STEM-ulating Coding Activities To Excite Students

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Why STEM and Coding in the Classroom?

1. **Collaboration in the Classroom**

   Teamwork and Communication

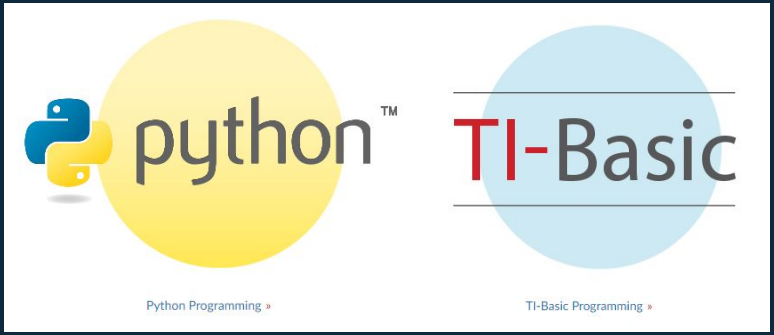
2. **Creativity**

   Introduce Innovation with Real-World Problems

3. **Critical Thinking**

   Connect Science and Math

TI Codes



- Entry-level
- Menu-based
- Python (TI- Nspire CX II/TI-84 CE Python) or TI-Basic (TI-84 CE/TI-Nspire CX)
- STEM integration with TI-Innovator Hub and micro:bit
- Spark interest in Robotics with TI-Rover

Getting Started with TI Technology

Coding in the Math/Science Classroom Introduction to Python

a. Difference between editor and shell
b. Menu and frequently used commands/statements
c. Mathematical equation creation ?

TI Resources for Python Coding

- Python Coding - Guidebook - TI Nspire CX II
- Python Programming on the TI 84 CE Python -Guidebook
- Getting Started Python TI 84 CE Python Website
- Getting Started Python TI Nspire CX II Website
- Overview of Python Coding
- Python and TI Nspire CX II Website
- Additional resources - Getting Started - including Innovator and Rover resources

TI Resources for Python Coding

On Demand Webinars on Coding

- Python
- STEM Projects
- Computer Science topics

Python Basics – Editor vs shell

Python Workspaces

There are two workspaces for your Python programming: The Python Editor and the Python Shell.

Python Editor	Python Shell
• Create, edit and save Python programs • Syntax highlighting and auto-indentation • Inline prompts to guide with function arguments • Tooltips to show range of valid values • [var] key lists global user variables and functions defined in the current program • Keypad shortcuts	• Run Python programs • Convenient for testing small code fragments • Interaction with Shell history to select previous inputs and outputs for re-use • [var] key lists global user variables defined in the last program ran in the given problem

Python Basics – Editor vs shell

1.1 moodring RAD

*moodring.py 1/34

```
# Hub Project
#==================================
from ti_hub import *
from math import *
from time import sleep
from ti_plotlib import text_at,cls
from ti_system import get_key
#==================================
temp=temperature("IN 1")
red=digital("BB 1")
green=digital("BB 2")
```

1.1 1.2 *moodring RAD

Python Shell 215/215

```
21.791
you are meh
21.791
you are meh
21.791
you are meh
21.771
you are meh
21.771
you are meh
>>>
```

