

## CRAIG RET 2022 WEEK 1

**Monday** began with tower building activities. [LINK to PHOTOS](#)

- Build for height (photo)
- Build for strength (photo)
- Build for both height & strength

Observe defense of Doctoral Dissertation by Shahab Afshar

**Tuesday** began with observation of presentation posters developed for each project.

ePortfolio development

Orientation to scheduled presentations and campus resources

[Tech Symposium](#)

[UTC Library](#)

[Databases](#)

Research Topics

1. Panoptic segmentation pavement distress detection (Tiffany & Ramsey or Anna)
2. **Smart inverters as optimization agents (Matthew or Anna)**
3. Distributed real time digital simulation (Stephen)
4. Regression analysis: Graduation rates in Hamilton County Schools (Kevin)
5. Drone swarms for solar panel distress detection (Anna or Tiffany & Ramsey)

What are Journals/Conferences looking for in articles?

We will receive a template for the Tech Symposium poster and an article (I think the article will be written by the Professor?)

## Wednesday

Juney shared a [folder from his RET in 2021](#).

We spoke about PBL design & filled in a PBL template as a group based on our Marshmallow Tower experience.

Some light discussion about how STEM (Science, Technology, Engineering and Mathematics) breaks out and the purpose for each subject. Cash and Shober identified that middle school students are engaged in more “true Science,” whereas high school students are learning about Science History. The adjectives “curious” and “investigative” came up within the discussion of Science, as well.

Discussion of NSTA “Crosscutting Concepts,” “Science & Engineering Practices”

Shober explained his PBL, “Using Pavement Design to Teach Math & Science,” which included some creation of pavement models using graham crackers, pretzels, peanuts, and

chocolate. These models were tested for durability, which included strength, deflection and hardness.

In the afternoon, we dissected the [NSTA Science & Engineering Practices](#) to familiarize ourselves with how they might be employed to improve/inform PBL development.

[SEPs Worksheet](#) for Marshmallow Tower  
[Math Habits of Mind](#)  
[21st Century Skills](#)

## **Thursday**

S.O.L.E.

Q: What are elements of great teaching?

Student-focused, Joy in discovery, students are held accountable for their own learning.

### ***Presentation by Dr. Kirrar about Real-Time Simulation Through Distributed Processing (using Raspberry Pi)***

We were able to see the Real-Time Simulation Power Lab, which had some interesting tools. These included a schematic and model of the [Watts Bar Power Plant](#). Through this model, they are able to simulate different types of electrical circumstances and faults. The (small) lab represents \$2M in electronic equipment, largely due to the real-time (RT) simulators that are used to run the experiments. His goal with this particular project is to replicate the work of the high-end RT units with inexpensive, off-the-shelf Raspberry Pi units. Of course, it is required that...I guess the firmware...for the Raspberry Pi will be properly modified to accomplish the same result as the RT unit.

While in the lab, I saw two high-end cameras on a cart that piqued my interest. Dr. K. said that these were used to stereoscopically observe traditional dials/gauges in the antiquated power plant. Because the Nuclear Regulatory Commission (NRC) doesn't want these systems to be hacked, and replacements for instrumentation is of high security importance, the NRC is slow to approve new devices. As a result, people still go around and take hand-written measurements of the readouts. This also means that there isn't much "visibility" to the technicians to ensure modern monitoring of the overall system.

## **CRAIG RET 2022 WEEK 2**

### **Monday PYTHON "a simple code"**

Professor Hanadi Mohamed from ChattState came over to give us a flying short course on coding in Python.

## **Tuesday More Python & a Trip to the Moon**

I made the mistake of not bringing my laptop to today's training, so I downloaded the Pydroid3 app on my phone (for \$9.99/forever or \$1.99/monthly) to attempt to code-along with the presentation. It was a challenge, to say the least. I was very thankful for the paper printouts of the slides (which I initially rolled my eyes at on Monday) so that I could keep up.

The app worked, but the text on it was so small that it was very easy to make simple mistakes with spaces and punctuation. Nevertheless, I was able to write a loop and begin to understand what was meant by a LOOP. I do not understand, really what a "Tuple" is. The definition is that they cannot be changed, I guess. I think that where they GET the data from wouldn't be changed, but the data within a LIST that the Tuple is drawing from could be updated and the code re-run.

The second half of the day, we went to the Challenger Center to attempt to deploy some single-axle rovers on the moon to explore some lava tubes that may or may not be suitable for human habitation. We were the first set of astronauts to head to the moon, and our rover got crushed due to tremors/seismic activity. I suspect it was due to Moon Worms, but aside from the "lava tubes," there is no evidence...yet.

We have also received our research assignments. I will be working with [Dr. Vahid Disfani on Optimization of Inverters](#). I have begun a [survey of his citations](#) (link in previous sentence).

Wednesday

## **Thursday:**

I am looking at the articles that Disfani has sent me. It looks like there will be some work on creating a distributed network that will report data around both energy generation and use.