Education Development in Emerging Transportation Research

Alice Grossman, Yanzhi (Ann) Xu, Randall Guensler

March 24, 2014

STRIDE | Southeastern Transportation Research, Innovation, Development and Education Center

Why Educational Development

- Reach out to students who are interested in transportation from a young age to foster ambition and knowledge
- Educational initiatives with students who are not aware of the opportunities transportation engineering has to offer can inspire and encourage children and young adults to pursue their interests in relation to the field

Goals

To instill upon students:

- How to collect and analyze data
- What types of research design, critical thinking, and planning go into transportation research
- The general idea that transportation engineering is a wide field suited to people of many difference skill sets
- Develop research plans

Georgia Tech College of Engineering
School of Civil & Environmental Engineering

Objectives

- Show students that Engineering is an accessible discipline
- Cultivate social responsibility among students
- Encourage young women and minorities to consider Engineering
- Give students an overview of areas of transportation engineering
- Showcase real-world applications of project-based learning
- Provide volunteer opportunities for undergraduate and graduate level students

Georgia Tech College of Engineering
School of Civil & Environmental Engineering

Partnership
Centennial Place Academy

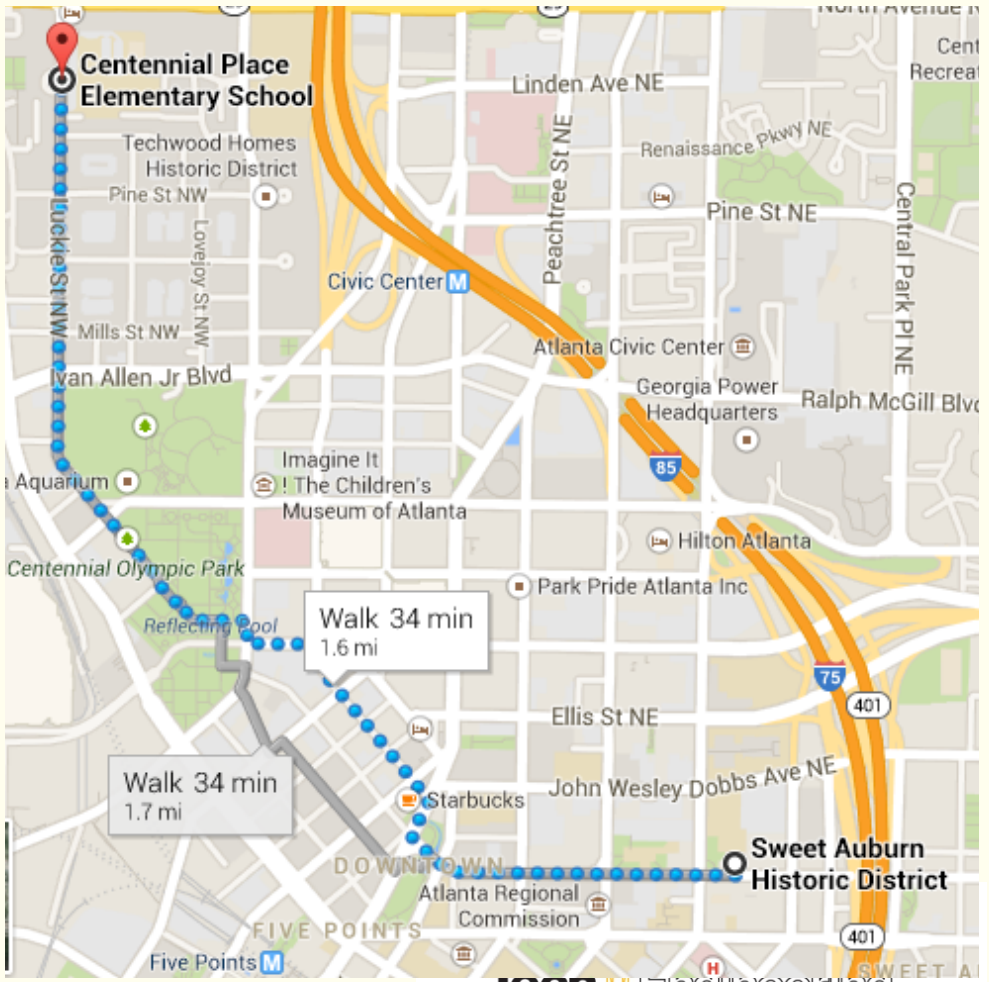
- 86% African American, 5% Caucasian, 2% Asian, 3% Hispanic, 4% Multi Racial
- 71% Free and Reduced Lunch
- Draws student population from the Centennial Place neighborhood and surrounding communities including two shelters
- 1st Atlanta Public School system conversion charter
- Emphasis on ***project-based learning***

Georgia Tech College of Engineering
School of Civil & Environmental Engineering

How do you get to your school?

