

M/J Earth/Space Science Advanced (#2001020)

Orange County Public Schools in Florida



Internet of Things (IoT) at UCF



UNIVERSITY OF CENTRAL FLORIDA

*UCF RET Site: Collaborative Multidisciplinary
Engineering Design Experiences for Teachers*

**Katherine
Grady**

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READ THIS FIRST

- Write all lessons and activities in present tense.
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- Remember to do your 3R reflection include an updated copy of your lesson plan, developed assessment tools, presentation materials, to the evaluator. See implementation plan instructions developed by the evaluator. Send within a week after completing the lesson to bonnie.swan@ucf.edu

RET Site: CoMET Lesson/Unit Plan

Course(s): M/J Earth/Space Science Advanced (#2001020) Orange County Public Schools in Florida

Grade Level: 7

Suggested Length of Lesson:



Internet of Things (IoT) at UCF



UNIVERSITY OF CENTRAL FLORIDA

Materials/Technology Needed

- arduino uno
- led light
- 2 wires
- bread board
- computer for power
- connector / cable to connect arduino with power ex. computer
- Pre - test / Post test
- Survey of Engineering jobs
- Presentation Slides
- "Science is LiT" Lab Report

Where this fits: 3 days

Quarter 1
Science

Nature of

SC.7.N.1.1 - Students are Defining a problem from the seventh grade curriculum, using appropriate reference materials to support scientific understanding, planning and carrying out scientific investigation, identifying variables, collecting data, interpreting data, making predictions, and defending conclusions. (Content Complexity Level 3)

SC.7.N.1.2 - Differentiating between replication (by others) from repetition (multiple trials). (Content Complexity 2)

<p><u>Student Evidence</u></p> <p>4.0 Student evidence should show that they can:</p> <ul style="list-style-type: none"> ● research a problem based on a specific body of knowledge. (SC.7.N.1.1) ● develop a strategy to solve a scientific problem. (SC.7.N.1.1) ● use diagrams and models to represent and solve a scientific problem. (SC.7.N.1.1) ● explain ways in which a scientific problem can be solved. (SC.7.N.1.1) ● critique another experiment. (SC.N.1.1) ● analyze a scientific investigation to identify strengths and weaknesses, including the thoroughness of repeated trials and the possibility of replication; then write to defend the analysis. (SC.7.N.1.2) 	<p><u>Standard(s)/Benchmark(s) Addressed</u></p> <ul style="list-style-type: none"> ▪ <i>Standards:</i> <p>SC.912.N.1.1 SC.7.N.1.2</p>
<p><u>3.0</u> <u>Student evidence should show that they can:</u></p> <ul style="list-style-type: none"> ● define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data analyze information, make predictions, and defend conclusions. (SC.7.N.1.1) ● differentiate replication (by others) from repetition (multiple trials). (SC.7.N.1.2) 	<p><u>Instructional Strategies</u> Marzano Instructional Strategies:</p> <p><i>Design Question 1: Communicating learning goals and feedback.</i></p> <ol style="list-style-type: none"> 1. Providing clear learning goals <p><i>Design Questions 2: Helping students interact with new knowledge.</i></p> <ol style="list-style-type: none"> 9. Chunking content 12. Recording and representing knowledge <p><i>Design Question 4:</i></p> <ol style="list-style-type: none"> 22. Engaging students in cognitively complex tasks involving hypothesis generation and testing.
<p><u>2.0</u> <u>Student evidence should show that they can:</u></p> <ul style="list-style-type: none"> ● describe the key parts of a specific body of knowledge. (SC.7.N.1.1) ● identify a problem and follow procedures to carry out an experiment, collecting and recording data, and reporting results. (SC.7.N.1.1) 	

<ul style="list-style-type: none"> ● explain the difference between outcome variables (dependent variables) and test variables (independent variables). (SC.7.N.1.1) ● construct a hypothesis in regards to a scientific investigation. (SC.7.N.1.1) ● compare repetition and replication. (SC.7.N.1.2) ● cite examples of investigations with repeated trials or replication. (SC.7.N.1.2) 	
<p>1.0 Student evidence should show that they can:</p> <ul style="list-style-type: none"> ● list laboratory safety rules and procedures. (SC.7.N.1.1) ● identify a “testable” question, research and develop a hypothesis, use materials provided to conduct a simple experiment, record and share results. (SC.7.N.1.1) ● define hypothesis. (SC.7.N.1.1) ● identify definitions of repetition and replication. (SC.7.N.1.2) 	<p>Description of lesson Day 1 Gauge: Bell work will be a 4 question pretest. My classroom expectations:</p> <ol style="list-style-type: none"> 1. students draw a picture of what they think a scientist looks like 2. Survey Engineering jobs 3. Show CHAMP for lecture 4. Show them pictures of scientist and lecture on careers in STEM careers 5. Show CHAMP for lab 6. demo “light on” with LED 7. let students try to get “light on” 8. show lecture of circuit 9. students will do some research, generate hypotheses, collect data, analyze data, and draw conclusions 10. Survey Engineering jobs 11. Post test <p>Lesson Goals: Students are reading the lesson goals Engaging: Students are watching a video of the hacking of the Internet of things. https://www.youtube.com/watch?v=eCv5jLFNHm0 Explore: Students are learning the different job opportunities with the internet of things. Explain : Students listen to a short lecture where teacher chunks information on circuits and students read a new CHAMP for teacher</p>

