The Technology in Action Expo held March 1 sponsored by the Applied Research and Technology Program (ARTP) was a great success. All Centers were well represented by faculty and students. In addition, SIFE (Students Involved in Free Enterprise), the Science Alliance, and the South Central Region Innovation and Commercialization Center (ICC) also participated. There were approximately 300 people in attendance with one-third from outside Western. Dr. Gary Ransdell, President of WKU, and Buddy Steen, the director of the ICC, both made comments regarding the partnerships among the ARTP, the ICC, government (local, state and federal), industry and the Chamber of Commerce and the impact of their coordinated efforts toward improving the quality of life for the citizens of Kentucky through economic development and environmental stewardship.

The Expo highlighted the impact that ARTP activities have had on the education of students through engagement in applied research and technology projects under the mentorship of faculty members. At the same time, these efforts have had a positive impact on economic development and environmental quality of the region and state. Middle and high school leaders were invited to witness the potential for intellectual development for their students and the availability of high-pay, high-tech jobs now available in Kentucky and the potential to create more through innovation. It was the intention of the Expo to have these school leaders take this message back to their respective schools in order encourage more students to pursue science, technology, engineering and mathematics careers and to think entrepreneurially.

I would like to thank the many people who worked so hard to prepare for this event. Special thanks go to Dr. Shivenendra Sahi, Associate Director of the ARTP, Lisa Lynn Haynes, the rest of the ARTP staff, and the Center directors. I also thank the Turf Management Club for the great pork chop dinner. Thanks go to President Ransdell and Buddy Steen for their support of the ARTP.

-Written by
Dr. Blaine Ferrell,
Director,
Applied Research and Technology Program
Dean,
Ogden College of Science and Engineering

Top Photo taken by ARTP Staff
Bottom Photo provided by John Andersland.

Photos From the “Technology in Action Expo”. Figure 1: President Dr. Gary Ransdell speaking with Dr. Richard Bowker (Interim Graduate Dean/Dept Head of Biology) and Dr. Michael Smith (Assistant Professor-Biology) at the Expo. Figure 2: The Volcano from the Science Alliance by Margaret Crowder and Dr. Andrew Wulff. (More photos from the Expo on Page 6 and 7)
WKU Engineering is working with Johnathan Jernigan, a Physical Scientist at the Mammoth Caves National Park to support NPS research into the cave environment and ecosystems. WKU Engineering staff and students have designed, built and tested two different integrated instrumentation systems. The systems had to be lightweight and rugged so that they can be transported considerable distances into the cave by NPS personnel, and provide accurate measurements for extended periods of time. The two projects are described below.

Laser Range Measurement System

The scope of project was to construct two tripod-mounted distance measurement systems that could be transported into distant cave locations. The device measures the spherical coordinates (distance and two angles) from a known location and the results are stored to an existing NPS data-recording device. (Figure 1)

NPS scientists are using the system to gather accurate locations of cave populations such as crickets. Currently it takes two researchers to measure these distances, and the method is less accurate. The new system will make it easier, quicker and more accurate to gather this ecosystem information.

Device details include the following:

- Distance is determined using a shock-resistant, moisture-proof HILTI laser measuring device with accuracy of ± 3 mm.
- Horizontal direction is determined using an Acroname electronic compass with one degree accuracy.
- Azimuth elevation is determined using a calibrated gearing system, potentiometer and rotating platform designed for one degree accuracy.
- The three devices are integrated onto a single platform that is mounted to a standard heavy-duty tripod. The system data is automatically sent to an NPS data-recording device. The overall system is moisture resistant and designed to withstand the transport in duffle bags to a measurement location.

Instrumentation Lift System

The 2nd portion of the project was to construct two transportable instrumentation lift systems. The tower has a stationary top instrumentation platform, and a second platform capable of moving up and down the tower continuously for extended periods while unattended, pausing to collect data. NPS instrumentation is mounted to the platforms to collect temperature, humidity and air velocity data, with results stored to an existing NPS data-recording device.

NPS scientists will use the system to gather accurate data on the quality and movement of air within the cave networks, and use the data to create a model of the environment. The new system will allow measurements up to 30 feet, and will make it feasible to collect long-term data over the cross sections of passages.

Device details include the following:
• A six feet tall 4-legged aluminum base structure supports and stabilizes the tower. The base can be disassembled and transported while in a duffle bag.
• Ten 3 feet sections of PVC pipe that can be screwed together to build a 10-meter tall tower. A gripping mechanism at the center of the base holds the partially completed tower during raising or lowering (Figure 2a).
• A top one-foot square platform houses instrumentation is mounted to the top PVC pipe. Data will be sent to a data-recording device located at the tower base.
• A motor/pulley system will raise and lower the moving platform between the top of the tower and the base. Data will be sent to a data-recording device located on the moving platform. The location of the moving platform is also measured.
• Four tension cable systems run from the base to the tower to increase the stability of the tower at full height (Figure 2b). Each tensioner attaches to the tower at the top and at a mid-tower location.

