

Engineering for a Better Life



THE SKUNKWORKS AT NEW RINGGOLD

Volume 1, Issue 3

October 2014

So What's the Buzz?

So why AEROGELS? Well they are really light and strong. It turns out that a company has been able to manufacture a nano-material from tree cellulose, they call it Airloy. What makes this product extremely useful for the Robotic Bee is while light and strong it also is water resistant and has the ability to adhere to other materials. It also has the ability to be machined as would, well wood!

Inside of the aerogel is another secret that makes it so valuable to our project. It is not dense solid material but instead is fibrous and full of very small pockets of space. This aspect of the aerogel will come into play when we talk about how to “power” our bee, so wait for it...

Now a bit more on the Robotic Bee's power to detect flowers. When I am teaching my young students about senses and sensors I have them correctly identify the five know human senses. Among those are taste and smell. While I tell them that the robots that they work with readily use, sight (light), touch and hearing (sound) that taste and smell are not so easily reproduced in a robot. A robot can identify a string

of molecules and thus can detect things like plastic explosives at an airport. They also can use the same molecular detection system to correctly call out the compounds found in their environments, but it is just not the same, so there is a degree of separation between humans and robotic simmuloids.

Our Robotic Bee is going to take this molecular detection a step further. It will use the wavelengths of refracted light to determine the molecular or in this case chromatic composition of target flowers. We use this in many ways currently in science and the coolest example that I can think of is the detection of gases in the atmospheres of planets many millions of miles outside of our solar system.

So the robotic Bee will be able to detect the correct flower to match the correct plant on which to land. This is still not enough, you see the flower has two components that are very important to our project. The first is pollen and the second, well the second is nectar.

The first would seem evident the second we will tie into the

equation later. The farmer is hiring our little Robotic Bee to pollinate the flowers of his choice. While the model from which we work, the honey bee, does this very well indeed, remember we are still concerned with the ongoing loss of these, and other pollinators, so....

The first new problem that we need to examine is to get our Robotic Bee to the material that it needs to manipulate, ergo the pollen. Pollen is found normally on the interior portions of the flowers, and while to some degree these are open to the air we will still need to penetrate the interior of the flower to get to it.

Remember our job is NOT to damage the flower itself, because it has the very important function of producing food. So now we need to add a secondary sensor function and some computer algorithms to detect the interior surfaces of the flower. This will be aided by the fact that nature has given us a helping hand in the form of changing colors in the throat of most flowers. To some degree our Robotic Bee will need to differentiate between colors, more to follow!

Special points of interest:

- LECTURES AND CLASSES
- POLLINATORS IN YOUR BACKYARD
- ALTERNATIVE ENERGY
- ENGINEERING FOR KIDS
- CAMPS FOR KIDS

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Engineering for a Better Life

The Skunkworks—A Beginning

On Saturday we met with our new landlord and signed the three year lease giving us access and use of the property that I have dubbed “The Skunkworks”.

Perhaps I should give you folks an idea of just what is meant by that term.

A skunkworks (also known as Skunk Works) is a small group of people who work on a project in an unconventional way. The group's purpose is to develop something quickly with minimal management constraints.

Skunkworks are often used to initially roll out a product or service that thereafter will be developed according to usual business processes.

It does have some interesting history as well. The term skunkworks was first introduced during World War II by engineers at Lockheed Corporation (which, in 1995, merged with Martin Marietta to become the Lockheed Martin Corporation). The engi-

neers, who were tasked with building a fighter jet for the United States Government, operated under an unconventional organizational approach developed by Clarence L. "Kelly" Johnson. His directives for how the skunkworks should operate are called The 14 Practices and Rules.

So it is in this spirit that we dedicate The Skunkworks at New Ringgold with God's blessing and a lot of elbow grease!



You know we are going to have to have a contest to name our new mascot, any thoughts?

Software

The Weatherly Institute for Robotics and Engineering has just been offered a considerable number of seats from Autodesk and will be opening up some teaching space in the Skunkworks building.

Most of these software opportunities will be made available to the students who come to work on the various projects in the Lab, but I will make an effort to see that adult students interested in learning these very valuable skills will have an opportunity in the near future to learn them in a small classroom environment and at a nominal charge..

[3ds Max Design 2015](#)

[AutoCAD 2015](#)

[Robot Structural Analysis Professional 2015](#)

[Autodesk Simulation CFD 2015](#)

[Simulation Moldflow Adviser Ultimate 2015](#)

Plus more.....

Planning for a Better Buzz - Drinks around the House

Did you know bees need to drink water? They seek out shallow water sources like puddles and bird baths.

Even if you don't keep bees, you can help out our little pollinator friends (and a host of other wildlife) by keeping a bird bath or even just putting a saucer of fresh water out for them.

You can do this even if you don't have a yard—try keeping a saucer of water on, say, a balcony railing or in a window box.

If you keep it full, and in the same location, word will spread and the bees will come and belly up. It may take a couple of weeks for a worker to discover the water source,

but once she does, she will take that information back to her hive and they will never forget where it is.

