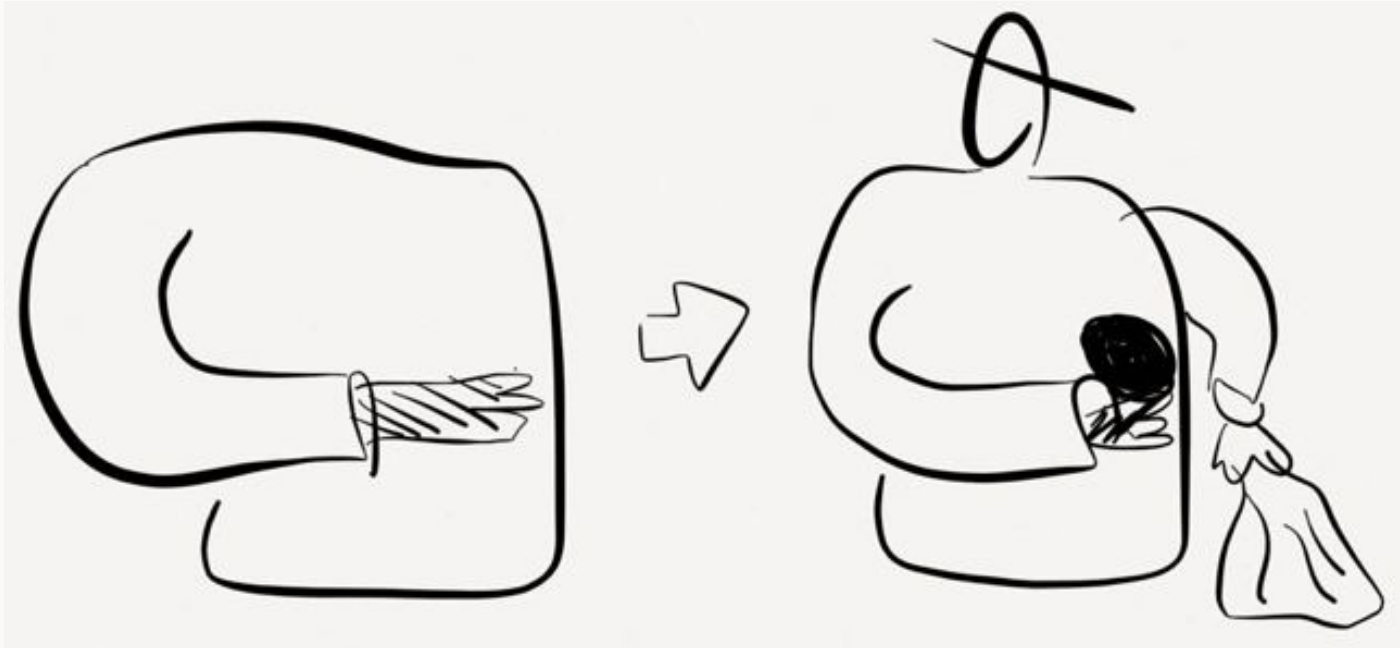
Magic Achieved via Change in Gravity



For Example: <https://www.youtube.com/watch?v=D87DSL4Eqw>

Robot Concept: Robot performing some trick (object disappear?), achieved via change in gravity

Robotic Arm Helping with Trick



For Example: n/a

Robot Concept: A fake robotic arm that look realistic frees up real arm for performing trick

