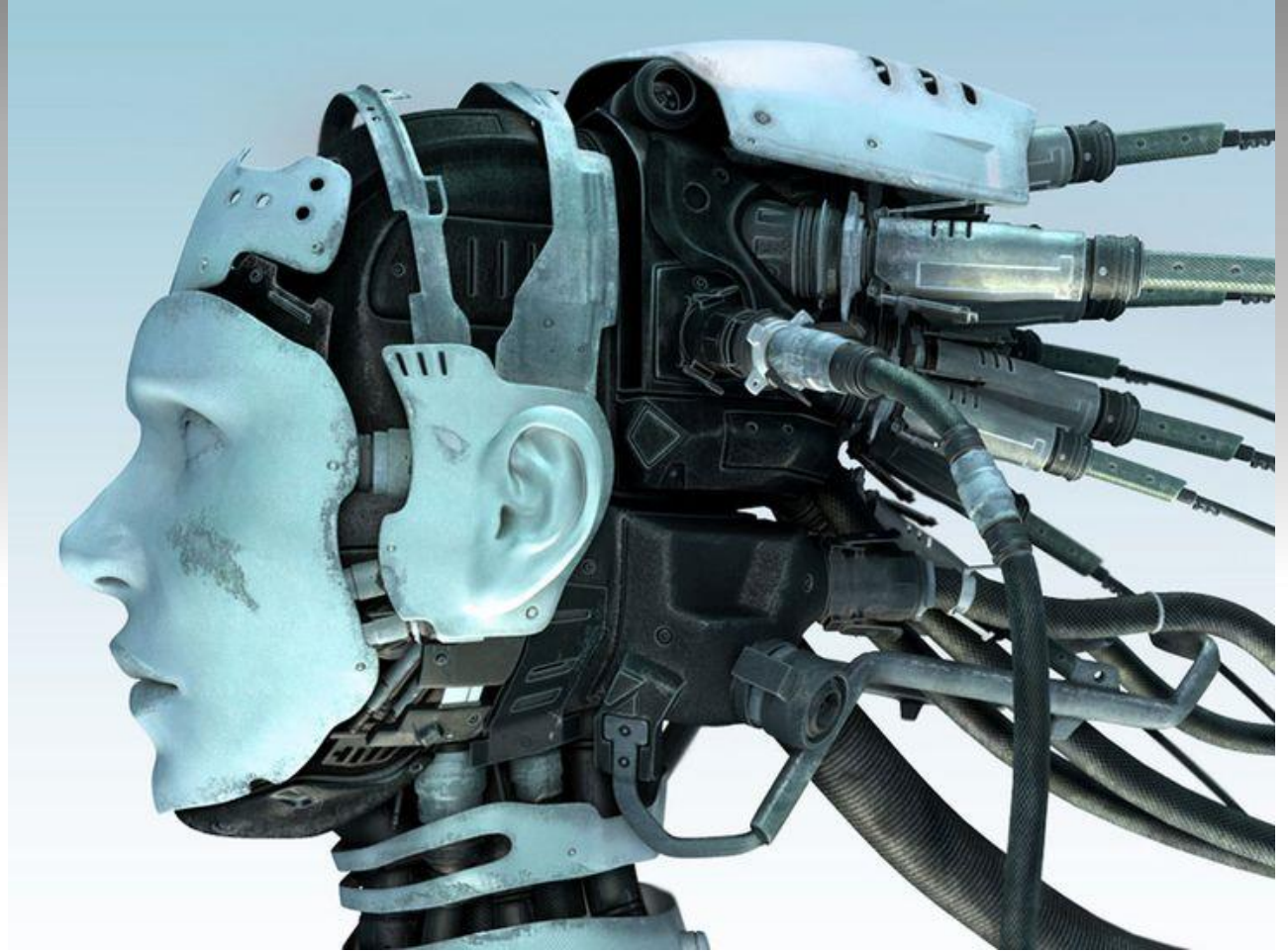




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MECHATRONICS ENGINEERING:

Who is Mr. Burnham & Mechatronics
Engineering Introduction



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WHO IS MR. BURNHAM?



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HELLO....





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CLEARs THROAT....



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MR. BURNHAM IN 60 SECONDS....



