Engineering for a Better Life

STEM DREAMS THE LAB AT NEW RINGGOLD

Volume 2, Issue 6 March 2015

Energy Storage - How to Get a Charge Out of Life

So how do you store energy if you don't want to use batteries? Batteries, which themselves create toxic waste both in their creation and their disposal. The first thing that we is a discussion of what types of energy there are. We want to create and use electrical energy but to do this we need other types of energy systems with which to create it.

In the battery's case it is chemical energy, the flow of electrons caused by a chemical reaction inside the battery casing itself. Unfortunately the materials that cause the reaction eventually get used up, transformed into elements that no longer are chemically reactive and no longer produce a flow of electrons. Even in the case of rechargeable batteries there is a finite life to this process thus necessitating the disposal of the left over materials.

So let's leave chemical energy behind for the moment and talk about two other types of energy. For the purposes of this article I would like to concentrate on potential and kinetic energy. The best example that I can give of potential energy is the one that I learned from my old physics text book. If you place a boulder on the top of a hill and position it so that it is just on the edge of the hill, this is an example of potential energy, nothing is moving but there is potential that it could. Kinetic energy is the energy that is released by the movement of a body, our boulder, from one place to another. From the top of the hill to the bottom of the hill where it once more lays at rest. The energy created by the movement is lost in friction which in turn creates heat, sound and sometimes light.

It is this energy system that I would like to talk about. Remember that we are trying not to use batteries to create a source of energy. Obviously we can't use something as crass as boulders, a system that produces a physical energy not necessarily an electrical energy, the type of energy that we can readily use.

So what if we had a reservoir of water, something like a pool or a cistern that would hold water at the top of a slope or incline. This would be our potential energy. Now to get electrical energy from this we would do a controlled release of water allowing it to run down hill, much like our boulder until it comes to rest in a similar pool or cistern at the bottom of the slope. Unlike our boulder which would be difficult to garner energy from flowing water has a long tradition of being harnessed by turbines which turn as water flows through them and which in turn create electricity for our use. No batteries needed.

So now all we have to do is add solar panels to create energy on sunny days which can be converted directly to our use and whose excess energy can be used to pump water from the lower cistern to the upper cistern. There to be used during periods of low sun light, such as nights!

While this system is not ideal, it does absolve itself of contaminants such as the heavy metals found in batteries and it could be used as an ornamental piece on your property. Flowing water always adds a certain peaceful ambiance to your environment. It also eliminates the use of fossil fuels which helps our environment in many ways.

Lab Phone:
570-386-2392
Website:
www.stemdreams.com
Email:
stephen@stemdreams.com

Special points of interest:

- Lectures AND Classes
- Pollinators in Your Backyard
- Alternative Energy Solutions
- Engineering For Kids
- Camps For Kids:
- **April 11th & April 18th**
  Basic Robotics
  10:00 am — 2:00 pm
  Sign Up Today!

Inside this issue:

Energy Storage— How to Get a Charge Out of Life	1
Classroom Report	2
Preparing For Spring	2
Adult Classes — Ad	2
Hummingbirds iIn The Garden	2
The NASA MSRR	2
The Voice of the Lark—AD	2
My Life—The Story Of A Photon—Third Installment	3
Seeds of Creativity by Barry Middleton	3
Changes at STEM Dreams	4

The Voice of the

LARK

The LARK is an anthology of articles, stories and poems that is published quarterly. Submissions of original written work are welcomed. The writer retains the copyright.

For your reading pleasure, issues, in PDF format, are sent as email attachments, FREE of any charge.

For more information or to subscribe, contact Betty Dye at bettydye@yahoo.com. Be sure to put LARK in the Subject line of your email.

Adult Classes

Classes run on Tuesday and Thursday nights, 6:00 pm—8:00 pm or during the day on Wednesdays 8:00am — 4:00pm. $280/course/person

Autodesk , Microsoft, and Adobe classes available

Call to reserve your spot!

A Classroom Report

We have moved on to two different hot air balloon projects.

The kids have created a small, balloon model that uses an inner core, (rubber balloon) which blown up to one fourth the size is heated by our hot air balloon tester. This safe device creates a column of hot air over which the young balloonists place their model balloon allowing it to expand inside of the tissue paper model.

The other project is much more demanding and works much better because of the volume that the hot air must fill, expanding the balloon's envelop and creating a much higher kinetic motion of the air molecules, so that they push strongly against the envelop forcing it to rise in the air column of the classroom.

This second balloon looks very cool and has required the teams of two students to work very hard to ensure that all the seams are sealed. Add a bunch of hot air and let their imaginations and balloon take flight!

Preparing For Spring

April To-Do List for Zone 6

Clean up the garden in preparation for the season ahead: Remove last year's dead plants, rake back winter mulches, and top-dress beds with compost.

After you've finished preparing your beds, plant potatoes, peas, spinach, and other leafy greens as well as beets, turnips, and carrots.