	<p>expectations during first lab of the school year. Teacher demonstrated first lab report of the year then Teacher models blink light with arduino board as demonstration (no code needed, just power from computer)</p> <p>Day 2-3</p> <p>Extend / elaborate: Students are researching arduino projects so they can experiment with arduino board to create a circuit to get an LED light on. Students write a lab report in experimental groups with experiment roles for each participant. Once research is complete, the students hypothesise, write out an experiment, test their experiment, collect data, repeat their experiment for teacher, generate a conclusion then share with other groups so that other students will then replicate. Students then create a new experiment with their own arduino project.</p> <p>Day 3</p> <p>Evaluate: Gallery walk take place so each student can share their original arduino project or the new project then a Post test completes the lesson.</p>
<p>Recommended Assessment(s) and Steps</p> <ul style="list-style-type: none"> ▪ Pre Test (bell work) ▪ Survey Engineering Jobs ▪ Video ▪ Notes ▪ Video ▪ Build Circuit for LED light research, generate lab report, draw conclusion ▪ Gallery walk / other groups replicate results ▪ Survey Engineering Jobs ▪ Post Test 	
<p>List of Materials/Resources Used</p> <ul style="list-style-type: none"> ▪ Arduino uno, breadboard, LED light, 2 cables, computer, cable https://www.arduino.cc/en/Main/Software ▪ Marzano Place Mat http://mathcoachcafe.weebly.com/uploads/2/1/4/7/21476084/2736673_orig.png ▪ Orange County Public Schools curriculum documents jms.ocps.net or https://docs.google.com/document/d/1GxfhvQPpvjMPSn6AAONLw7CcbMu2VB1lifDyi6qZa_w/edit# 	

- https://playground.arduino.cc/uploads/Main/arduino_comic_v0004.pdf
- *arduino comic strip*

Important Vocabulary

Term	Definition
open source	resources that can be used, redistributed or rewritten free of charge. often software or hardware.
electronics	technology which makes use of the controlled motion of electrons through different media.
Prototype	an original Form that can serve as a basis or standard for other things.
Platform	hardware architecture with software framework on which other software Can run.
OHM's law	current = voltage/resistance ($i = v/r$) or Resistance = voltage/current ($r = v/i$) or Voltage = Resistance * current ($v = r*i$)
Voltage (V)	is a measure of electrical potential. It is measured in volts
Current (I)	is the amount of flow through a conductive material. It is measured in amperes or Amps.
Resistance (R)	is a material's opposition to the flow of electric current. It is measured in ohms.
IoT	internet of things
replicate	when an experimented can be validated by another scientist with the same results
repetition	When a scientist conducts their experiment multiple trials with the same results to generate a conclusion
Test Variable	The part of the experiment that the scientist purposely changes
Outcome Variable	The goal of the experiment, what the scientist hopes to see. The result of the experiment.

Troubleshooting Tips

Add anything helpful here.

Other Helpful Information

Hardware	Price	Quantity	Where to buy	Online Store
<p>Basic Starter Kit w/ Breadboard, Jumper wires, Color Led, Resistors, Buzzer For Arduino UNO R3 Mega2560 Mega328 Nano</p> <p>#04971395</p> <p>Arduino with accessories</p>	19.99	26	http://www.miniinthebox.com/basic-starter-kit-w-breadboard-jumper-wires-color-led-resistors-buzzer-for-arduino-uno-r3-mega2560-mega328-nano-p4971395.html?currency=USD&litb_from=bing_shopping&utm_source=bingshopping&utm_medium=cpc&utm_campaign=bingshopping	<p>miniinthebox.com</p>

Attachments

- PowerPoints for lecture
- Survey for Engineering Career Interest
- Pre / Post Test
- Answer Keys for Pre / Post test
- Lab Report for “Science is LiT”

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Authors

Katherine Grady, Jim Ebbert, Stephen Williams

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Contact information

Katherine Grady

katherine.grady@knights.ucf.edu