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I WAS BORN IN LOS ANGELES CALIFORNIA



<http://www.kaiserpermanentehistory.org/wp-content/uploads/2011/10/sunset.jpg>



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WHEN I WAS 6 MONTHS OLD WE MOVED TO BOGOTÁ COLOMBIA

- My Dad worked for the Accounting Firm Ernst and Young



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WHEN I WAS JUST TURNING 5 YEARS OLD WE MOVED TO BRUSSELS BELGIUM



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WHEN I WAS JUST TURNING 12 YEARS OLD WE MOVED TO CLEVELAND OHIO

- Where I vividly remember staying up for 2 Lunar Eclipses
- And meeting John Glenn



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THEN AT 16 MY DAD CHANGED JOBS...

- Bank in London?
- Bank in San Francisco?
- Bartlesville Oklahoma?



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HE PICKED OKLAHOMA...



THEN LIFE SPED UP...

- Year of College @ BYU
- 2 Years in Chile
- Semester at OSU
- Married High School Sweetheart
- 4 more Years @ BYU for an Electronics Engineering Technology BS

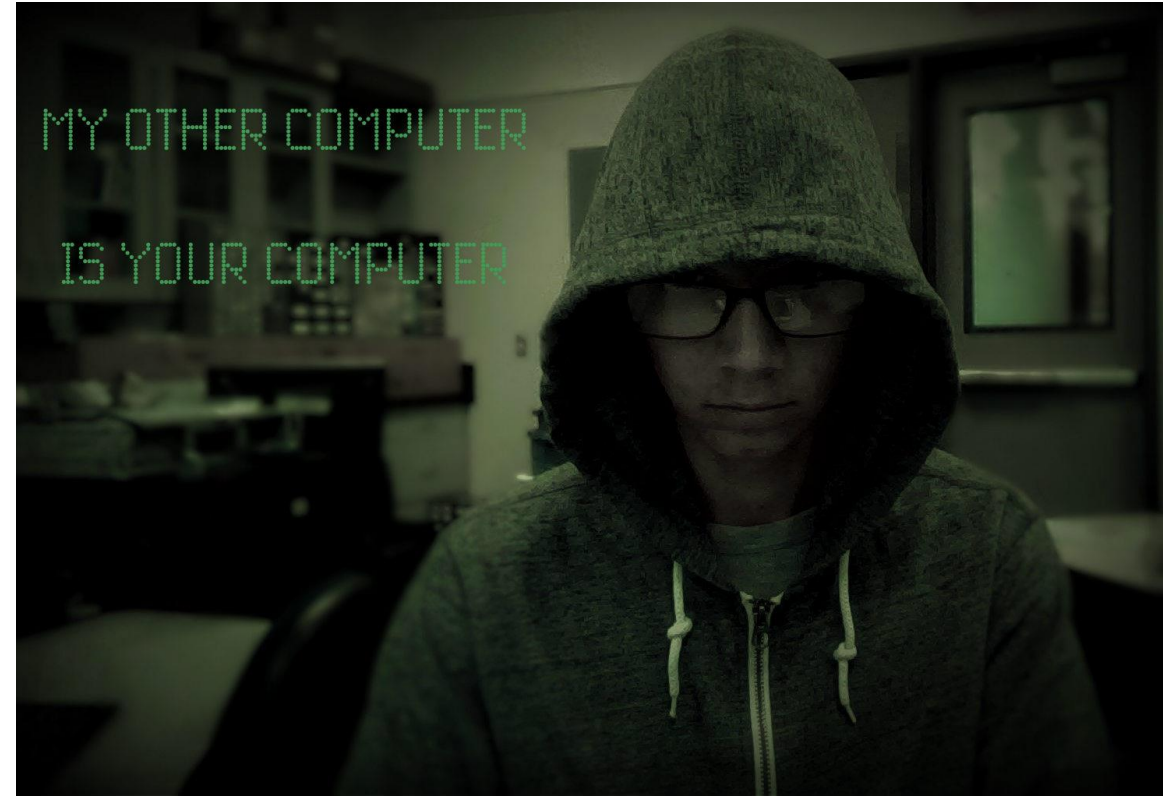


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LIFE AS AN ENGINEER...

