Dickinson Researches Insect Flight Abilities

By DAVID CHEN

"Why are insects so successful and the dominant form of life on the planet?" Michael Dickinson, Esther M. and Abe M. Zarem Professor of Bioengineering, asked the audience.

He explained, "A possible reason is that insects were the first organisms to take active flight." After emphasizing the importance of insects in the terrestrial ecosystems, Professor Dickinson introduced his current research on how flies can fly.

The movement of flies is characterized by a graceful and extreme agility. For example, the involuntary take-offs—such as when someone is attempting to swat a fly—are over in less than one fourth of a second. Thus, our ability to study the flight systems of such small insects had been hampered for quite some time.

The previous way to study nervous systems of insects was to rip it out and put the nervous system in a Petri dish. Professor Dickinson, however, explained that this method of study included the understanding of how the parts work together.

The current systems-level integrative approach is to observe how the central nervous system affects musculoskeletal system, which influences the external environment and how the sensor systems send input back to the nervous system.

Professor Dickinson actually began this research into fly motion at the University of California, Berkeley. While Dickinson noted that "this is a strange place for a zoologist," his fascinating work actually involves much of new demands of the field.

ME72 Modernization Underway This Term

By ZHIYUN GUAN

Recent changes to one of Caltech’s most popular and publicized courses have sparked discussion and controversy within the community. The class, Mechanical Engineering 72, provides students a hands-on and competitive experience in design and robotics and fulfills part of the ME and Mech 72 lab requirement.

In previous years, students formed teams to build a device and solve an assigned problem, such as moving a cage assembly across a table or attaching magnetic items to a wall. At the end of the course, students participated in a much-anticipated competition at Beckman Auditorium. This year, however, the familiar format of ME72 has changed to meet the new demands of the field.

Updating the course to cover more recent technological developments, current instructor Joel Burdick explained, is the ultimate goal for ME72. According to Burdick, a modern mechanical engineer comes into frequent contact with computing, sensing and advanced mechanical technology, aspects that were not extensively covered by the class’s previous format. "We want to bring [ME72] into the 21st century, actually the 20th century," he explained. "It’s still kind of stuck in the 19th century at the moment."

The projects for the current year involve the use of new technologies. Students may choose from a DARPA challenge.
Voter Survey Reveals Information About Electronic Voting Devices

By MARK WHEELER

While the November 2 election will determine who will occupy the White House for the next four years, it may also make another determination as well: namely, whether Americans will embrace the use of electronic voting devices.

Suffering through the Florida recount debate in the 2000 presidential election may have raised America's consciousness as to the methods they use to cast votes. Since then, there have been lots of claims made by advocates about how comfortable people are with electronic voting, while opponents have argued just the opposite, that the confidence of all voters is now shaken by the thought of using electronic voting systems. Who's right, who's wrong?

Neither, says R. Michael Alvarez, a professor of political science at the California Institute of Technology and codirector of the Caltech/MIT Voting Technology Project. "In fact, there appears to be a lot of indecision on the part of voters about the use of electronic voting devices," he says. Alvarez and Thad Hall, assistant professor of Political Science at the University of Utah and a collaborator with the Voting Project, just completed a study on American registered voters' attitudes about electronic voting devices.

"Roughly one-third of the registered voters in our sample stated they had no opinion about any of the arguments for or against the use of electronic voting machines," notes Hall. "This might represent uncertainty about electronic voting machines, a lack of familiarity with them, or some ambivalence about their use."

That leads Alvarez to believe that public opinion is at a critical moment regarding their use. This November, voters in 42 states will use new voting systems, such as touch screen ballots and optical scan machines. As a result, says Alvarez, "the performance of these voting systems on November 2 will play a critical role in determining how American voters feel about using electronic voting technologies in the future."

If things run smoothly with few glitches, electronicballoting will probably be here to stay. If there is another glitch-filled election, the controversy will go on.

The telephone survey, funded by the University of Utah's College of Social and Behavioral Science and Political Science Department, was conducted by International Communications Research between August 25 and 29. It interviewed a nationwide sample of 829 male and female registered voters. (The margin of error for the poll was plus or minus 3.4 percentage points.)

While roughly one-third of voters in the sample expressed no opinion, a plurality of 38 percent of voters said they are most comfortable with using electronic voting machines to cast their vote, while 30 percent were most comfortable using optical scanning devices.