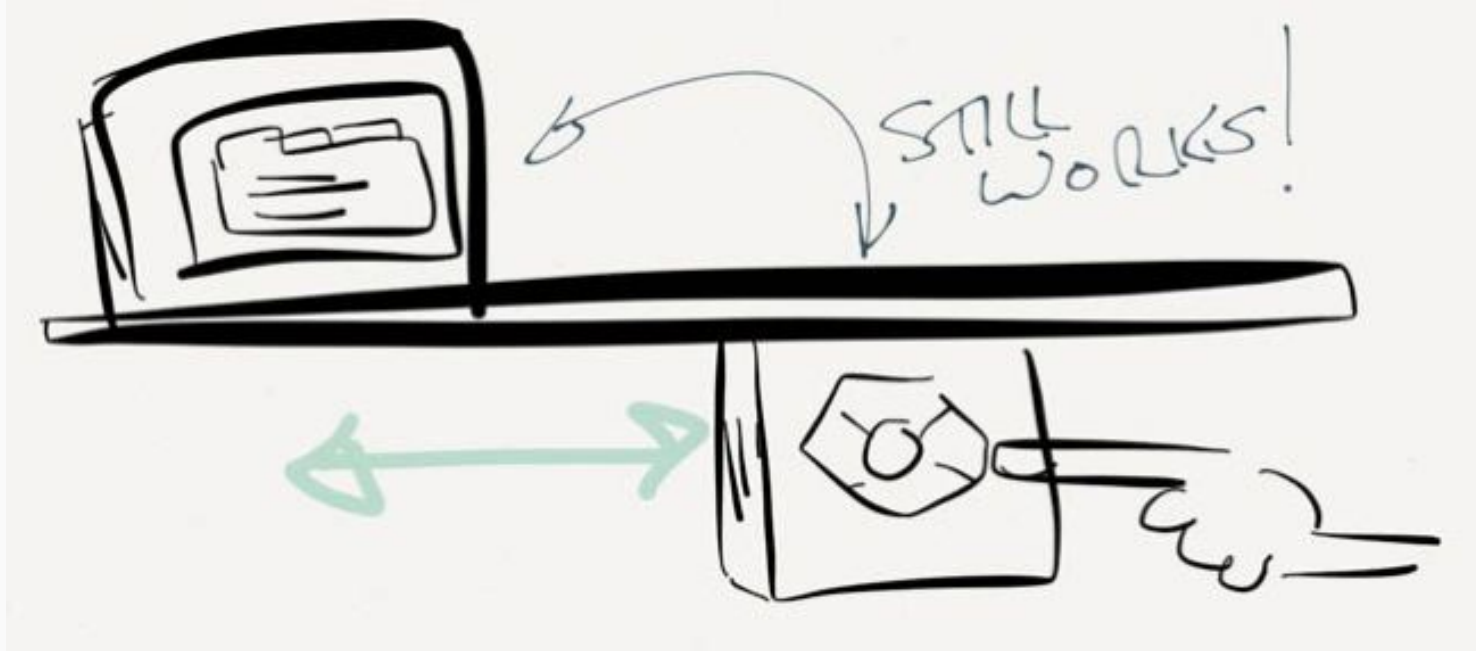
Levitating Robot



For Example: <https://www.youtube.com/watch?v=n98aq0jBm1s>

Robot Concept: Robot magically rises off the ground

Cut an EV3 in Half



For Example: n/a, but lots of examples online

Robot Concept: The classic “lady in half” trick but performed on a functioning EV3

Assignment 4: Magic Tricks from Fall 2014

Levitation (x2)

“Occult Banana Splitter” (?)

Linking Rings

Coin from behind the ear

Appearing Robot (Car)

Disappearing Salt Shaker

Mentalism, w/ Red Cups (x2)

Rabbit out of a Hat

Assignment 4: Magic Tricks Brainstorm

Tell the order of cards in a deck

“Empty Box” (via mirrors)

Catch card on a knife

Making rain go up/Stop water mid air

Card on door/other side of window

Harry Potter stuff

Cutting people in half

Flying/Levitation

Making objects levitate

Lying on nails, fire/hot coals

Never-ending scarf

Sword swallowing/fire breathing

Making doves appear

Escape in general

Bite a coin/spit it back together

Hypnosis & telekinesis (mentalism)

Waterbending

Walking on water

Quarter through coke bottle

Quarter through table

Restored ripped in half dollar

Slicing a pencil in half with a dollar

Smashed birdcage/reappearing bird

Walking on the side of buildings

How Do I...?

Challenge 1: Drive the Motor forward 5 seconds and back 5 seconds

Challenge 2: Use Touch Sensor to “toggle” direction of the motor

Challenge 3: The motor moves as fast as the light sensor reads

Challenge 4: Display sensor value on the EV3 Screen

Challenge 5: Display sensor value on the LabVIEW Front Panel (value? meter? graph?)

Challenge 6: Save collection of sensor data values (e.g. light value each time you click touch sensor) and export to file for analysis in Excel

The screenshot shows a web browser at www.dreslab.com/robotics2016/category/help-videos/how-do-i/. The page title is "How Do I" and it contains a list of tutorials. A blue button at the top says "Submit a How Do I post".

The tutorials listed are:

- Motor Speed via Motor Rotation:** A diagram shows a flow from "Reset Rotation" to "Port B" (Read Rotation) to "Lego Port A" (Power). The text explains: "Constantly read motor B value, and change motor A power based on it. Drive the speed of one motor by the amount of rotation of a second. This (version 1) directly inputs the value of the B motor into the power of the A motor. The 'reset rotation' at the beginning of the code, before the start of the While Loop, just ensures when the program starts it [...]"
- Motor Speed via Light Sensor:** A diagram shows "Port 3" (Read Ambient Light) connected to "Lego Port A" (Power). The text explains: "How to control the speed of a motor based on the value read on the light sensor. This (Version 1) reads the ambient light in the room and drives the power of the motor. It happens continuously and instantly. Covering up the light sensor (making it 'go to zero') will stop the motor; putting the [...]"
- Motor Direction via Touch Sensor:** A diagram shows "Port 1" (Power) connected to "Wait for Bump" (Touch Sensor) and "Brake" (Power). The text explains: "Run motor forward, wait for Bump on touch sensor, then Brake motor. Change the motor direction via the Touch Sensor. That is: every time you press the touch sensor, it changes the motor direction. This (version 1) runs the motor until the Touch Sensor is pressed. Then stops the motor. This (version 2) runs the motor forward, waits for touch, then backward, waits for touch. If you [...]"
- Motor forward and backward:** A diagram shows a sequence of "Time" blocks (5, -75, 5) connected to "Power" blocks. The text explains: "How to move a motor forward 5 seconds and backward 5 seconds"

Each tutorial includes a "Read More >" button and a footer with the author "Ethan Danahy", date "October 6, 2016", and "How Do I" tag.

[See "How Do I" section under Help Videos](#)