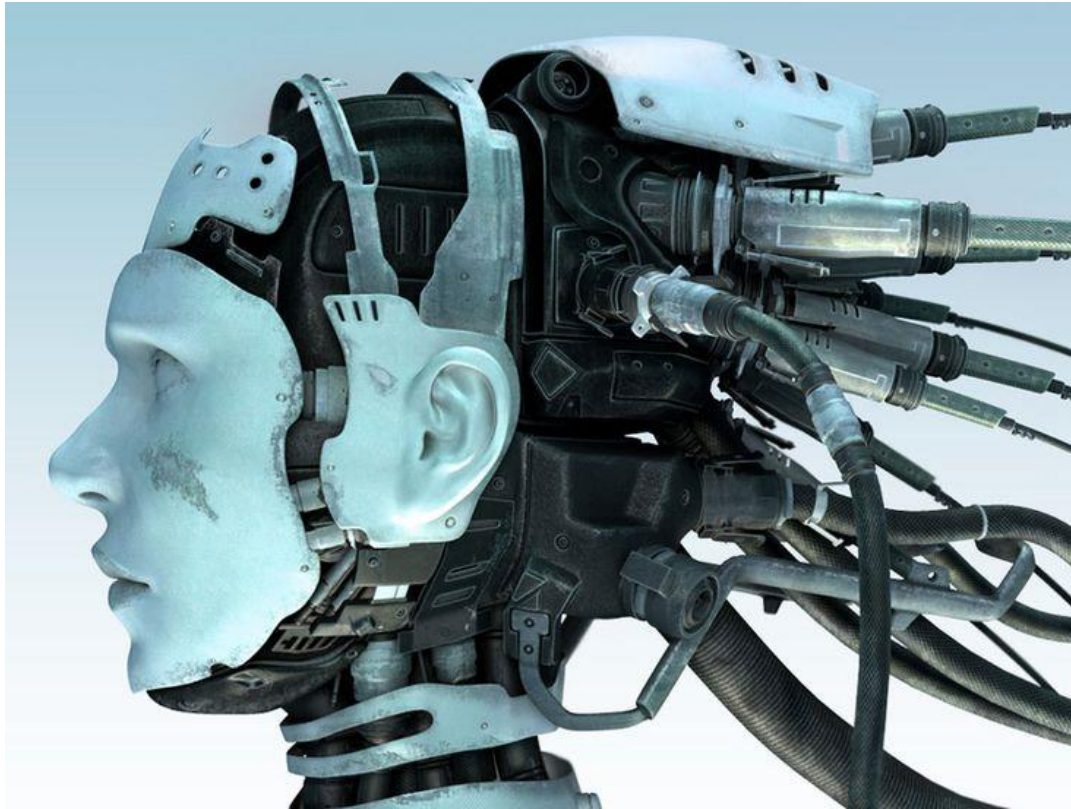
- Summer Internship, with Beehive Telephone in Wendover Nevada
- Then Amdahl in Sunnyvale CA
- Then for the last 25+ years I worked for Xilinx in San Jose CA
- In 2016, I taught Cybersecurity...



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AND NOW I'M A MECHATRONICS ENGINEERING INSTRUCTOR AT SILICON VALLEY CTE