Objective: Cultivate social responsibility among students

- **Hands-on data collection experience in the community**
- **Observations of accessibility for persons with limited mobility**



Engineering as an Accessible Discipline

Objective: Show students (especially K-12 aged) that Engineering is an accessible discipline that

- **Encompasses many aspects of everyday life and**
- **Includes many different skill sets such as**
  - **Mathematics**
  - **Presentations**
  - **Communication**
  - **Critical thinking**
  - **Organization and planning**
  - **The ability to work in teams**

Georgia Tech College of Engineering
School of Civil & Environmental Engineering

K-12 Initiative at Centennial Place Academy

- Four two-hour long sessions at the Centennial Place Academy
- Researchers will travel to Centennial Place Elementary once each quarter to lead the sessions
- Teachers and Georgia Tech students will work with students in data collection and analysis techniques in between sessions

K-12 Programming

- Session 1: Background and Overview
  - Presentation to full group
  - Rotating small group activities stations that the students will visit in smaller groups
- Session 2: Pedestrian data collection
  - Materials and procedure development
  - Sidewalk and Pedestrian activity data collection
- Interim work: Continue data collection efforts
- Session 3: Basic data analysis
  - Data organization and chart building in Excel and by hand
  - Simple statistical calculations

K-12 Programming

- Interim work
  - Centennial teachers Georgia Tech students will assist the 5th graders in preparing presentations of their work
- Session 4: Centennial Student Presentations
  - 5th graders will present to their peers, teachers, and GT researchers

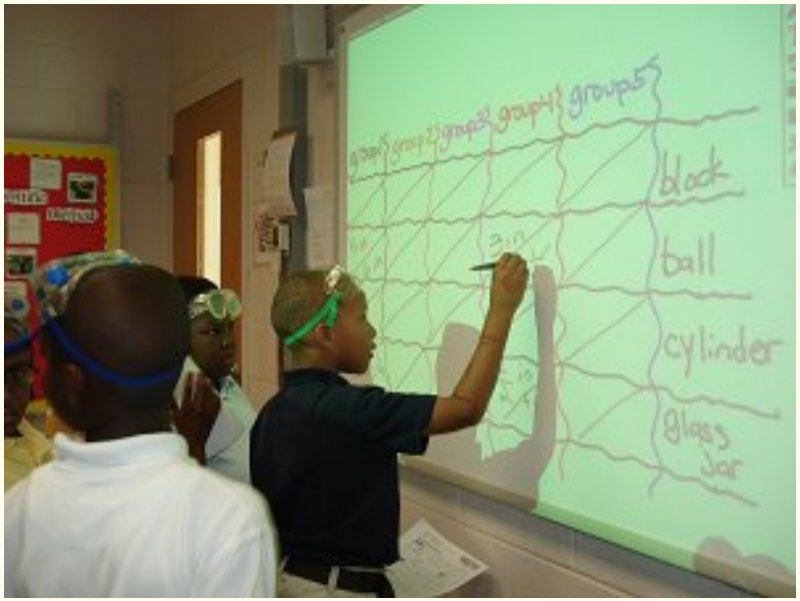


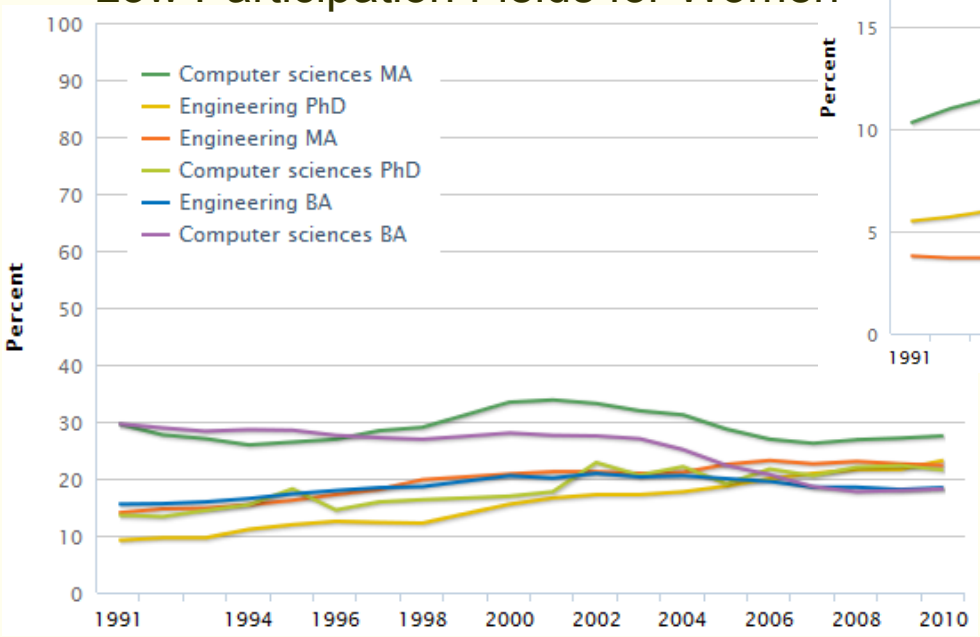
Image courtesy of Atlanta Public Schools