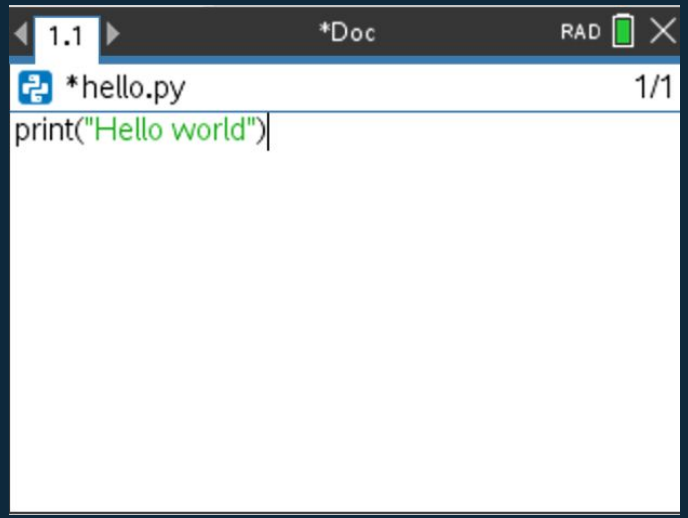
Python Basics – Mathematical equation

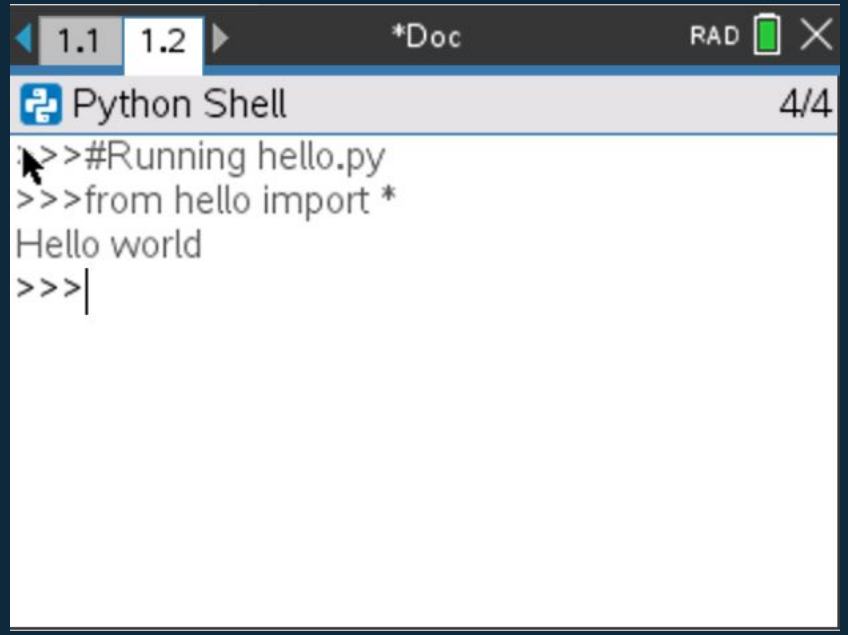
practice.py 6/6

```
from math import*
x=float(input("What is the hydrogen ion concentra
pH=-log(x,10)
print(pH)
```

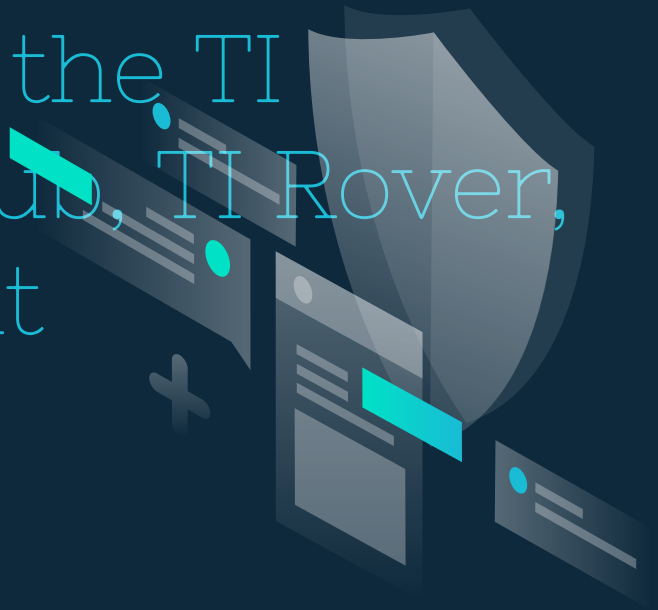
```
>>>#Running practice.py
>>>from practice import *
What is the hydrogen ion concentration?0.0001
3.999999999999999
>>>
```

Introduction to Coding on the TI Nspire CX II





Coding with the TI Innovator Hub, TI Rover, and micro:bit



Application Program with TI Innovator Hub Coding on the TI Nspire CX II

1.1 *Doc RAD

*sound.py 17/17

```
from ti_system import get_key
#==============================
while get_key() != "esc":
  for t in range(1,5):
  color.rgb(255,0,0)
  sleep(.5)
  color.rgb(0,255,0)
  sleep(.5)
  color.rgb(255,255,0)
  sleep(.5)
color.off()
```