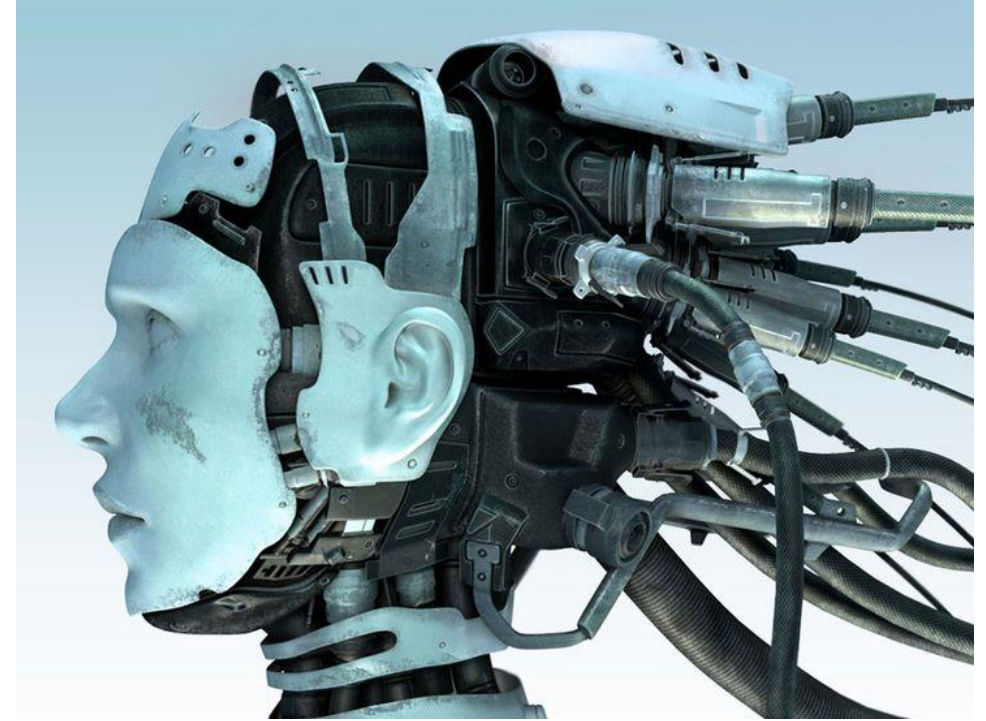


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MECHATRONICS - WHAT WILL YOU LEARN?

- Hands on Physics -- satisfies the A-G "D" Science requirement
- AC/DC Electronic Fundamentals
- Digital Electronic Fundamentals
- Programming with Microcontrollers
- Mechanical 3D Design & Printing
- Pneumatic Systems
- Programmable Logic Controllers
- Industrial Robotic Theory & Application

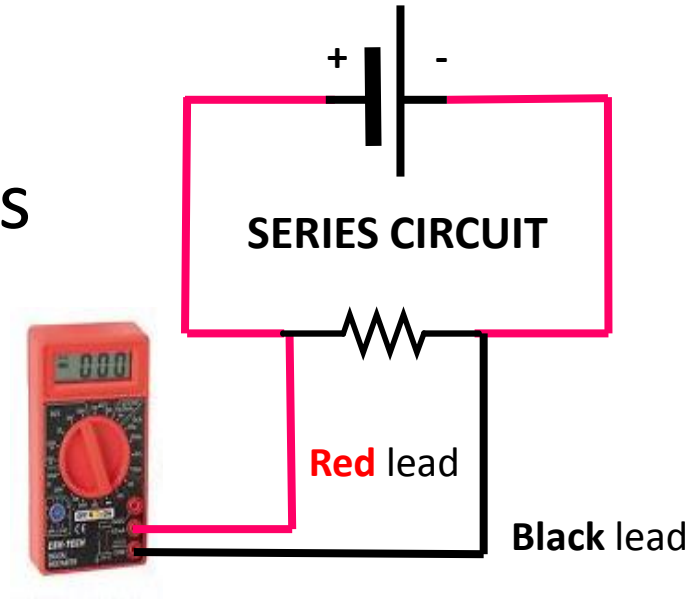


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MECHATRONICS - WHAT WILL YOU LEARN?

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



```
20 class GameOverScene : public cocos2d::CCScene {
21 public:
22     GameOverScene(): _layer(NULL) {}
23     ~GameOverScene(){}
24     bool init();
25
26     //SCENE_NODE_FUNC(GameOverScene);
27     static GameOverScene* node()
28     {
29         GameOverScene *pRet = new GameOverScene();
30
31         //Error: undefined reference to `GameOverScene::init()'
32         if (pRet && pRet->init())
33         {
34             pRet->autorelease();
35             return pRet;
36         }
37         else
38         {
39             //Error: undefined reference to `vtable for GameOverScene'
40             delete pRet;
41
42             pRet = NULL;
43             return NULL;
44         }
45     }
46 };
47 CC_SYNTHESIZE_READONLY(GameOverLayer*, _layer, Layer);
```