Not surprisingly, the survey shows a sizeable generation gap in attitudes about electronic voting. More than half of Generation Y registered voters, those between age 18 and 28 and a generation older up with computers and video games, expressed comfort with their use. But only a third of those 59 and older were comfortable with the newer electronic voting technology.

A plurality of registered voters living in Utah in the past year were most comfortable with using electronic voting machines to cast their vote, while 38 percent were most comfortable using optical scanning devices.

Among those who have voted in the past year, 56 percent were most comfortable with using electronic voting technology, while 38 percent agreed that electronic voting increases the potential for fraud.

Other questions broke responses down by race and political affiliation (see http://vote.caltech.edu/Reports/fall04survey.pdf for complete results), but the scientists believe opinions will be strongly set by the November election.

"The tenor of the debate over voting technology has already been set by arguments over the past two years," says Hall, "but electronic voting hasn't been all bad.

On the other hand, says Alvarez, there have been many cases of malfunctions in the use of electronic voting systems that have resulted in votes being lost or problems at polling places. At the same time, there have been cases of electronic voting disenfranchising voters, giving certain people—as such as people with disabilities—the chance to cast a secret ballot for a candidate or her name in the write-in section.

"Much of this debate has played out among media and political elites," says Alvarez, "and our goal was to determine how the public views these issues at this point in time, in particular the tradeoffs between possible increases in accuracy relative to potential increases in either glitches or outright election fraud."

"Overall, I'd say the electorate does see increasingly favor some form of electronic voting, but it's weak. So it will be interesting to see how the November election shapes this ongoing argument."

The California Tech

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Robert Morell

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The Rock is published weekly during vacations and 28 times a year while the Associated Students of the California Institute of Technology, Inc. The opinions expressed herein are strictly those of the authors and subscribers.

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By MIKE RUPP
October 25, 2004
CaltechAthletics.com
Weekly Roundup

Athlete of the Week: Men's Water Polo's Tom Jurczak

The 6-0 Sophomore from Davisonville, Maryland was Caltech's best player this weekend. Jurczak had two close losses to SCIAC opponents Cal Lutheran and Pomona-Pitzer. Against Cal Lutheran, Jurczak had four goals, four steals, two errors drawn and an assist. Against Pomona-Pitzer, Jurczak had three goals, three steals and one assist.

Jurczak, along with Sophomore Daniel Oliver and Seniors Jason Lee and Logan Linderman, have formed the core of the team's offense this season. Jurczak will try to break the team out of its slump this Wednesday at home against La Verne. The match is set for 4:00 PM.

Sophomore Rebecca Streit continues to lead Women's Volleyball

Sophomore Outside Hitter Rebecca Streit continued to lead the Caltech Women's Volleyball team this weekend. Caltech went against West Coast Baptist College last weekend and has been losing three straight matches to La Sierra University and then to SCIAC opponents Vanguard and Cal Lutheran.

Streit led the team in kills, kills percentage, and service aces over the course of the week, and was being a 43 kill and three ace performances against La Sierra. Senior Outside Hitter Kristen Mortsen had three goals in kills and percentage, and led the team with an outstanding eight blocks for the weekend.

Caltech's best player this week in Men's Water Polo was Senior Logan Linderman and two more by Sophomore Daniel Oliver. Oliver also had two assists in that match.

Sophomore Daniel Oliver scored two more goals and had two more assists, but Caltech fell short again, losing 10-6.

Caltech's next match will be at home this Wednesday against La Verne University. The match begins at 4:00 p.m.

Political analysts like to cite Ralph Nader's candidacy as a third party's vote for a more ideological candidate rather than their ideological leader, they follow the infamous "wasted vote" theory into an area where it no longer makes sense. Unless the electorate is extensively small, perhaps a few hundred or few thousand, the chances of a candidate who won't swing the election are next to none. In a state with millions of voters, it is impossible to expect that one's vote will be the tie-breaking vote.

This is the "strategic voting" that is often studied in the scientific as a method to determine outcomes. It makes more sense than trying to determine outcomes than voting against one's principles. And even if it does work to produce better outcomes, it only makes sense if one thinks in terms of the segments of the electorate who would vote for each candidate.

