MECHATRONICS

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READY TO HEAR ABOUT MECHATRONICS?

Mecha = Mechanical

Tonics = Electronics

Mash These Together And What Do You Get?

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YES… WE WILL BUILD STUFF LIKE THAT!!!

- Mechatronics Is A Mashing Together Of:
  - Electronic And Mechanical Technology
  - Computer Control Systems
  - Robotics Engineering

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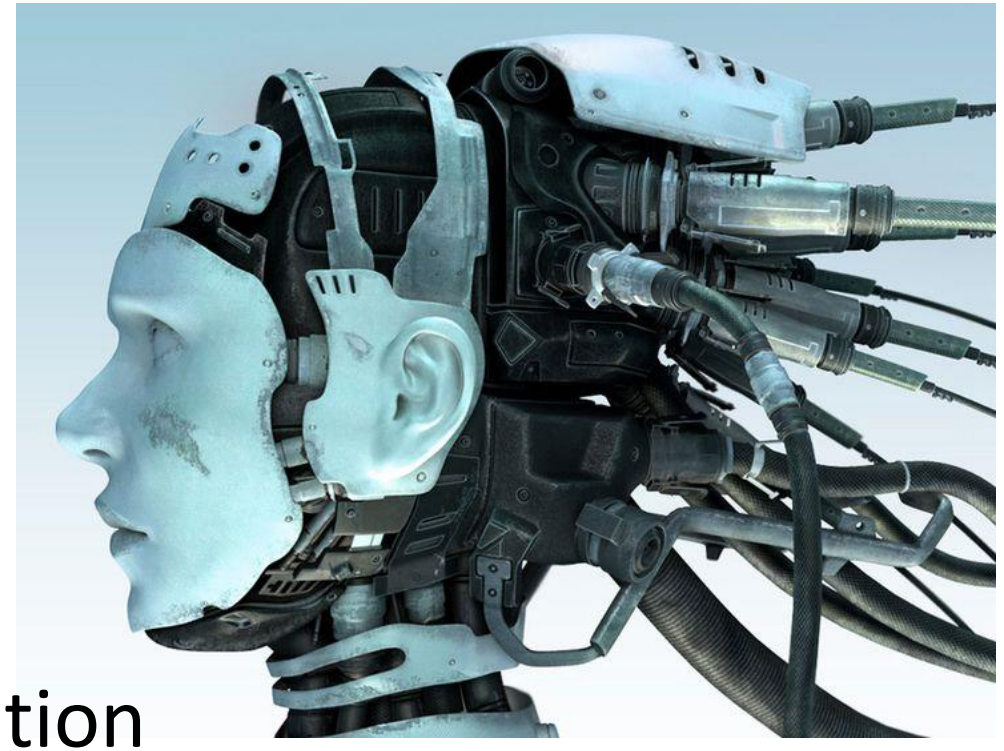
MECHATRONICS - WHAT WILL YOU LEARN?

- Hands on Physics <-- this is planned to be interleaved as part of the other modules, but to satisfy the A-G "D" Science requirement
- AC/DC Electronic Fundamentals
- Digital Electronic Fundamentals
- Programing with Microcontrollers
- Mechanical 3D Design & Printing
- Pneumatic Systems
- Programmable Logic Controllers
- Industrial Robotic Theory & Application



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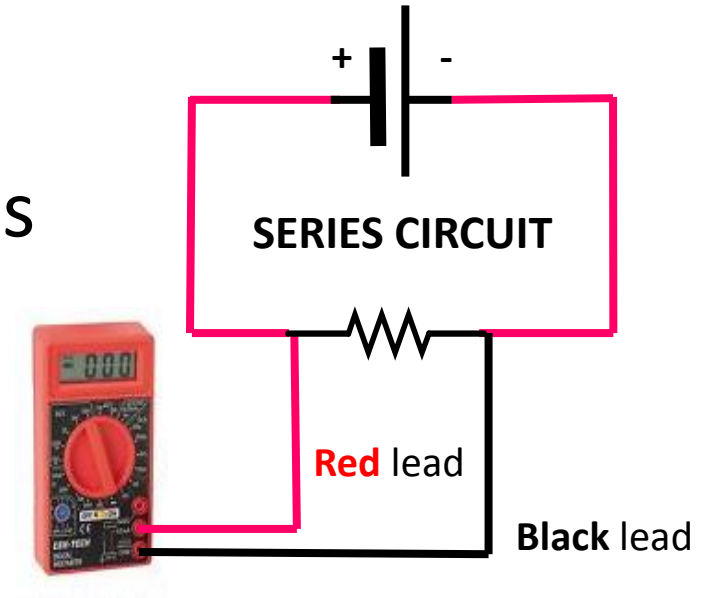
Leila Madrone
Mechatronics Engineer
Otherlab

MECHATRONICS - WHAT WILL YOU LEARN?