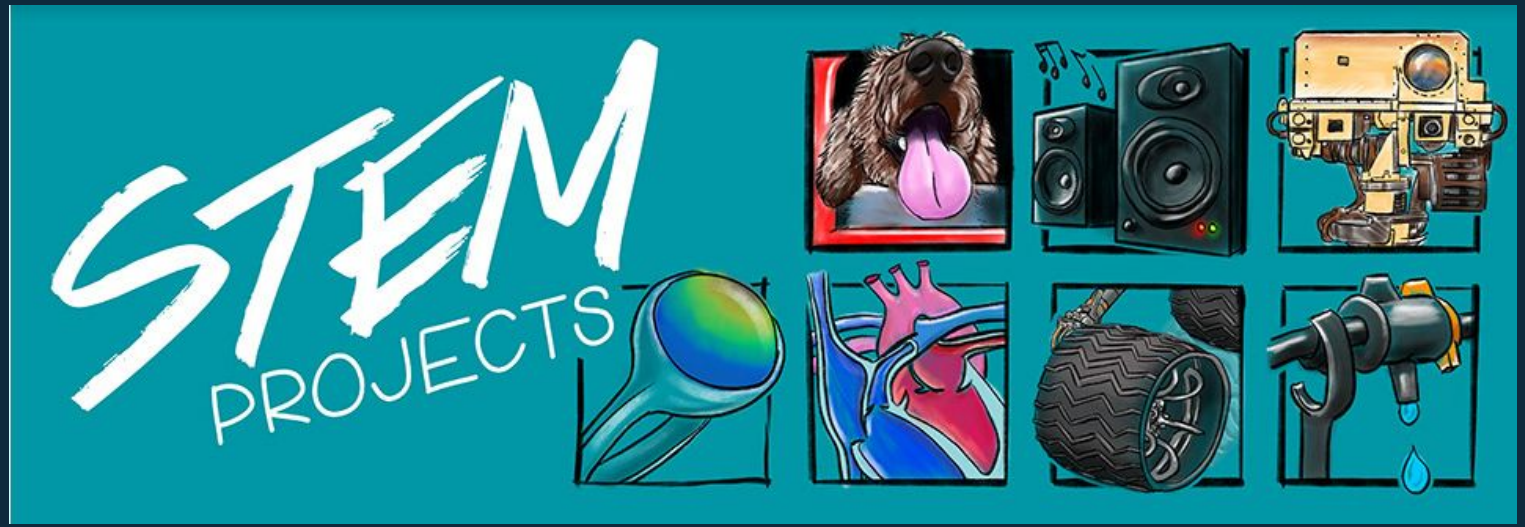
Micro:bit

A
B
0
1
2
3V
GND

1.6
1.7
1.8
*SB3
RAD
*bright.py
5/5
from microbit import *
while get_key() != "esc":
bright=display.read_light_level()
print("Brightness = ",bright)

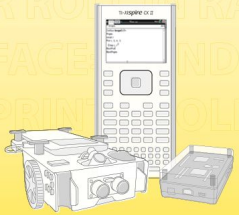
TI STEM Projects and Resources

STEM Projects



STEM Projects with Python

TI Codes Python »



10 Minutes of Code: Python and TI-Innovator™ Technology

These short, easy-to-teach activities are designed to be completed in order, using TI-Nspire™ CX II and TI-Innovator™ Technology.

Note: These lessons require the use of TI-Nspire™ CX II technology with OS 5.2 and above.

- **Unit 1:** Getting Started With Python and the TI-Innovator™ Hub
- **Unit 2:** for loops With the TI-Innovator™ Hub
- **Unit 3:** Brightness, if and while With the TI-Innovator™ Hub
- **Unit 4:** Rover's Driving Features
- **Unit 5:** Rover's Sensors
- **Unit 6:** Coordinates With Rover
- **Unit 7:** The TI-RGB Array

