

## Undergraduate Research/Bem Atim

- By: Daniel Bates



Bem Atim (left) and Kent Harries

**This engineering student collaborated on Pitt research that may lead to stronger, safer bridges and other structures**

*This is the last in a series of Pitt Chronicle articles profiling outstanding University of Pittsburgh undergraduate researchers*

One day last summer, Kent Harries gathered a team of University of Pittsburgh student-researchers from his lab and drove to Washington, Pa., where, several months before, an overpass had collapsed onto Route 70 East.

The University and Harries, a professor in the Pitt School of Engineering's Department of Civil and Environmental Engineering, had been awarded a contract by the Pennsylvania

Department of Transportation (PennDOT) to conduct a forensic investigation of the structural failure of the bridge, whose collapse had caused major traffic headaches, though no injuries.

Among the students who methodically investigated the bridge scene—examining the corrosion of metal reinforcement bars (rebars) within the bridge’s concrete beams, checking for concrete deterioration, taking lots of photos—was Bem Atim, whose neat and precise handwriting earned him the job of serving as the team’s official note taker, among his other duties.

Atim was interning as an undergraduate researcher in the engineering school’s Watkins-Haggart Structural Engineering Laboratory, where Harries conducts much of his research. Among Harries’ research interests are the seismic design and retrofit of building structures; the design and behavior of high-rises; and the use of nontraditional materials in bridges, roads, and other structures.

This exacting summary of Harries’ work doesn’t do justice to its potential for shoring up America’s infrastructure—or to its coolness, according to Harries. “How can you not get excited about big things breaking?” the extroverted professor asks, with a laugh. “Who doesn’t get excited about breaking huge concrete beams and cutting them up? We’re engineering geeks.”

Harries’ enthusiasm rubbed off on Atim, inspiring him to change his major last year from mechanical to civil and environmental engineering.

In a way, that change reconnected Atim with his own roots as an engineering geek. As a child, he had been fascinated by airplanes, trains, and subways. “I just liked how they worked and that they moved a lot for something so large,” the Pittsburgh native recalls. “When I lived in Atlanta, for instance, I would fuss if I didn’t get to ride the Metro.” (Given his soft-spoken demeanor, it’s challenging to imagine Atim fussing about *anything*, so that tells you something about his passion for engineering.)

Also as a child, Atim enjoyed building bridges and other structures out of K’NEX building blocks and connectors, created by the makers of Tinker Toys™. Beginning when he was in the third grade and for every Christmas thereafter, Atim’s parents bought him larger and larger K’NEX sets.

“I built everything in the manuals,” he remembers.

Atim attributes much of his intellectual curiosity to his family’s influence. His mother is a chemist. His father, originally from Nigeria, is an engineer by training. Most inspiring, Atim says, was his maternal grandfather, who taught himself algebra and the Japanese language despite not having earned a high school diploma.

Atim spent the summer after his sophomore year as an intern with Federal Express. His assignment: helping manage a building project. The Fed Ex internship gave Atim hands-

on experience with the complexities of project management. “It introduced me to how corporate America works,” he says. “I did learn to become more of a ‘people person,’ but I wanted to do something more technical, and that [Fed Ex internship] was more about management than design.”

In fall 2005, Atim attended a presentation by Christopher Earls, then-chair of Pitt’s civil and environmental engineering department. “It was a very convincing speech,” Atim remembers. “He joked that civil engineers are terrible drivers because they’re always staring up at bridge decks.”

After describing the prototypical, preoccupied civil engineer, the department chair asked the audience: “Is that you?”

Atim thought: “Yes. That’s me.”

Soon thereafter, Atim was introduced to Harries, who offered Atim a summer research internship in his lab. Among the projects in which Atim participated was a PennDOT-funded study investigating the effectiveness of square metal binding sleeves in splicing together separate steel rebars in concrete.

PennDOT asked the team to come up with ways to test the structural integrity of the connectors for spliced rebar. PennDOT would then use the research findings to determine whether to include the connectors on its list of approved products. Harries says that finding better ways to splice rebars remains important to PennDOT and transportation departments as they repair concrete road and bridge surfaces.

Over last summer, the Pitt team tested two types of splices, using special machines to pull the bars apart. Atim and other team members conducted fatigue tests, which required repetitive pulling, and tests to determine the breaking point for the rebars and connectors. They also studied the behaviors of connectors in concrete beams and slabs. At the end of the summer, the team detailed its findings in a lengthy report to PennDOT.

Harries is quick to point out that his research team does not make purchasing recommendations to PennDOT regarding the products it tests. But Pitt research findings are critical to PennDOT’s ongoing quality control and assurance objectives, he says.

For his work in Harries’ lab, Atim received a Best Summer Research Project award from the Pitt engineering school’s Excellence in Engineering (EXCEL) program.

As Atim’s mentor, Harries talked with the younger man about potential graduate school and professional opportunities.

“Bem was really trying to figure out what he was going to do [with his career], and we had long talks about what he wanted,” Harries says. “I wanted to give him an opportunity to see what graduate school would be like, and he worked out very well.”

Atim says he found that “research is frustrating in the sense that there’s a lot you have to learn on your own. It made me realize just what would be expected of me with research in graduate school.”

For the next two years, though, graduate school will have to wait while Atim teaches high school mathematics in the Chicago area through the Teach for America program, which trains recent college graduates to teach children in low-income urban and rural communities.

Harries hopes that Atim, who graduated from Pitt April 29 with the highest grade-point average in his class in the Department of Civil and Environmental Engineering, will return to Pitt’s engineering school as a graduate student once his teaching stint is over.

In the meantime, Harries has no doubts about Atim’s grasp of mathematics and engineering, or his ability to impart that knowledge to others. “I watched him with the other students,” the professor says of Atim. “He knows his stuff.”