Georgia Tech College of Engineering
School of Civil & Environmental Engineering

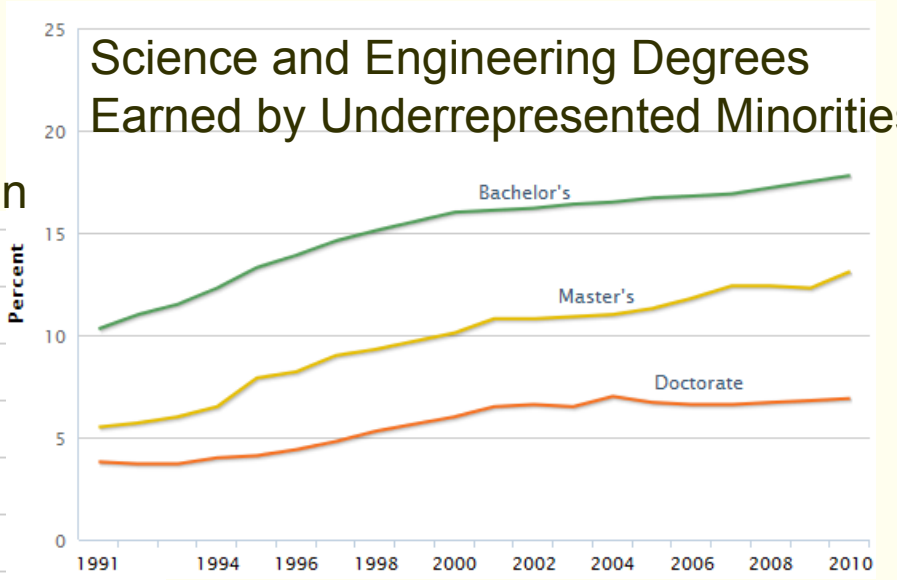
Encouraging Women and Minorities

Encourage young women and minorities to consider Engineering from a young age

Low Participation Fields for Women



Science and Engineering Degrees Earned by Underrepresented Minorities



Charts from nsf.gov
NOTE: Data not available for 1999
SOURCE: Women, Minorities, and Persons with Disabilities in Science in Engineering

Gives an Overview of the Field

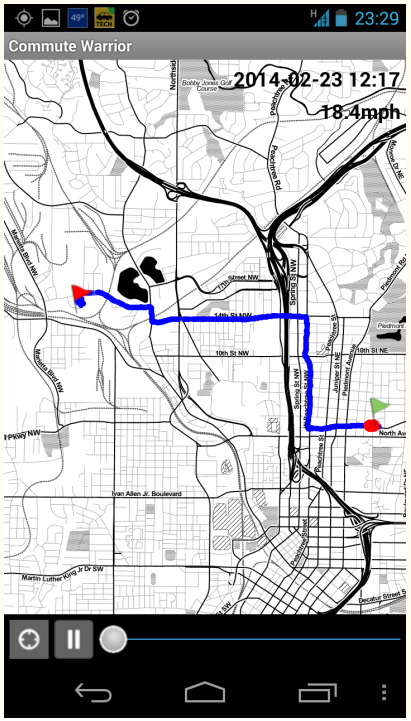
- **Objective: Give students an overview of areas of transportation engineering including various measurement tools across different transportation modes**

GT Honors College Programming

- New course in development for Fall 2014
- Open to all undergraduate Honors College students
- Small class size (20 students max)
- Weekly in-class lecture/discussion
- Weekly field work component
- Topics: transportation, accessibility, research methods

Data Collection and Analysis

Objective: Showcase real-world applications of project-based learning, with an emphasis on students collecting and analyzing their own data



Mapping, recording trips, and collecting field data with smart phone and tablet technologies allow students to easily collect and look at their own data

Provide Volunteer Opportunities

Objective: Provide volunteer opportunities for high school, undergraduate and graduate level students in data collection and

Gives a basis for future outreach and educational activities

Georgia Institute of Technology

High School Community Service Initiative

Do your community service with Georgia Tech!