But when individual voters use it to determine a "third party's vote," it is good to appeal to individual's voting decisions. If you actually support a major candidate to a significant degree, then vote for someone else while voting for him, then by all means vote for him. If you're dissatisfied with the Republican and Democratic candidates, then vote for a third party candidate that you like instead.

Your vote will count a thousand times more toward increasing the third party's vote count of tens of thousands than toward increasing a major candidate's pool of tens of millions. A drop in a bucket is more significant than a drop in an ocean, even if it's just a drop. This will send a message of protest to the major parties and a message of encouragement to the third party, especially in states where one candidate barely beats another. The big parties may then be more likely to borrow ideas from the third party in the future. And when your friends come to you and ask about your vote, they will have a chance to tell them about an otherwise unknown candidate and the ideas he represents.

Of course, it is possible to do all of this outside of the election, but political organizing and campaigning takes time and effort. On the other hand, the election is a way that has already been arranged for you to publicly express your views. It may also be the only time when the major parties and many individuals will show interest in your views.

Don't be fooled by people who tell you to vote strategically and to not waste your vote on a third party candidate. In reality, if you vote for a wasted vote if you choose a major candidate that you don't like. Your vote will make no difference at all. It will make no difference if you vote for a third party candidate, it will not change the outcome. It will not change the major party's future, and it will not let your true opinions be heard. So on Election Day, keep in mind what you're actually voting for in a candidate, not whether everyone else will vote for him.
Advocacy for Immediate Withdrawal from Iraq

By SIMON QUINE

On the morning of June 24, 2004, I read the surprising news that the “band of power” in Iraq, a.k.a. the U.S. administration, had a new plan for the country’s government. It was a two-day affair, with the new coalition government being sworn in. I hasten to add that there was no attempt to list the American regime in the sovereign statement that day.

The United Nations Security Council of course,,the current Iraq government, had a new statement from the Security Council, stating that the U.S. administration was in charge of the country. The new statement confirmed that the Iraq government was in place.

The new plan involves the U.S. administration in Iraq, with the new U.S. administration in charge of the country. The new plan involves the U.S. administration in Iraq, with the new U.S. administration in charge of the country.

Iraqi government is determined to bring freedom in Iraq. Freedom is something that the people of Iraq must discover and take up on their own initiative. It means that they should be able to control their own destiny, to decide the course that it takes. It means that they should be able to control their own destiny, to decide the course that it takes.

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ASCIT Minutes

October 18, 2004

Present: Ann Benndfeldt, Ryan Farmer, Hang Meng, Meng-mei Fu, Kelly Lin, Galen Loram, Kim Popendorff, Claire Walton, Corinna Zygourakis

Absent: Shaun Lee

Treasurer: Benndfeldt

Secretary: Galen Loram-Sandoval, Dan O'Hanlon, Boris Chen, Kevin Trotter, Keris Allrich, James Yoong, Binhui Lin

Call to Order, 12:05 PM

New/Open Positions:
1. Any new/old computer? The Doton Devteam is looking for new members to help run and maintain the doton website. Devteam members are ASCIT employees and receive a salary. If you'd like to find out more about the job, or if you are interested in interviewing for the position, email galen@caltech.edu, shaun@caltech.edu, or shaun@caltech.edu.

Money Requests:
1. Scott and June Wicks ask to take Prof. Tirtell out to lunch at the A&H. Vote: 5-0-0 (approved).
2. Dan O'Hanlon, of Lloyd House, requests $100 multi-user housing for funds tied to with Fleming. Vote: 5-0-0 (approved).
3. Kevin Trotter, of Fleming House, asks for $100 multi-user housing for laser tag event with Lloyd. Vote: 5-0-0 (approved).
4. Dan O'Hanlon, of Lloyd House, requests additional money for the annual pumpkin drop on October 31.

Suggestions for Budget Surplus:
1. Ivan La Frinere-Sandoval asks for approximately $500 to buy fitness equipment, such as dumbbells, for his new fitness club that already has several members.
2. James Yoong asks for funding to buy more video games for his new gaming club which already has 20 members.
3. Boris Chen asks for funding to start a music library with CDs (chamber music practice room) and sheet music. Galen suggests that Boris also talk to the music department and the MHH.