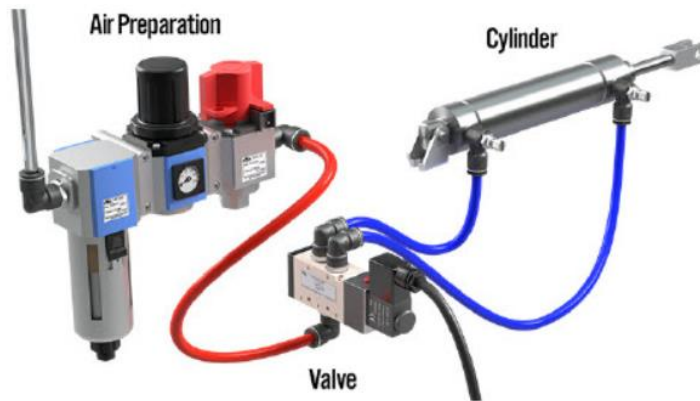


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MECHATRONICS - WHAT WILL YOU LEARN?

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

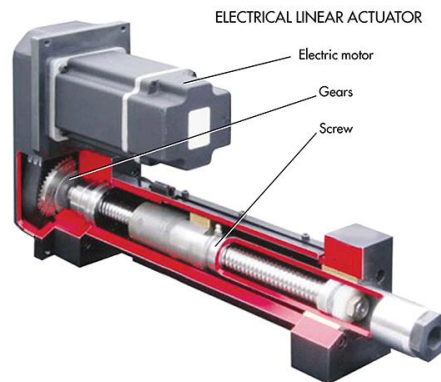


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MECHATRONICS - WHAT WILL YOU LEARN?

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

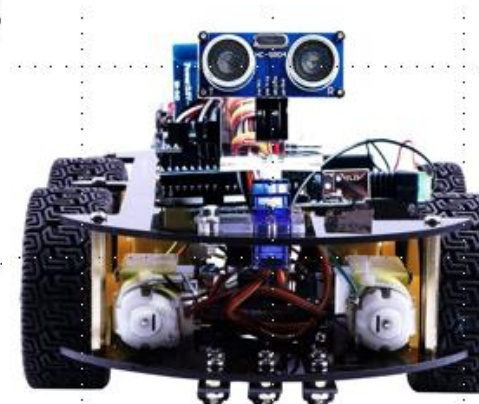
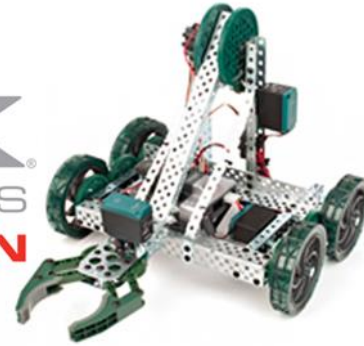


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MECHATRONICS - WHAT WILL YOU LEARN?

- Hobby Robotic Theory & Application
 - Assembly & Application
 - Programming & Control
- Robotic Competition
 - VEX
 - HBRC and other Table top
 - Sea Perch Submersibles