Help make Atlanta a more *walkable* city

Impact on the Community

- Sidewalks are a **community** resource
- **Everyone** walks
- More than **10%** of Americans report walking as their primary mode of transportation
- **Teens**, kids, elderly people, and people with disabilities benefit enormously from more walkable communities
- Walking is one of the most **sustainable** modes of transportation
- About 25% of Atlanta sidewalks and curbs need to be **replaced**
- Narrow, uneven, and obstructed sidewalks affect everyone in the **community**
- Improving our sidewalks is a big step to making our communities **safer** and more **livable**
- Sidewalks **connect** people to other modes of transportation inlcuding public transit and surface parking lots

How does the project affect YOU?

Colleges and **employers** like to see work with research university labs and dedication to your community. You can add both to your resume at once!

YOU TOO use sidwalks. A more walkable city benefits everyone.

This is an opportunity to do your community service out-doors, and in small groups, getting excercise and seeing the city as you go.

Find out more and reserve your spot now!

Alice Grossman:
(404) 385 2376
sidewalks@ce.gatech.edu

Pamphlet sent out to High School students through councilors

Georgia Institute of Technology

Georgia Tech College of Engineering
School of Civil & Environmental Engineering

Who's Involved

- Leaders/Mentors at Georgia Tech
  - Professors
  - Research Engineers
  - Graduate Research Assistants
  - Undergraduate Students
- Students/Mentees
  - 5th graders at Centennial Elementary
  - High school students at Decatur High School
  - Undergraduate students at Georgia Tech

Georgia Tech College of Engineering
School of Civil & Environmental Engineering

Outreach to Students

- **Elementary school administration**
- **High school community service initiative**
- **Undergraduate email blasts and paper flyers**

Flyer sent to University students

Elementary and High School Activities

Initiatives include field visits to elementary and high schools with indoor and outdoor activities such as

- Transportation data collection such as vehicle counting and sidewalk quality assessment using smart phone and tablet technology to
- Data analysis with prose, maps, and graphs to presentation giving of methodologies and findings.
- Familiarization with accessibility issues by using manually powered wheelchairs on school property looking at transportation infrastructure, specifically sidewalks, for persons with disabilities.

Georgia Tech College of Engineering
School of Civil & Environmental Engineering

Field Visits

- Level: Elementary School and high school
- Researchers travel to local high school and elementary schools to do activities in the classroom and in the field with the students
- Students come to Georgia Tech's campus to see the lab facilities and University campus

Research Plans

- Level: Elementary, High school, Undergrad
- Discus what question or problem the research is addressing
- Make simple procedure and materials list for projects
- Carry out data deployment plans
- Analyze data

Students from Decatur High School optimize and map out their routes for sidewalk data collection

Experience with Technology

- Level: Elementary School, High School, Undergrad
- Projects include using the newest smart phones and tablets for data collection
- Data analysis uses standard software and familiarizes students with computational methods

Sidewalk Sentry Application recording sidewalk video, GPS, and vibration data.