Other Business:
9. Kim Popendorff reports that most of the services currently located on the roof have been moved to the SAC basement such as the chamber music practice rooms, photography dark room, etc. will be relocated to other locations during the South House Renovations. Kim also reports that there are no plans to relocate the ASCIT screening room for the duration of the renovations.

10. Kim also stresses the importance of continuing to take good care of our houses, particularly in the time before the renovations. She reports that the IHC is considering the establishment of a Damage Committee with a Damage Representative from each house in order to evaluate all reported damage incidents and determine whether they should be classified as normal wear and tear, accidental damage, or willful damage. Such a committee represents a form of pro-active student self-government that reflects the students' desire to keep our houses neat.

12. This term's club checks are out! You can pick them up at Lin ky@427@caltech.edu with your name, club name, and mailbox code in order to receive your check.

15. Congratulations to the following members of the Student-Faculty Committees! Thanks to you for volunteering your time and energy to your club's check.

Congratulations to the following members of the Student-Faculty Committees! Thanks to you for volunteering your time and energy to support your club.

Biography: Vincent Auyeung*, Paul Nagui, Ziming Zhao, Tim Barnes, David McKinney, Ransom Poutryesh

Chen/Chem: Maya Sheik, Raman Shab&, Lydia Ng, Christine Chang, John Sadowski

EE/Computer: Will Coultier, Hao Ye, Michelle Wyatt, Jacob Burnim*, Arjun Bansal

EE/CS: Meng-mei Fu, Galen Loram, Andy Green, Grant Chang-Lee, Yuliya Gorlina, Nick Witt, Nick Ma*, Kate Magary, Passion McDouglas

Mac/CM: James Berglund*, Yuliya Gorlina, Nick Witt

Mech/ Aero: Kevin Monaj†, Jason Yosimiki, Joanna Cohen, Kayte Fischer

Physics, Astro, APS: Janet Sheng, Joe Wasmen, Jacob Homsick†, Vivian Ly, Adrian Anthony

Core Curriculum: Rahul Deb†, Megan Crowley, Rocky Velez, Andy Green, Grant Chang-Lee, Helena Wang, Kayte Fischer

Respectfully submitted, Corinna Zygourakis
SAND SURFERS STUDY DUNE SOUND EFFECTS

By MARK WHEELER

PASADENA, Calif.—Sliding down a sand dune on your derriere might at first seem like a bad idea, but for one professor from the California Institute of Technology, it’s all in the name of science.

Dr. Hunt and students trek up a sand dune to unload their equipment and prepare for the ride down.

Dr. Hunt and her students dragged the geophone to the top of the dune, and it was used to record the noise as the students slide down the dune. For a quick time movie, complete with sound, of students sliding down a dune, please see the website of Kathy Brantley, one of Hunt’s former students, at http://www.prettypixel.net/Dunes/index.html.

By D. WILLIAMS-HEDGES

PASADENA, Calif.—In response to the arduously slow progress in finding cures for AIDS and cancer, Caltech researchers are now investigating a promising new approach in the treatment of these diseases.

With a $1.5 million matching grant from the Skirball Foundation in New York, Caltech biologists have established the Engineering Immunity project, designed to create a novel immunological approach to treating—and even some day preventing—HIV infection and some cancers like melanoma.

The immune system provides humans with a powerful defense against infectious diseases—but sometimes, it fails. Utilizing an innovative, integrated approach, the Engineering Immunity project will combine gene therapy, stem cell biology and immune therapy to arm the immune system for treatment of these diseases and others for which the immune system currently fails to provide defense.

Caltech President David Baltimore, who won the Nobel Prize in 1975 for his work in virology and cancer research, stated, “The Engineering Immunity project advocates a new approach to therapy for AIDS and cancer with revolutionary implications for the treatment of these and many other diseases. It is an innovative research project that holds special significance for the future of biomedical sciences.”

In the fight against HIV, the viruses that causes AIDS, T-cell immunity and T-cell-focused therapies are what vaccines have been mostly used, while the viruses that cause other diseases have been widely investigated and pursued. However, antibodies often provide the best protection against viruses and virtually all vaccines for other viral diseases are designed to elicit antibody-based immunity. Antibodies against HIV do appear during HIV infections, but heretofore, they had not been able to provide therapeutic advantage to most patients. Rare neutralizing antibodies have been identified, but have not proven valuable because a general way to elicit their production in all patients has not been found. Moreover, most of them are effective only at very high concentrations that are hard to maintain in a person by conventional means. Thus, early attempts to elicit antibody-based immunity against HIV have largely failed.

