General Faculty move to require student laptop ownership

Michael Hagearty
Institute Communications and Public Affairs

A proposal to require future Georgia Tech students to own laptop computers was met with approval during last week's meeting of the General Faculty Assembly and Academic Senate.

In the end, said Electrical and Computer Engineering Professor Jim McNeill, it formalizes a trend his committee has observed among incoming students during the past three years. “This fall, 88 percent of the students bought laptops, up from 78 percent the previous year,” said the chair of the Student Computer Ownership Committee. “When you look at all of the students in housing, the numbers are lower (58 percent in Spring 2006) but they are increasing quickly. It’s clear where this is headed.”

Many of the traditional concerns, such as the higher cost of a laptop, are not consistent with ResNet surveys conducted annually among incoming freshmen. In fact, the cost of the laptop recommended to students by ResNet is in line with what students are paying for machines under the current computer ownership policy.

On its potential as a student distraction, he pointed out this “attractive nuisance” already exists, whether among students who already bring

Research suggests fluid dynamics works on nanoscale in real world

David Terraso
Institute Communications and Public Affairs

Understanding the motion of fluids is the basis for a tremendous amount of engineering and technology in contemporary life. Planes fly and ships sail because scientists understand the rules of how fluids like water and air behave under varying conditions. The mathematical principles that describe these rules were put forth more than 100 years ago and are known as the Navier-Stokes equations. They are well-known and understood by any scientist or student in the field. But now that researchers are delving into the realm of the small, an important question has arisen: namely, how do these rules work when fluids and flows are measured on the nanoscale? Do the same rules apply or, given that the behavior of materials in this size regime often has little to do with their macro-sized cousins, are there new rules to be discovered?

In 2000, Georgia Tech researchers showed that fluid dynamics theory could be modified to work on the nanoscale, albeit in a vacuum. Now, seven years later they’ve shown that it can be modified to work in the real world, too — that is, outside of a vacuum. The results appear in the February 9 issue of Physical Review Letters (PRL).

It’s well-known that small systems are influenced by randomness and noise more than large systems — because of this, Georgia Tech physicist Uzi Landman reasoned that modifying the Navier-Stokes equations to include stochastic elements — that is, giving the probability that an event will occur — would allow them to accurately describe the behavior of liquids in the nanoscale regime.

Writing in the Aug. 18, 2000, issue of Science, Landman and postdoctoral fellow Michael Moseler used computer simulation experiments to show that the stochastic Navier-Stokes formulation does work for fluid nanochannels and nanobridges in a vacuum. The theoretical predictions of this early work have been confirmed experimentally by a team of European scientists (Dec. 13, 2006 issue of PRL).

Library and Information Center wins national award for excellence

For its “impressive five-year transformation into the heart and soul of the community,” the Association of College and Research Libraries (ACRL) has recognized Georgia Tech’s Library and Information Center with its 2007 Excellence in Academic Libraries Award.

The award is a validation of the Library’s strategic plan, crafted with both librarian and staff participation, reinventing its approach to the learning and research missions of the Institute.

“This isbin Academnic Libraries Award is a national tribute to a library and its staff for the outstanding services, programs and leadership they provide to their students, administrators, faculty and community,” said ACRL Executive Director Mary Ellen Davis.

In striving to be the intellectual center of the campus and the community, the Library staff forged partnerships, both with student groups and colleagues in the Office of Information Technology (OIT) and the Center for the Enhancement of Teaching and Learning (CETL), developing the physical space and the learning resources within.

“The library staff was guided by students and faculty throughout the design and implementation of engaging and creative new services to improve student learning,” said Frances Maloy, who chaired the ACRL’s selection committee.

The committee cited the Library’s imaginative use of public space for two information commons, a cafe, a presentation room and a multimedia center, transforming the Library into a place where the community gathers. Programs such as CoLibriation during Freshman Welcome Week and Tuesday Talks, a lecture series showcasing faculty research, invite the community to the Library.

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"Instead of being deaf, dumb, and blind sitting on our desks or in our pockets, our computers might be able to observe what we do all day, understand what is important to us, and act as a virtual assistant that helps us on a second-by-second basis."