TI Online STEM Events

Digital Mood Ring

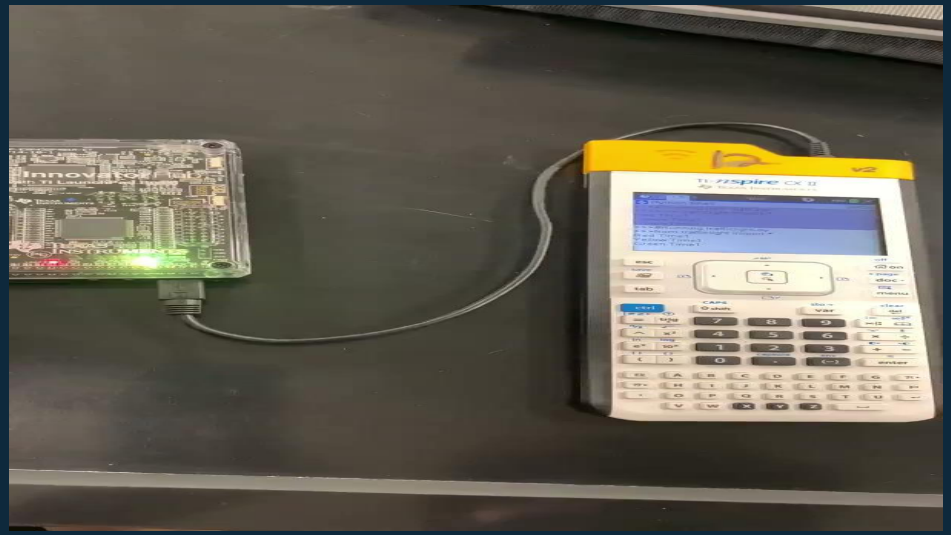
Getting Started with Nspire CXII

TI-Nspire CX II technology

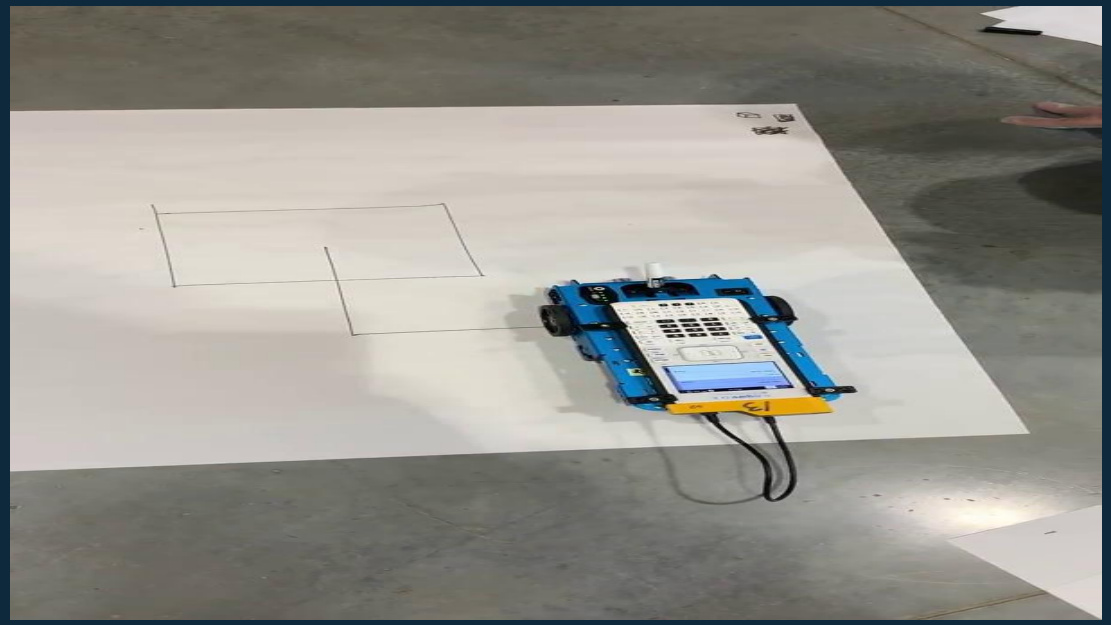
python™

Texas Instruments

TMOC – Application 1 – Traffic light

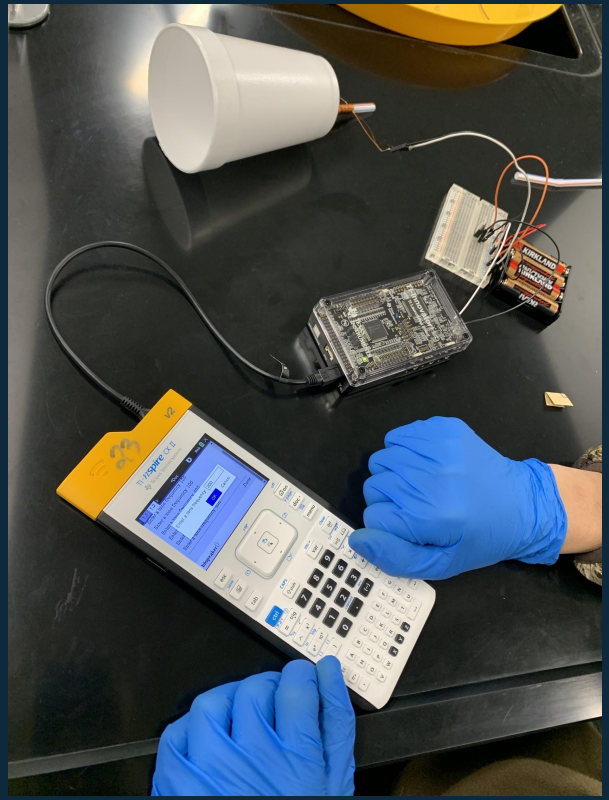


Stacy’s projects – Rover on the Move!