Traffic counting application screen shot

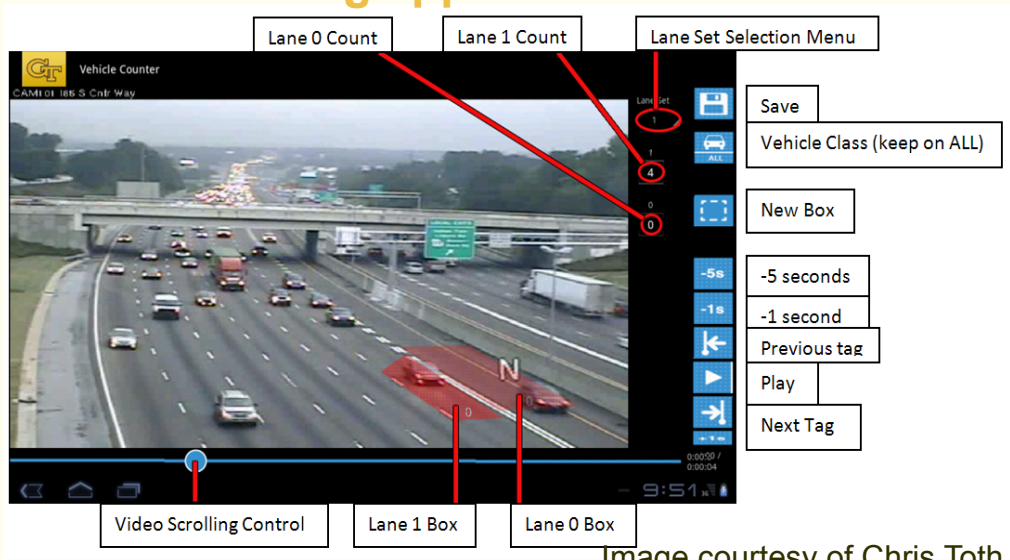
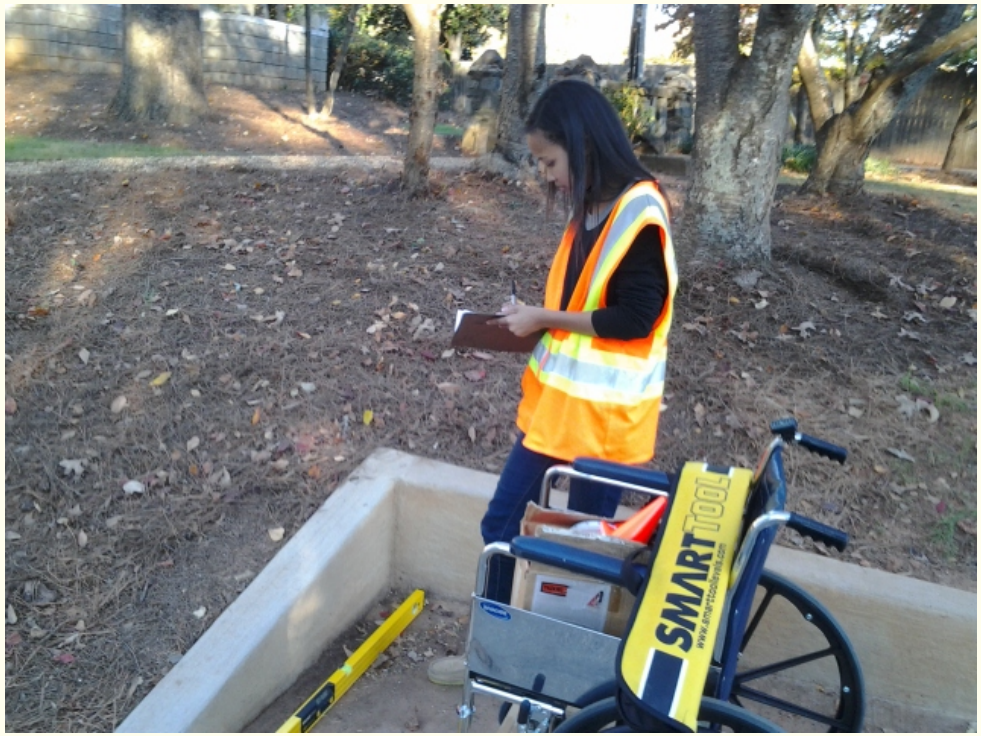


Image courtesy of Chris Toth

Data Collection

- Level: Elementary School, High School, Undergrad
- Vehicle counting with tablet app,
- Trip tracking with Commute Warrior app
- Sidewalk quality assessment with hand measurements and tablet app



Georgia Tech College of Engineering
School of Civil & Environmental Engineering

Data Analysis

Level: Elementary School, High School, Undergrad

- **Data analysis with prose, maps, and graphs**

Public Outreach

Level: Undergrad

- Undergrad students help with volunteer training and attending neighborhood meetings to call for volunteers and keep community members informed

Graduate and undergraduate researchers train community volunteers on how to conduct sidewalk data collection

Mentorship

Level: Undergrad

- **Undergrad students attend field visits to high school and elementary schools to work with younger students**

Georgia Tech College of Engineering
School of Civil & Environmental Engineering

Conclusions

Thank You

We would also like to acknowledge the research team members working on Vehicle counting, Sidewalk Sentry, Sidewalk Scout, and Commute Warrior related projects: Alper Akanser, Felipe Castrillon, Vetri Elango, Alexandra Frackelton, Sara Khoeini, Andreas Nagel, Evangelos Palinginis, Komal Poddar, Ramik Sadana, Adnan Sheikh, Christopher Toth