The benefit to you is that if bees are coming to drink in your yard, they'll do you the return favor of pollinating your garden.

Thanks to, <http://www.rootsimple.com/2011/03/thirsty-bees/>



Methane—A Key Element in Ozone Depletion

Most Methane in our atmosphere is found in the Stratosphere, a layer found at the height of 6.2 to 8.1 miles above the surface of the planet.

Here the gas interacts with monoatomic oxygen (O) to form a hydroxyl radical (OH•). This hydroxyl radical is then able to interact with non-soluble compounds like chlorofluorocarbons, and UV light breaks off chlorine radicals (Cl•).

These chlorine radicals break off an oxygen atom from the ozone molecule, creating an oxygen molecule (O₂) and a hypochloryl radical (ClO•).

The hypochloryl radical then reacts with an atomic oxygen creating another oxygen molecule and another chlorine radical, thereby preventing the reaction of monoatomic oxygen with O₂ to create natural ozone.

Ozone helps to protect life on Earth by absorbing ultraviolet radiation from the sun, particularly UVB radiation that can cause skin cancer and cataracts, damage crops, and destroy some types of marine life.

Global methane levels, have risen to 1800 parts per billion (ppb) as of 2013, an increase by a factor of 2.5 since pre-industrial times, from 722 ppb, the highest value in at least 800,000 years.

An Engineering Poser

A couple of summers ago I had the privilege of teaching a very gifted group of high school students at Bloomsburg University in PA. It was a week long camp on Nanotechnology.

During this camp I introduced them to the problems that Methane poses to our planet in respect to its affect on possible climate change and runaway global warming.

I then challenged them to come up with a solution using the engineering techniques

available to them through the use of nano materials.

After studying the possibilities they determined that any chance of reducing this gas would have to take place at an area of high concentrations, which meant that it would have to be done in the stratosphere.

This is aided by presence of the Tropopause, a layer of interactive temperature inversions between the Troposphere and the Stratosphere. This is where you find the Jet

Streams, two rivers of air which flow very rapidly.

By using a light weight, high strength vehicle, which would use a combination of nano materials and chemistry, the group proposed the capture and reformulation of methane into complex carbohydrates.

This was an elegant solution which would help pull atmospheric methane out of the air reducing its affects as a greenhouse gas while creating from it a basic food source! You have to love young minds!

The Real World Design Challenge

The interesting problem of delivering a drone to the field from some offsite location is two fold. First the drone has to arrive safely to the precise center of the field.

This entails the careful study of FAA regulations and adherence to their stated safety protocols. Collision avoidance, flight paths high

enough to allow clearance from ground based obstacles yet low enough not to interfere with manned aviation.

It also involves using a power source strong enough to get the drone to the field, record the data and get it back to "home" base in one piece.

Team Aeroflex decided to use a mother ship approach to these two issues.

This allows for a more robust vehicle to fly to the designated field, while a smaller drone rides "piggyback" awaiting release from the mother ship.

From there it can map the field using an algorithm to scan and record data. If the drone runs low on power it just recharges at the mother ship and continues its study.

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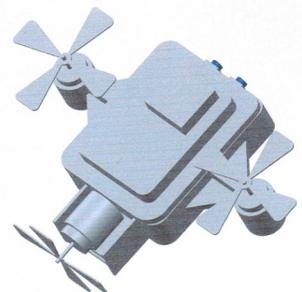
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THE WEATHERLY INSTITUTE FOR ROBOTICS AND ENGINEERING

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570-401-7813
email: goodalestephen@gmail.com

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.

We are a Christian Based Organization. We Believe!

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, The Skunkworks at New Ringgold. While not a separate company it will become 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.

I would also like to invite you to donate as you see fit. **I currently need a stereoscopic microscope with camera mount.**

Thanks: Stephen Goodale

The NASA Mars Sample Return Competition

NASA has once again issued a challenge in the 2014—2015 year to any organization, school or private group who might be interested in competing in the MARS SAMPLE RETURN CHALLENGE.

There are two levels of competition both are “played” on an 80 meter square playing field. Level one is designed to allow a robot to leave its “home” platform and to attempt to “capture” and bring back to that platform a designated pre-packaged sample.

The robot must do this adequately in order to advance to level Two, the retrieval of different shaped/sized/colored samples in that 80 meter square field. Sometimes as a single robot sometimes with other robots on the course.

The Weatherly Institute for Robotics and Engineering has registered for this year’s challenge and is awaiting acceptance from the Worcester Polytechnic Institute of

MA, who is administrating and overseeing the event. W.I.R.E. will accept 11 and 12th grade students as well as 1st and 2nd year college students onto the team. There will be ten spots available. If you are interested or if you know someone who might be interested please pass along this newsletter to that person.

You can contact me via email at:

goodalestephen@gmail.com

Or by phone at:

570-401-7813

If you or your organization is interested in helping with the costs involved with this project, thank you in advance, all donations are welcomed. Please contact me and I will give you the information needed to send those monies or materials along.

Please keep reading the newsletter for more information and additional details/progress.