The lift platform has been designed and is currently being built and tested to assure that it is user friendly and reliable (Figure 3). Tower stability, ease of tower construction, accuracy of platform movement, and required battery life are ongoing issues. The overall system will be moisture resistant and designed to withstand the transport in duffle bags to a measurement location.

Work on these projects was performed by WKU Engineering Students: Josh McCombs, Jason Kondracki, Josh DeArmond, Rusty Welsborn, Russell Wimsatt, Jason Birkhead and Seth O’Dell. Primary guidance and input for these projects was provided by WKU Staff Engineers Ron Rizzo and Chris Moore. Funding was provided by a grant from NPS. This project demonstrates the kind of opportunities for continuing interactions between Engineering Services and other ARTP centers. In addition to these NPS projects, Engineering Services has also constructed integrated instrumentation systems for the WKU WATERS lab, as well as a variety of external customers. Other ARTP centers may be interested in considering Engineering Services as a resource to investigate the design and construction of a prototype instrumentation system.

~Submitted by
Kevin Schmaltz,
Director
Engineering
Services Center

Figures 2a and b: (a) Gripping system to hold tower during installation; (b) tensioner system mounted to tower base to support tower

Figure 3: (At Left) Josh McCombs, Josh DeArmond and Chris Moore performing testing on completed tower.
WKU Engineering Students Win Regional Competitions

Bowling Green, Ky. - Western Kentucky University civil engineering students brought home top honors at the annual Ohio Valley Regional Student Conference.

WKU students won the concrete canoe competition for the 12th straight year and added first-place finishes in concrete Frisbee and technical paper competitions along with second place in the surveying competition and third in the steel bridge competition.

The Ohio Valley Regional Student Conference was held March 29-31 at Ohio State University in Columbus. Other participating schools included Kentucky, Louisville, Carnegie Mellon, Cincinnati, Cincinnati State, Cleveland State, Dayton, Geneva, Ohio, Pittsburgh, Stark State College of Technology, Ohio State and Youngstown State.

In the concrete canoe competition, WKU won the best oral presentation, best final product, men's slalom/endurance race, women's slalom/endurance race, men's sprint race and women's sprint race and took second in best design paper. The concrete canoe team advanced to the national competition June 14-16 in Seattle. WKU has finished in the top 10 nationally in six of the past seven years.


In the concrete Frisbee competition, WKU won best overall and had first-place finishers in men's distance (Parker Sloan of Shawnee Mission, Kan.) and women's distance (Magon Kirby of Auburn). Other team members included Brad Hall of Russellville, Sean O'Bryan of Whitesville and David Coomes of Philpot.
In the technical paper competition, WKU’s David Hurd of Bowling Green won best overall. In the surveying competition, the team of Sean O’Bryan of Whitesville, Clint Ervin of Greensburg and David Coomes of Philpot placed second overall.

Original article

Issue 14, 3rd Quarter

Page 5

In the technical paper competition, WKU’s David Hurd of Bowling Green won best overall. In the surveying competition, the team of Sean O’Bryan of Whitesville, Clint Ervin of Greensburg and David Coomes of Philpot placed second overall.

Original article

WKU News & Events
April 5, 2007
Written by
Tommy Newton
Submitted by
Shane Palmquist
shane.palmquist@wku.edu

Competition Results:

CONCRETE CANOE COMPETITION:
Students:
- Brandon Bagby
- Sarah Barker
- Brian Ferguson
- Joshua Melson
- Devon Moore
- Stuart Payton
- Bryan Phillips
- Parker Sloan
- Seth Warren
- Jon Whitaker
- David Coomes
- Sean O’Bryan
- Catie Gay
- Kelly Stolt
- Kal Vencill
- Sarah Bertke
- Erica Rigney
- Chris Simpson
- LeAndra Chandler
Best Overall: 1st place
Best Design Paper: 2nd place
Best Oral Presentation: 1st place
Best Final Product: 1st place
Men's Slalom/Endurance Race: 1st place
Women's Slalom/Endurance Race: 1st place
Men's Sprint Race: 1st place
Women's Sprint Race: 1st place

STEEL BRIDGE COMPETITION:
Students:
- Chad Doughty
- Adam Evans
- Joseph Kelly
- Sarah Kohler
- Justin Young
- Austin Shields
- Matt White
- Brad Hall
- David Morse
- JP Tilley
- Curt Smith
- Brad Dobina
Overall Performance: 3rd place

CONCRETE FRISBEE COMPETITION:
Students:
- Brad Hall
- Sean O’Bryan
- David Coomes
- Parker Sloan
Best Overall: 1st place

Men's Distance: 1st place (Parker Sloan)
Women's Distance: 1st place (Magon Kirby)

TECHNICAL PAPER COMPETITION:
Student:
- David Hurd
Best Overall: 1st place

SURVEYING COMPETITION:
Students:
- Sean O’Bryan
- Clint Ervin
- David Coomes
Best Overall: 2nd place

(Continued from Page 4)
A graduate student from the University of Ghana, Lily Paemka, (Figure 1) is currently working in the laboratory of Dr. Keith Philips conducting projects on insect diversity in Ghana, West Africa. One study is on the phylogeography of a genus of dung beetle using mitochondrial DNA sequence data to elucidate the relationships of populations in Ghana. This will determine unique populations that deserve protection and will assist the government in making conservation decisions.