Put up a trellis for tall varieties of peas as soon as they sprout.

Dig, divide, and replant perennials, such as helenium, fall asters, Shasta daisies, chrysanthemums, and phlox.

As soon as the weather settles, plant transplants of pansies, forget-me-nots (*Myosotis* spp.), foxglove (*Digitalis* spp.), and other cool-weather flowers.

Sow seeds of sweet peas, bachelor's buttons (*Centaurea cyanus*), and larkspur (*Consolida ajacis*) in flowerbeds.

http://www.rodalesorganiclife.com/garden/gardeners-april-do-list

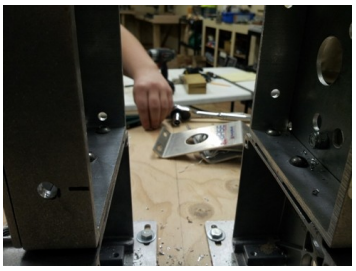
NASA MSRR Project

With the unexpected snow fall in late March and the illness of two of our students our project has made little progress, but it has made some!

The motor that will drive the rack gear of our horizontal arm has been secured in place and is ready for its new shaft and pinion gear. We have priced these out and will be ordering them shortly.

Our arm has been fabricated from three separate pieces of u -channel steal and have been joined by sturdy strips of aluminum metal.

Our next class will continue with the sample belt drive, placing the pulleys which will keep the belt from "travelling" and putting together the two drive belts. So let's get back to work and get this Bot in motion.



Hummingbirds in the Garden

Because hummingbirds specialize on nectar feeding, they play an important role in pollination. These colorful, migratory birds serve as a link between plant populations by visiting flowers and moving pollen over great distances.

Rufous Hummingbird A tiny jewel of a bird, the Rufous Hummingbird fiercely defends its feeding areas and will attack much larger birds including Great Horned Owls.

To attract hummingbirds to your garden, provide them with nectar starting in early spring. It's thought that hummingbirds prefer red-colored flowers; however, they will feed on any flower that produces abundant nectar

Photo Curtsey
Deborah Goodale

* http://www.fs.fed.us/wildflowers/pollinators/documents/AttractingPollinatorsV5.pdf

My Life: The Story of a Photon—Third Installment

Energy is one part of me and it is the part that I want to talk about right now. If you are a teenager and you think that your life is complex and out of control just think about what I have to go through. For example do you know if you place me with a bunch of other photons and I come streaming down through the envelope of the Earth's atmosphere I get jostled about, judged and separated? Sound familiar?

You see because part of me is an energy wave I get intercepted by what's in the atmosphere. Parts of me get thrown back out into space rejected outright! Parts of me have run-ins with molecules in the atmosphere and I jostle back and forth hitting and being hit, like a dancer in a moshpit. Part of me moves fairly slow for a energy wave, they call that infrared which causes heat, some of me oscillates so violently that when I hit living tissue, say your skin I can cause lasting damage like serious sunburn. I can even change the molecular structure of your cells and cause cancer. That part of me they call ultr violet. How would like that Rep? Some of me splits apart into all the colors of the rainbow, no seriously you can split me like this by simply running me through a glass prism, step back and watch the show!

Now some of me comes in for a brief visit, I hit the surface of the earth and strike snow and ice and then bing- a - batta- boom I get bounced back out into space. Some of me gets trapped by plants that use my energy in the process of photosynthesis the way that they make food. Now as my hypothetical teenager you have to love that I get to help make food!

Still more of me is trapped by mysterious glass like panels that I understand you humans call Solar Panels, solar I do like the sound of that. You see my energy strikes the surface of these panels and magic happens. My energy transfers to the valence electron of an atom in the n-type Si layer. That energy allows the valence electron to escape its orbit leaving behind a hole. In the n-type silicon layer, the free electrons are called majority carriers whereas the holes are called minority carriers. As the term "carrier" implies, both are able to move throughout the silicon layer of the solar cell, and so are said to be mobile. Inversely, in the p-type silicon layer, electrons are termed minority carriers and holes are termed majority carriers, and of course are also mobile. *

The region in the solar cell where the n-type and p-type Si layers meet is called the p-n junction. As you may have already guessed, the p-type silicon layer contains more positive charges, called holes, and the n-type silicon layer contains more negative charges, or electrons. When p-type and n-type materials are placed in contact with each other, current will flow readily in one direction (forward biased) but not in the other (reverse biased) * this creates energy which the humans use for all kinds of interesting things.

The next time we meet I need to talk to you about what happens to the parts of me that get kicked back into space or at least they try to do that.

*http://specmat.com/Overview%20of%20Solar%

YOUTH IMMERSION CAMPS TAKE YOUNG PEOPLE AGES 9—16 AND PROVIDES THEM WITH TWO SATURDAYS DEVOTED TO A SINGLE TOPIC OF ENGINEERING. THIS REQUIRES KIDS TO WORK IN A TEAM FORMAT WITH SOPHISTICATED MODELS THAT ACTUALLY WORK.