—Thad Starner, an associate professor in the School of Interactive Computing, on the emerging field of pervasive computing. (CNN.com)

In five years, the Georgia Tech Library and Information Center has taken dramatic steps to change the way it provides services to students. Among the improvements:

- **Library West Commons (Fall 2002)**
  In partnership with the Office of Information Technology (OIT), library staff created the General Productivity and Multimedia Center to provide an aesthetically stimulating environment with information and technology assistance in a 24-hour setting.

- **Presentation Rehearsal Studio (Spring 2004)**
  Responding to student feedback, the Library installed custom accommodations for student teams practicing for major presentations.

- **Resource Center (Spring 2006)**
  Created a single-stop location for academic support services such as tutoring, advising and technical support.

- **East Commons (Fall 2006)**
  Further collaboration with OIT and students led to enhanced study zones (shown, left) and performance spaces, as well as a café and exhibit space.

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Library staff have forged a new model for the 21st century research library. "I'd like to thank every member of the Library staff and faculty and our OIT and CETL colleagues who participate so effectively to advance the programs of the Library," Dean Richard Meyer said. "This award reflects your hard work, creative energy and commitment to the programs of Georgia Tech." The Library staff are planning to host a celebratory event in April.

Students gather in one of the flexible study spaces in the East Commons, the most recent programmatic change in a rapid transformation of library services.

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Now, Landman and graduate student Wei Kang have discovered that by further modifying the Moseler-Landman stochastic Navier-Stokes equations, they can accurately describe this behavior in a realistic non-vacuous environment.

"There was a strong opinion that fluid dynamics theory would stop being valid for small systems," said Landman. "Regents professor and director of the Center for Computational Materials Science. "It was thought that all you could do was perform extensive, as well as expensive, molecular dynamic simulations or experiments, and that continuum fluid dynamics theory could not be applied to explain the behavior of such small systems."

In both studies, Landman simulated a liquid propane bridge, which is a slender fluid structure connecting two larger bodies of liquid, much like a liquid channel connecting two rain puddles. The bridge was six nanometers in diameter and 24 nanometers long. The object was to study how the bridge collapses.

**Under pressure**

In the study performed in 2000, the collapse was in a vacuum. The bridge broke in a symmetrical fashion, pinching in the middle. This time, the simulation focused on a model with a nitrogen gas environment surrounding the bridge at different gas pressures. When the gas pressure was low (under 2 atmospheres of nitrogen), the breaking occurred in much the same way it did in the previous vacuum computer experiment. But when the pressure was sufficiently high (above 2.5 atmospheres), the bridge tended to create a long thread and break asymmetrically on one side or the other of the thread instead of in the middle. Until now, such a collapse configuration has been discussed only for macroscopically large liquid bridges and jets.

"If the bridge is in a vacuum, molecules evaporating from the bridge are sucked away and do not come back," said Landman. "But if there are gas molecules surrounding the bridge, some of the molecules that evaporate will collide with the gas, and due to these collisions the scattered molecules may change direction and come back to the nanobridge and condense on it."

As they return they may fill in spaces where other atoms have evaporated. In other words, the evaporation-condensation processes serve to redistribute the liquid propane along the nanobridge, resulting in an asymmetric shape of the breakage. The higher the pressure is surrounding the bridge, the higher the probability that the evaporating atoms will collide with the gas and condense on the nanobridge. Landman and Wei have shown that these microscopic processes can be included in the stochastic hydrodynamic Navier-Stokes equations, and that the newly modified equations reproduce faithfully the results of their atomic molecular dynamics experiments.

"Knowing that the hydrodynamic theory, that is the basis of venerable technologies around us, can be extended to the nanoscale is fundamentally significant, and a big relief," said Landman. "Particularly so, now that we have been able to use it to describe the behavior of nanofluids in a non-vacuous environment — since we expect that this is where most future applications would occur."

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explore how academia and industry can empower today’s computing workforce with an expansive knowledge base that can be applied across multiple disciplines and geographic boundaries in order to achieve success in an integrated, dynamic and globally competitive world.

When asked the difference between computer science and computing, School of Interactive Computing Professor Mark Guzdial said, “Computing is applying computer science to other problems. The curriculum implications are enormous — it’s like a new form of literacy — to think about computing for everyone. What does it mean to make computer science useful to liberal arts majors?”

“To me computer science has an interesting stigma among the student body,” said Vanessa Lazo, third-year computer science and management student. “To me, computer science is not as exciting as computing because in computing you apply what you learn to healthcare or other areas and it is tied into our everyday lives.”

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