The Engineering Immunity integrated methodology involves utilizing retroviruses, which are natural carriers of genes. Retrovirus vectors will be produced that encode antibodies found to be effective against HIV. Utilizing retroviruses, the Baltimore Laboratory at Caltech, in collaboration with Caltech structural biologist Pamela Bjorkman, will introduce specific genes into stem cells. These genes will encode specificity molecules on the immune cells, thereby arming the immune cells to kill selected agents or cells, i.e., the cells that are growing HIV or particular cancer cells.

The Engineering Immunity initiative will provide a new route to the production of antibodies with therapeutic and even protective, ability for a potential cure of AIDS, melanoma and other diseases ultimately.

The Skirball Foundation, an independent foundation created in 1950 by Jack H. Skirball, is dedicated primarily to medical research and care, educational and social needs of disadvantaged children and advancing the highest values of the Jewish heritage. Among the many institutions that the Foundation has supported are the Skirball Children’s Center, the Salt Lake County Family Clinic and the Jewish Childcare Association in New York City.

Intriguing questions, says Hunt and it ties into her research concerning the flow of particulates and granular materials, including the natural environment of both sand and debris flows. Which is why she has spent the last few summers investigating the phenomenon of sand dune sound as a mentor with Caltech’s Summer Undergraduate Research Fellows (SURF) program. (Every summer, the SURF program brings undergraduate students from various schools to Caltech to conduct independent research with faculty members.)

With a full summer budget, Hunt, her research colleague, mechanical engineering professor Chris Brennen and her students make the long drive to the Eureka Dunes in Death Valley, California, or the Dunes at the Salton Sea, or to the Kelso Dunes near Mojave, CA. Once there, they plug up to the dune’s crest line, caving a radar unit, geophones (a type of microphone) and lots of water to combat the common 100-plus degree temperatures.

The equipment is being used to confirm Hunt’s theory about the sound that’s generated—it believes it’s a resonance effect, much like a string being plucked on a musical instrument. Over a long period of time, whatever rain that falls in this desert environment percolates into the sand, eventually forming a band of moisture some two meters (3.3 feet) deep. In time this sand hardens, says Hunt, forming a hard, cement-like crust. When the sand on the surface is disturbed, friction between sand grains creates a noise that reverberates, back and forth, between the dry sand on the surface and the wet sand below.
ME72 to be Extended

Continued from Page 1, Column 2

biology and engineering. To conduct much of the research, Dickinson and his group constructed and utilized many devices to help them study the flight of insects. Last month they high-speed cameras used today record data at 6000 frames per second, compared to most cameras that record at 30 frames per second. To use these cam­

ers, Professor Dickinson and his group initially built a “fly-o­

ram” a one-meter diameter cyli­

nder for flies to fly in. They im­

aged the flies with infrared light.

Flies tend to fly in straight lines with sharp, almost 90-degree turns that are called saccades. With just a few wing-strokes, the flies are able to complete such a sharp turn, quite an astonishing feat compared to most human­

motions. Dickinson noted that this peak speed requires a large turning radius.

Professor Dickinson noted that it “looked like the flies have an internal clock to make saccades and it seems like the brain is taking control of the fly.”

Although Huo had planned to take the class, the recent alterna­
tions have been disappointing. “I’ve known about the competi­tion, but I decided not to spend 72 hours doing this course and go out into the real world,” she said. The cur­

rent format of the course, though, added another factor that could improve its appeal.

Huo, a junior, said that ME72 was a strong motivating factor in his choice to major in mechanical engineering. Originally, the course was “probably the best thing that [the student] department] had, the most public­

cized and one of the reasons that people respect the ME major,” he said.

“At the major is the flight simulator, or the combination of that with the course work. At this point, we are in the final round for discontinuing the course,” Professor Dickinson noted, who helped fund Professor Berryman’s “landing” and “takeoff” research.

Dickinson noted that it is not certain why halteres evolved and it is a concern for Eddins. In its place, mechanical engineers in what they call the “landing” and “takeoff” motors on the possible cancellation of the course. Could the updated ME72 students prepare to face off in the final round of last year’s ME72 competition.