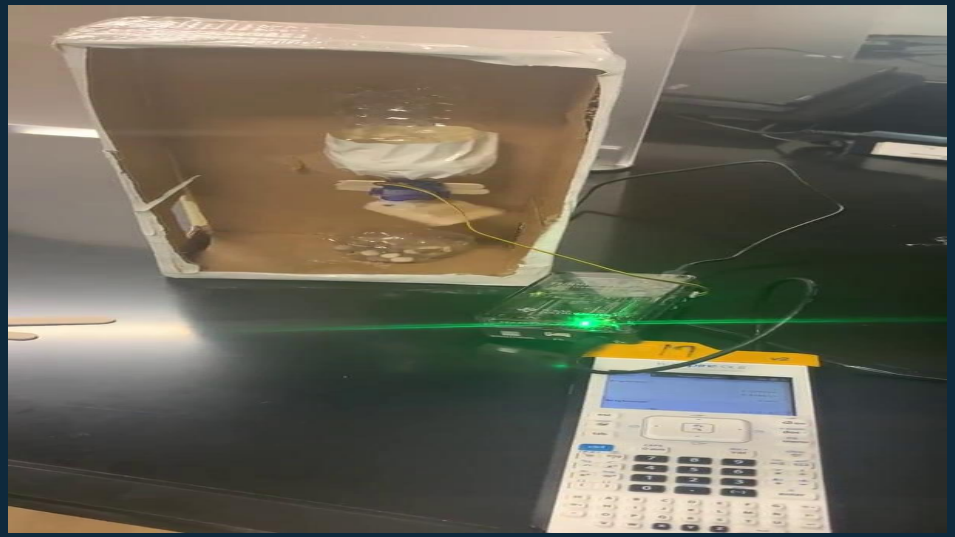
Using external breadboards – Path to STEM Projects

We made a speaker with magnetic wire, a nail, and the styrofoam cup!



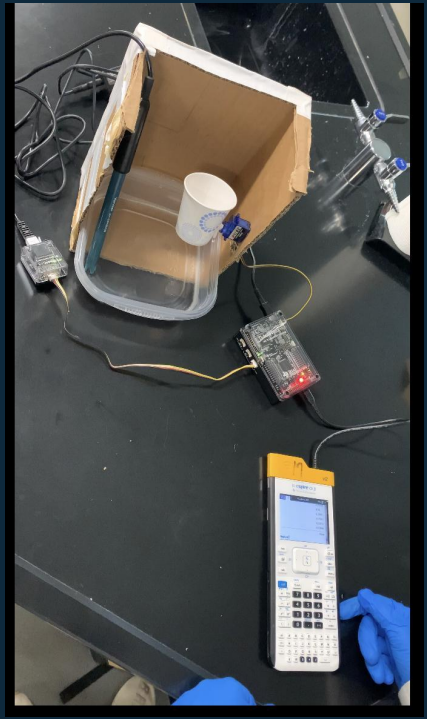
Stacy’s projects – Automatic Dispenser

Use built in Brightness sensor to turn a Servo motor to dispense something – added sound and RGB LED.