THE CAMPS WILL TAKE PLACE AT STEM DREAMS THE LAB AT NEW RINGGOLD.
CALL:
TEL. (570)-386-2392

DECEMBER 13TH
AEROSPACE/IN ATMOSPHERE

JANUARY 17TH
NANOTECHNOLOGY

MARCH 14TH & 21ST
BRIDGES & STRUCTURE

APRIL 11TH & 18TH
BASIC ROBOTICS

THE COST IS ONLY $75 PER PERSON PER CAMP AND INCLUDES CATERED LUNCHES.

CALL US AT 570-386-2392 TO REGISTER.

PREPAYMENT IS REQUIRED!

MORE CAMPS TO BE ANNOUNCED KEEP READING OUR NEWSLETTER!

Seeds of Creativity - Barry Middleton

I often introduce my new engineering students to the art and science that is engineering by doing an imagination exercise.

I tell them that I can teach them all that they need to know about engineering except use of the imagination.

Now I have met a man who does exactly that. Barry Middleton has put together a short series of seminars which talks directly to the following:

Recognizing creativity and talent

Exercising creativity and talent

Drawing and studio arts

Writing

Building (small scale)

Classes are 6:00—8:00 PM at the Arts Barn 3 Berry Road Schuylkill Haven, PA 17972

The series dates are Tuesday May 5, Tuesday May 12, and finishes Tuesday May 17.

Contact Barry: 570-366-8736 or kodiakbarr@aol.com

YOUNG MINDS! REAL WORLD PROBLEMS! UNIQUE SOLUTIONS!

THE WEATHERLY INSTITUTE FOR ROBOTICS AND ENGINEERING

3320 Summer Valley Road
New Ringgold, PA 17960

570-386-2392
email: stephen@stemdreams.com

We are a Christian Based Organization. We Believe!

It is the goal of The Weatherly Institute for Robotics and Engineering to create a culture of Science and Technology in which young people and adults may come to learn and be inspired!

Over the years we have watched as technology has increasingly driven our culture, while the number of people who are actually taking engineering and technology courses have decreased. Even more maddening is that this knowledge base has found its way overseas and to other countries making the United States vulnerable to the whims of a global economy.

W.I.R.E. has taken the challenge up in a small way, bringing young children, young adults and adults to the class room and exposing them to a wide range of engineering opportunities.

For twenty two years I have operated my for profit company: KG Projections, Inc. and for the past ten years The Weatherly Institute for Robotics and Engineering or W.I.R.E. a PA recognized non-profit.

My for profit company has generated most of the monies needed for my non profit to survive and complete its mission to teach the children engineering.

Now I have introduced a third arm, STEM Dreams the Lab at New Ringgold. While not a separate company it is the umbrella structure to support my other two enterprises and will allow me to open up a research facility dedicated to creating new technologies to help in our struggle with a changing climate and alternative energy strategies.

I intend to share some of these concepts with you my readers beginning with the Robotic Bee program. So please look for further developments in the pages of this newsletter and those to follow.

Please consider the donation of **a stereoscopic microscope with camera mount or the money ($300) to purchase the unit.**

Thanks: Stephen Goodale

Changes at STEM Dreams the Lab at New Ringgold

The following is a list of competitions that will made available to our students.

Junior FIRST Lego League	Ages 6—9
FIRST Lego League	Ages 9—14
FIRST Tech Challenge	Grades 7—12
FIRST Robotics Competition	Grades 9—12
The Northeast PA Bridge Building Competition	Grades 7—12
The Real World Design Challenge	Grades 9—12
The NASA Mars Sample Return Robotics Competition	High School Grades 11—12 and College Years 1 & 2

Some of these competitions have the possibility of gaining College Scholarships through the programs that they are attached to and all look great on college applications.

It is time to start planning for the up coming year 2015 — 2016 and the competitions that W.I.R.E. will make available to young people in our region.

Once again all of the competition classes will be held at STEM Dreams the Lab at New Ringgold. In order to do this we will need three things. The first is obviously students who are interested in Science Technology Engineering and Mathematics, better known as STEM. It is important that parents, teachers, and students understand that it will take a commitment of time and energy to be a member of any of these teams.

The second is money. While traditionally, W.I.R.E. has never asked for monies to be part of any classes taught under its umbrella, money has become a necessary element that must be addressed. So to that end we will ask that parents begin to donate what they can to help support the programs that their children are to be part of. W.I.R.E. will not define the amount and will leave that up to the families involved.

The third thing is materials. You may have spare tools, lumber, metals, or old electronics that are available to you. Even help with transportation and chaperoning might become extremely important to aid the team that your child is part of, there is so much more that can help than you might guess.