- Introduction to DC /AC & Digital Electronic Circuits
  - Ohms Law
  - Serial and Parallel Circuits
  - Digital Logic
- Programing with Microcontrollers
  - Learn Linux Command Line
- Programing in C++ & Python
  - CPA Programing Essentials In C++
  - Learn the C++ and Python




```
class GameOverScene : public cocos2d::CCScene {

public:
    GameOverScene():_layer(NULL) {};
    ~GameOverScene();
    bool init();

    //SCENE_NODE_FUNC(GameOverScene);

    static GameOverScene* node()
    {
        GameOverScene *pRet = new GameOverScene();

        //Error: undefined reference to `GameOverScene::init()'
        if (pRet && pRet->init())
        {
            pRet->autorelease();
            return pRet;
        }
        else
        {
            //Error: undefined reference to `vtable for GameOverScene'
            delete pRet;

            pRet = NULL;
            return NULL;
        }
    };

    CC_SYNTHESIZE_READONLY(GameOverLayer*, _layer, Layer);
};
```

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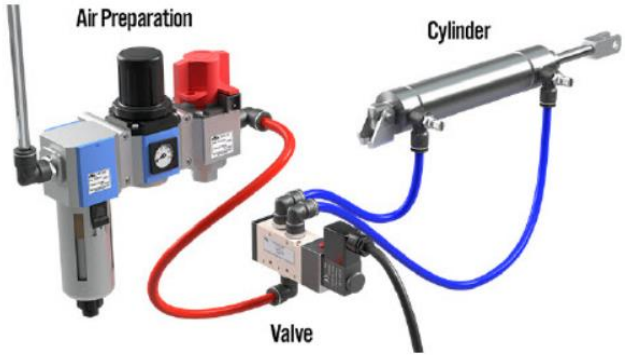
MECHATRONICS - WHAT WILL YOU LEARN?

- Mechanical 3D Design & Printing
  - 3D Design
  - Mechanical Interaction

- Pneumatic Systems



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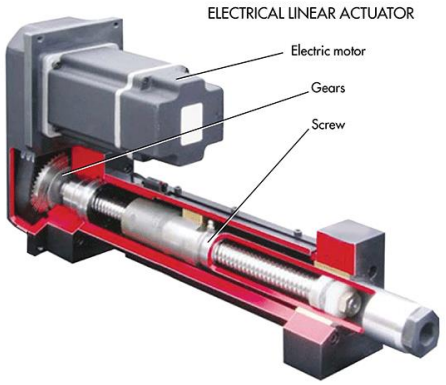
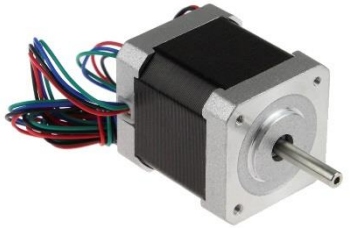
MECHATRONICS - WHAT WILL YOU LEARN?

- Programmable Logic Controllers
  - Ladder Logic
  - PLC Programing & Control
- Industrial Robotic Theory & Application
  - FANUC LR-MATE Robot
  - Stepper, Servo & DC Motors
  - Linear Actuators





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WE ARE ALL ABOUT "HANDS ON" & PROJECT BASED LEARNING

Project Examples

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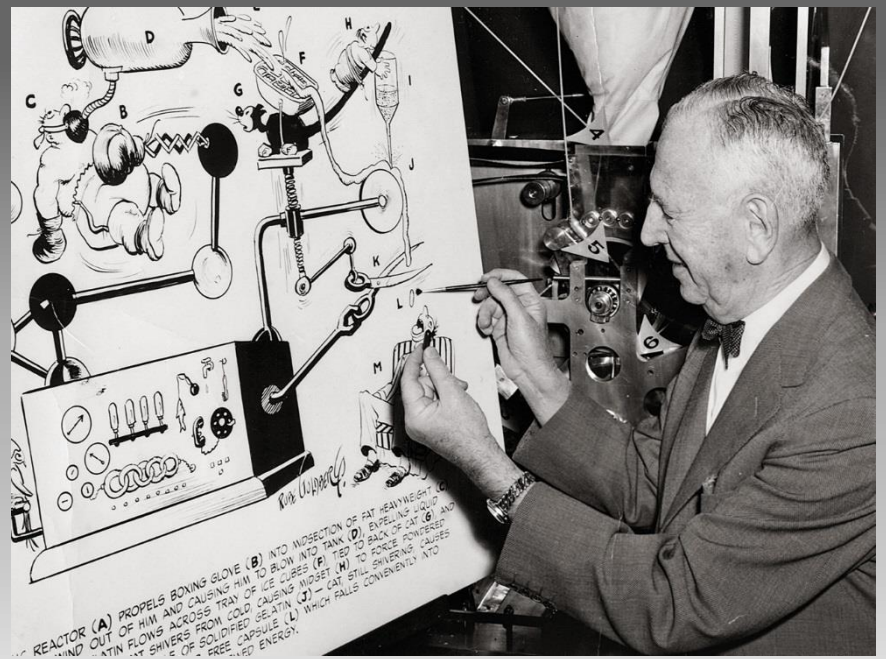