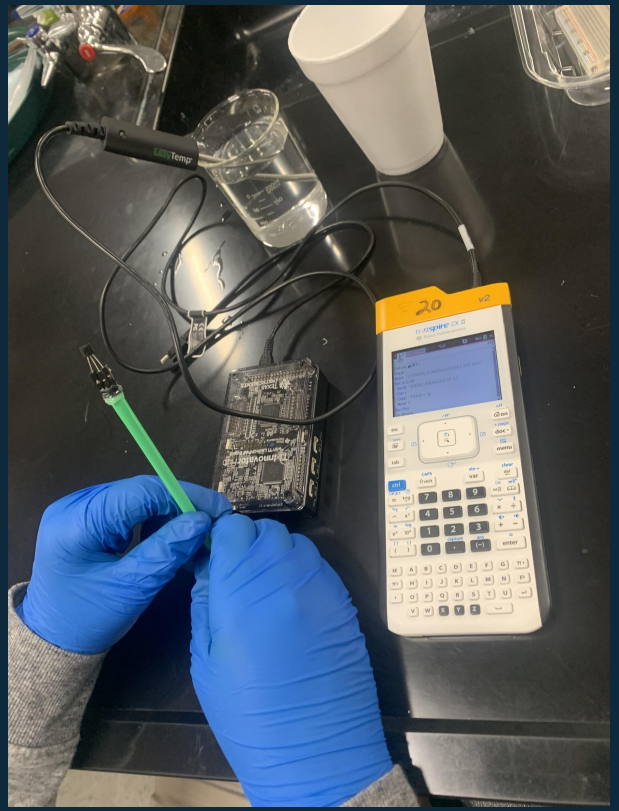
Sensor Link with Vernier Sensor

We used a TI Sensor Link connected to a Vernier pH sensor. Code was written that when pH was too low, the motor turned on and dispensed material to raise pH.



Created temperature sensor – Path to STEM Projects

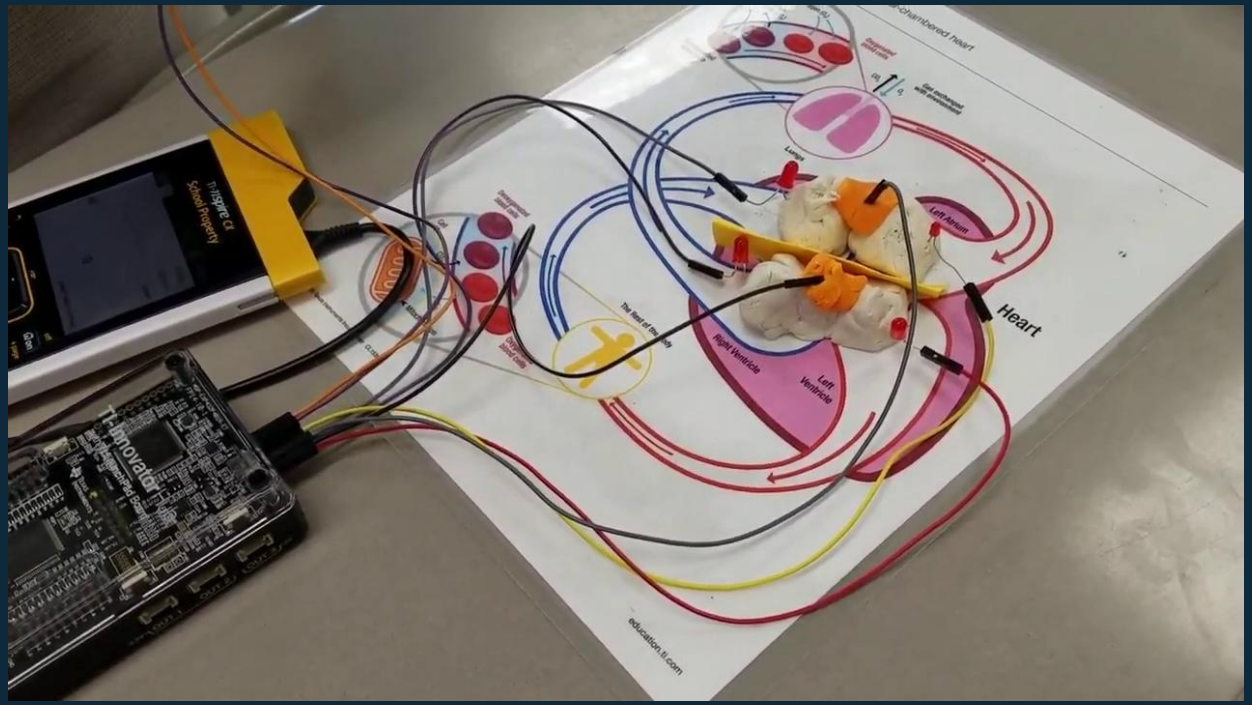
Used thermistor to create temperature sensor with breadboard port on Hub. Use Vernier temperature sensor to collect actual data, create mathematical model of that data and then calibrated thermistor sensor.