VEX
ROBOTICS
COMPETITION



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

Project Examples



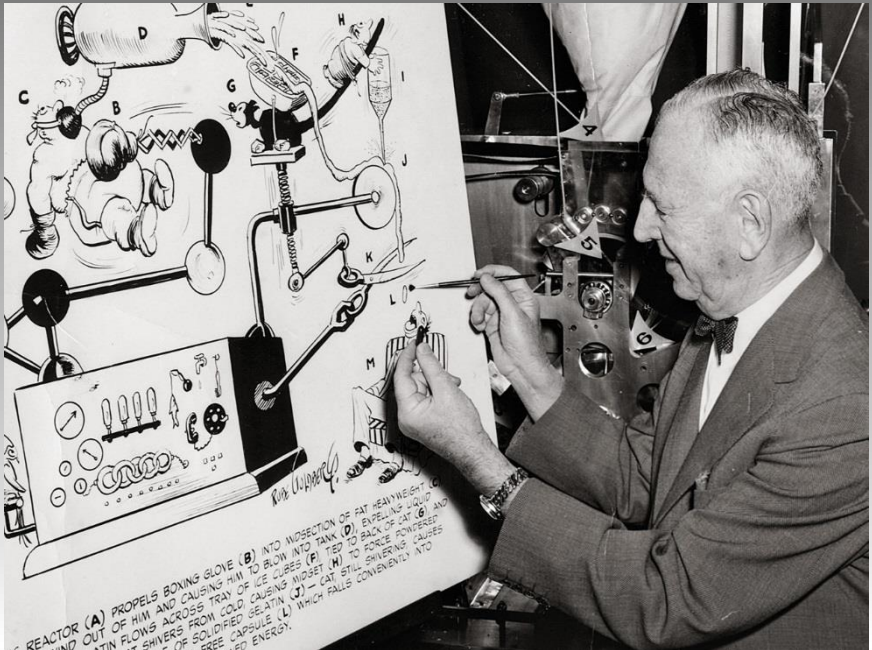
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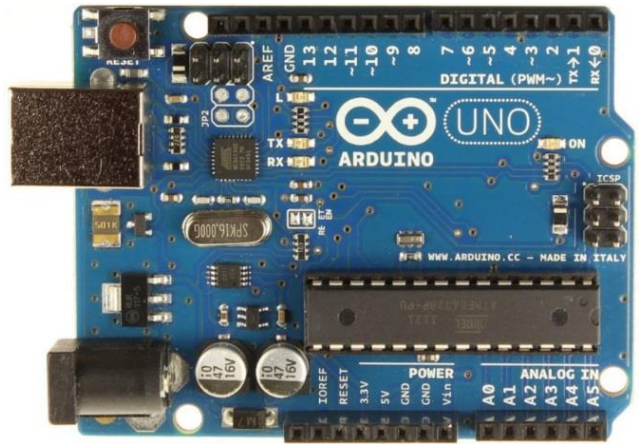


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ARDUINO RUBE-GOLDBERG



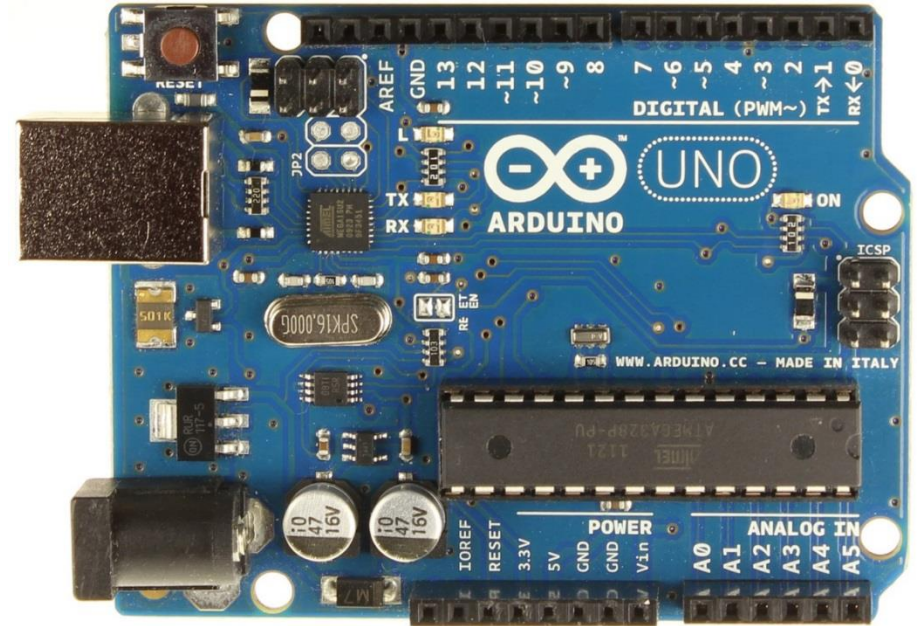
http://cbsnews1.cbsstatic.com/hub/i/2014/01/24/921e8beb-d03f-42a5-9ff2-feac76a8dbc7/Art%20of%20Rube%20Goldberg_20a.jpg