http://cbsnews1.cbsistatic.com/hub/i/2014/01/24/921e8beb-d03f-42a5-9ff2-feac76a8dbc7/Art%20of%20Rube%20Goldberg_20a.jpg

ARDUINO RUBE-GOLDBERG

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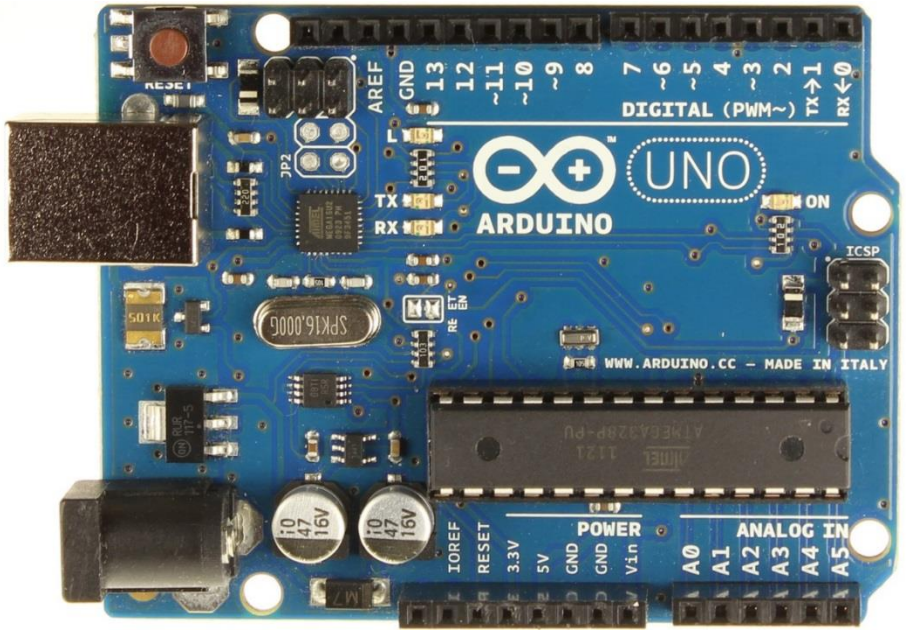
Learning C++ Using the Arduino

- Arduino Is An Open-source Electronics Platform
  - With easy to use hardware & software.
  - Intended for anyone making interactive projects
- Arduino Can Sense & Control It's Environment
  - Receiving information from sensors on input pins
  - Affecting it's surroundings by controlling lights, motors, actuators, etc on output pins
- You Tell Your Arduino What To Do
  - Writing code in the Arduino programming language
  - Using the Arduino development environment



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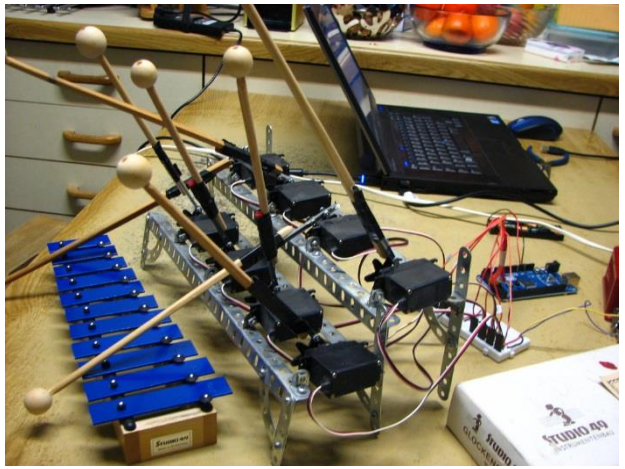
ARDUINO RUBE GOLDBERG