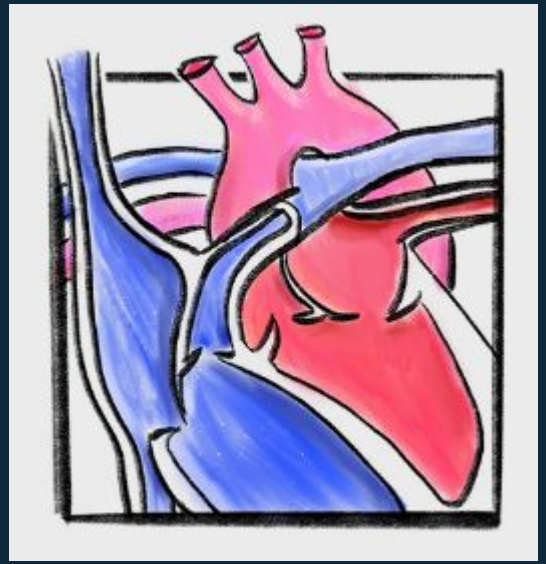


Design a warning system – use micro:bit as temperature monitor, hub as output

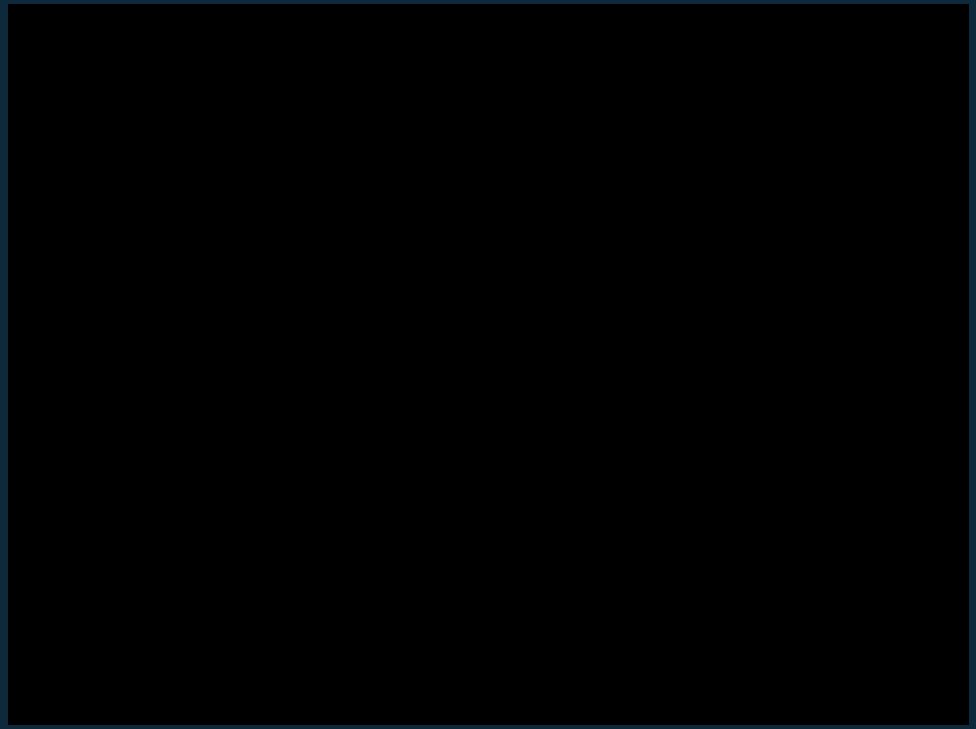
Smart Irrigation

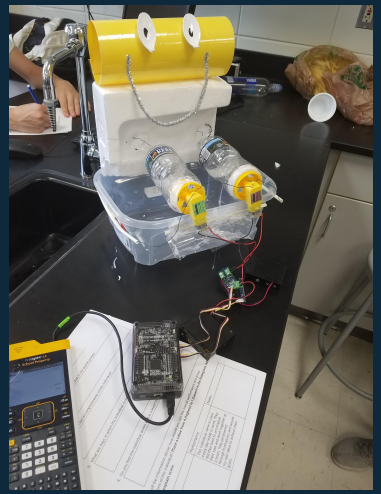
I ❤️STEM

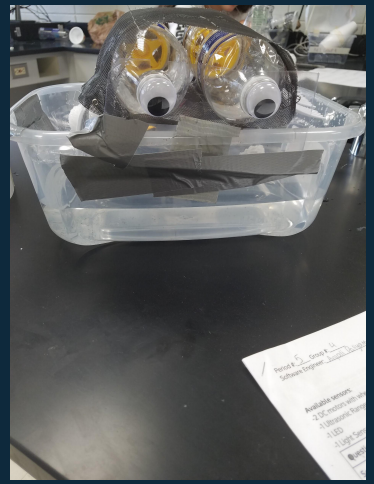

Lungs
Left Atrium
Heart
Right Ventricle