The second analysis is an investigation into the ecosystem health of several preserves to better understand the effects of human disturbances such as logging and bushmeat hunting on the mammal fauna via the study of dung beetle species diversity. In addition to supporting the efforts to protect the Upper Guinean Forest biodiversity global hotspot (one of 25 in the world), this project has resulted in baseline data on species presence that will be used in future monitoring efforts of these ecosystems.

Lily will return to the University of Ghana in early June to present her research and defend her thesis.

~Written by Keith Philips
Biotechnology Center
~Submitted by Sigrid Jacobshagen
Director, Biotechnology Center
Photos taken at the 2007 Technology in Action Expo provided by the ARTP Staff and John Andersland.
### ARTP CENTERS

**ARTP PHONE INDEX:**

<table>
<thead>
<tr>
<th>CENTER</th>
<th>PHONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AREC</td>
<td>270-745-5959</td>
</tr>
<tr>
<td>API</td>
<td>270-781-3859</td>
</tr>
<tr>
<td>AMSI</td>
<td>270-745-6302</td>
</tr>
<tr>
<td>BIOD</td>
<td>270-745-5048</td>
</tr>
<tr>
<td>BIOTECH</td>
<td>270-745-5994</td>
</tr>
<tr>
<td>BISC</td>
<td>270-745-5997</td>
</tr>
<tr>
<td>CCKS</td>
<td>270-745-3252</td>
</tr>
<tr>
<td>CWRS</td>
<td>270-745-8895</td>
</tr>
<tr>
<td>ES</td>
<td>270-745-8859</td>
</tr>
<tr>
<td>HERI</td>
<td>270-745-5201</td>
</tr>
<tr>
<td>IASS</td>
<td>270-745-6198</td>
</tr>
<tr>
<td>ICSET</td>
<td>270-745-2272</td>
</tr>
<tr>
<td>KCC</td>
<td>270-745-5983</td>
</tr>
<tr>
<td>MCC</td>
<td>270-780-2568</td>
</tr>
</tbody>
</table>

- **AREC—Agriculture Research and Education Complex**  
  Nevil Speer, Director, EST 234, 270-745-5959  
  nevil.speer@wku.edu

- **API—Applied Physics Institute**  
  Phillip Womble, Director, TCCW 232, 270-781-3859  
  phillip.womble@wku.edu

- **AMSI—Architectural and Manufacturing Science Institute**  
  Neil Downing, Director, EST 222, 270-745-6302  
  neal.downing@wku.edu

- **BIOD—Center for Biodiversity Studies**  
  Scott Grubbs, Director, TCNW 107, 270-745-5048  
  scott.grubbs@wku.edu

- **BIOTECH—Biotechnology Center**  
  Sigrid Jacobshagen, Director, TCNW 111, 270-745-5994  
  sigrid.jacobshagen@wku.edu

- **BISC—Bioinformatics & Information Science Center**  
  Claire Rinehart, Director, TCNW 121, 270-745-5997  
  claire.rinehart@wku.edu

- **CCKS—Center for Cave and Karst Studies**  
  Nicholas Crawford, Director, TCNW 107, 270-745-3252  
  nicholas.crawford@wku.edu

- **CWRS—Center for Water Resource Studies**  
  Andrew Ernest, Director, TCCW 105, 270-745-8895  
  andrew.ernest@wku.edu

- **ESC—Engineering Services Center**  
  Kevin Schmaltz, Director, EBS 2210, 270-745-8895  
  kevin.schmaltz@wku.edu

- **HERI—Hoffman Environmental Research Institute**  
  Chris Groves, Director, EST 321, 270-745-5201  
  chris.groves@wku.edu

- **IASS—Institute for Astrophysics and Space Science**  
  Mike Carini, Director, TCCW 229, 270-745-6198  
  mcarini@wku.edu

- **ICSET—Institute for Combustion Science and Environmental Technology**  
  Wei-Ping Pan, Director, 2413 Nashville Rd.  
  270-745-2272, wei-ping.pan@wku.edu

- **KCC—Kentucky Climate Center**  
  Stuart Foster, Director, EST 304, 270-745-5983  
  stuart.foster@wku.edu

- **MCC—Materials Characterization Center**  
  Ronald Hoffmann, Director, South Campus,  
  270-780-2568, ron.hoffmann@wku.edu