- Control with an Arduino
- Use 1 or more mechanical devices, like motor, solenoid or servo
- Use 1 or more sensors, like a switch, PIR, motion sensor, IR, magnet, etc…
- Make Stuff Move…

https://www.pinterest.com/explore/rube-goldberg/?lp=true



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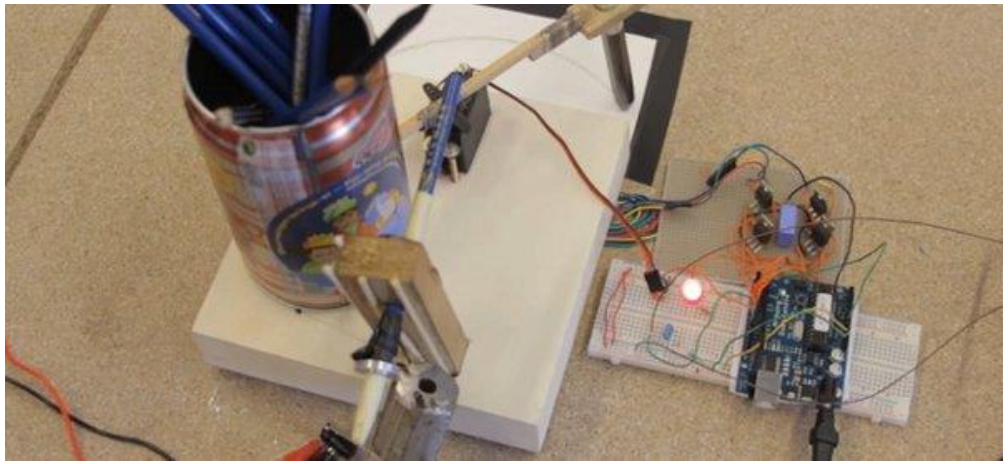

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RUBE GOLDBERG – STUDENT DELIVERABLES

- Completed section in Rube Goldberg “chain of events”
- Collaborate & Negotiate with teams before & ahead in the “chain”
- Development Log Book
  - Design process
  - What worked? / Didn’t work? / How you Solved it?
- Source code for
  - Any webserver, scripts, apps, exe that are needed to run the “Box”
- Teaching Presentation
  - Team presentation to show how their section worked & interacted with others

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STEAM CLOWN™ PRODUCTION

"THE BOX"

If You Could Play With Toys Like This, Would You Like To Be A Mechatronics Geek?

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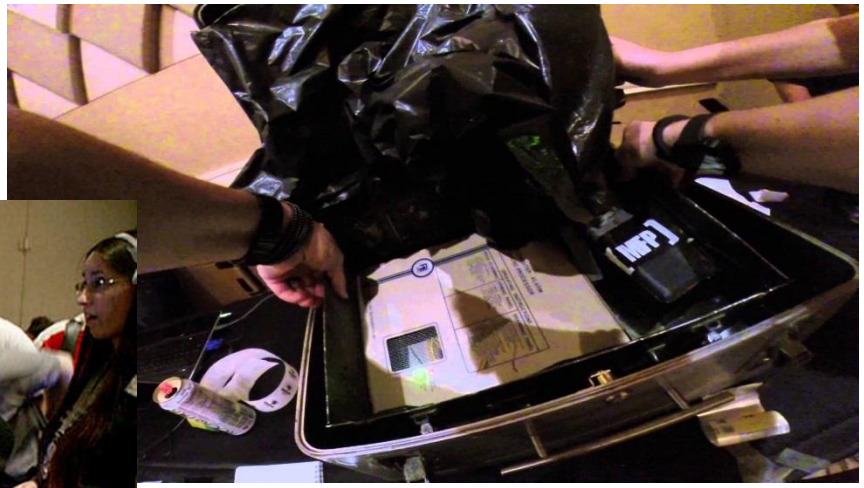
WHAT IS "THE BOX"

THINK "INDIANA JONES" BOX OF TRAPS



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THE BOX

- "Box" that has a number of "traps" to get into it
  - Physical Box, maybe a box with in a Box
  - Students will build small "box" with a few "traps"
  - Class will integrate individual "traps" in to a larger Class produced "box"
- Traps range from:
  - Simple Electronic Traps. Sensors, switches, proximity radar, optical, etc
  - Ethernet port, USB port, Parallel port, VGA or HDMI port that can be used to get information out of the "box"
  - Processor running Linux or Windows, which you can interrogate with port scans and other methods to determine what processor is in the box, and how to deactivate any traps
- What's in the Box? – How Do You Win?
  - Solve all the Traps and Puzzles using Mechatronics Skills…
  - Students pick the "prize" inside… Old Pokémon cards?

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THE BOX – STUDENT DELIVERABLES

- Completed mini box
- Development Log Book
  - Design process
  - What worked? / Didn't work? / How you Solved it?
- Produce a User Guide document
  - How to setup
  - How to run an "event" against the box
  - Steps to solve the box
- Source code for
  - Any webserver, scripts, apps, exe that are needed to run the "Box"
- Promotional Presentation
  - "Sell" the Mechatronics as an Awesome choice as a profession
  - Mechatronics industry overview, projected growth, pathway, etc
- Teaching Presentation
  - Group presentation to show elements of each component of each trap, with possible solutions

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DID I SAY "WE ALSO GET TO DO HALLOWEEN"

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