Left Ventricle
education.ti.com

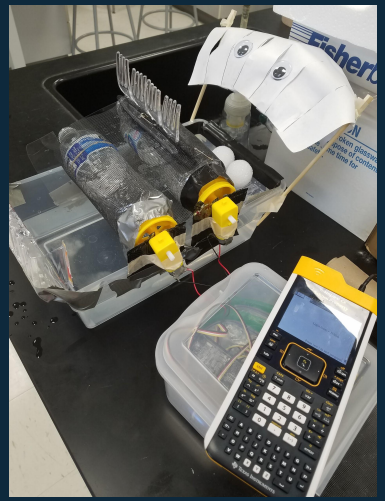


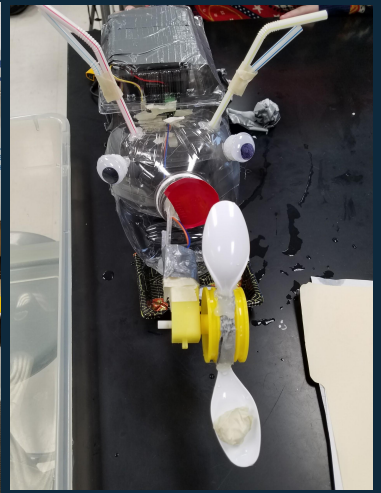
Innovative Problem Solving



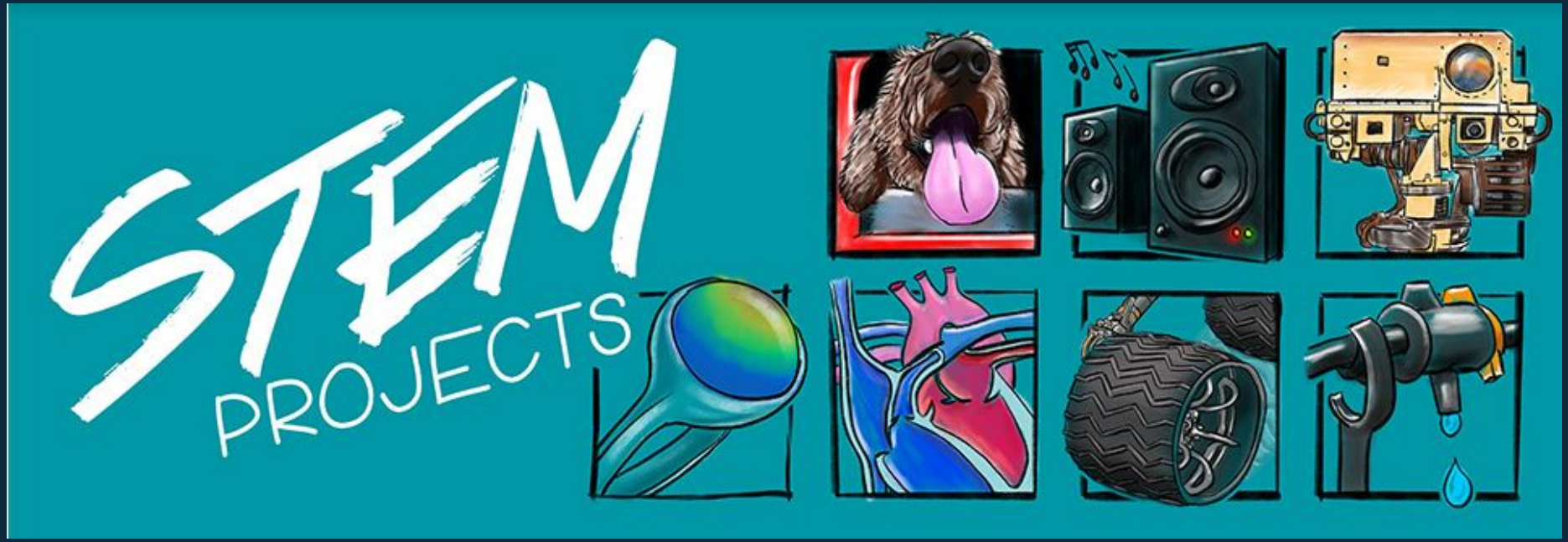








STEM Projects- How to borrow supplies



Thank you

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