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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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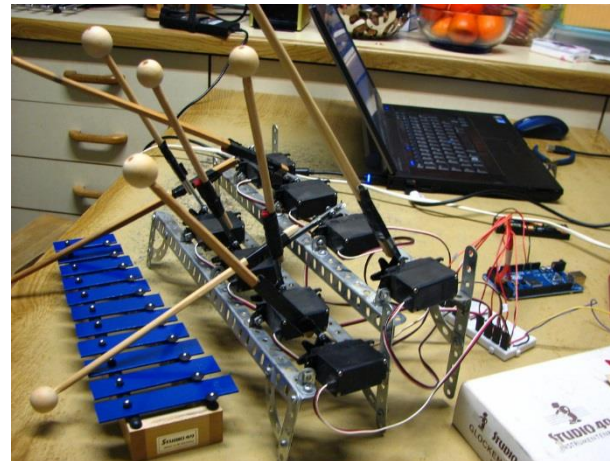
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ARDUINO RUBE GOLDBERG

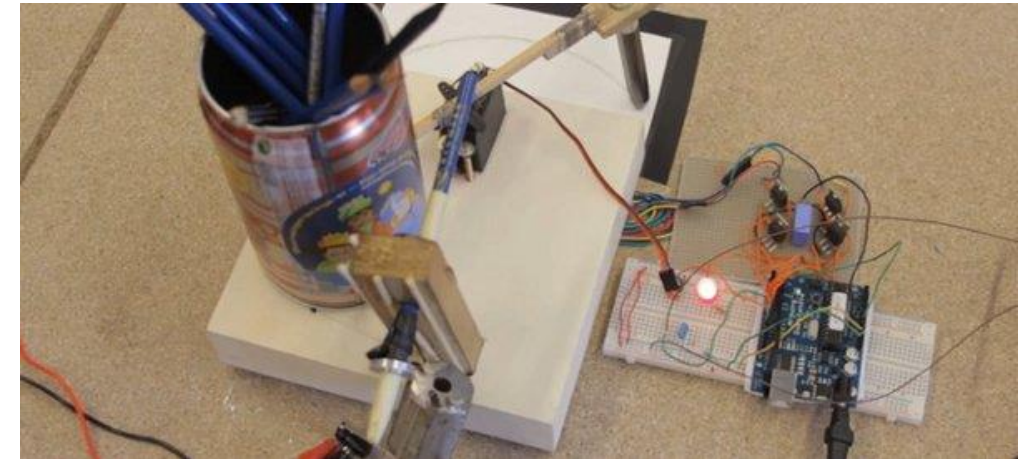
- Control with an Arduino
- Use 1 or more mechanical devices, like motor, solenoid or servo
- Use 1 or more sensors, like a switch, PIR, motion sensor, IR, magnet, etc...
- Make Stuff Move...



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



<https://www.flickr.com/photos/fdecomite/8443261903>



<https://www.pinterest.com/pin/7459155604280056/?lp=true>



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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 their “section” of the chain of Rube Goldberg events
- Teaching Presentation
 - Team presentation to show how their section worked & interacted with others



MEET MY STUDENTS...

- You come from all over San Jose and Silicon Valley
- Some know you are going to College right after High School
- Many are the first in your family to consider College
- ½ of you don't know what the future is after High School
- A few may tentatively ask, “Will there be a lot of MATH?”

**But you decided to take a chance on
Me and my Mechatronics class**

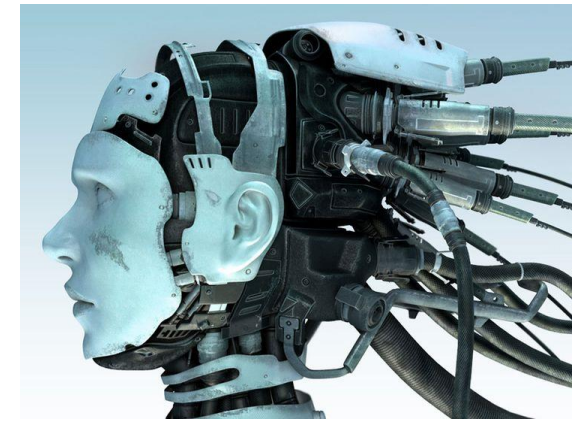


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MY HOPE FOR YOU...

- Expose You to Hands on Engineering
 - Electronics and Programming
 - Fanuc Robot Tool Handling Certification
 - Exposure and Training with Programmable Logic Controllers and Industrial Automation
 - Prep them for a CPA C++ Certification
- Give You a Strong Pathway to College Engineering
 - Electrical Engineering
 - Mechanical Engineering
 - Mechatronics Engineering
 - Computer Science



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