Building a Sidewalk Inventory and Prioritization System

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http://transportation.ce.gatech.edu/sidewalk
Introduction

- Importance of high-quality pedestrian infrastructure
  - Pedestrian trip generation
  - Public health
  - Safety, accessibility and quality of life
  - Sustainability

(Photo: City of Atlanta Office of Planning)
Overview

- Design and operating characteristics of sidewalks affect safety, mobility and accessibility
- Pedestrian planning requires sidewalk inventories, condition assessment, and prioritization of repairs
- This research project will:
  - Deploy an expert system to collect sidewalk video and sensor readings
  - Establish a Sidewalk Quality Index to assess current facilities and prioritize future repairs
  - Develop a system to prioritize sidewalk repairs
Pedestrian Facility Data Needs

- Compliance with the Americans with Disabilities Act (1990)
- Accurate infrastructure data are needed to properly plan for existing and future pedestrian facilities
- A system is needed to prioritize sidewalk repairs given limited resources

Image: City of Bellevue (WA)
Pedestrian Infrastructure Quality

- Pedestrian quality of service indicators:
  - Sidewalk presence
  - Sidewalk width and buffers
  - Amenities
  - Safety and security

- ADA guidelines
  - Sidewalk width, curb ramp design, smooth surfaces (pavement material), gaps/changes in level, grade and cross-slope
  - ADA-related case law that indicates city responsibility for maintenance
Examples of Sidewalk Problems

- Obstructions within the pedestrian route
- Uneven sidewalk surfaces due to tree encroachment
- Insufficient vertical clearance

Photos: City of Atlanta Department of Planning and Community Development
Pedestrian Facility Assessment

- GPS-based walkability audits, perception surveys, pedestrian LOS models, walkability indices
- Issues with current methods
  - Subjective evaluation
  - Labor intensive

PDA used to collect sidewalk data (University of Oregon)
Research Goals and Objective

● Basic research goals:
  – Standardize data collection methods
  – Objective data evaluation with consistent results
  – Low cost implementation

● Establish a process to automatically assess sidewalk quality utilizing indicators from literature, ADA guidelines, and field data

● Develop a baseline dataset for Atlanta

● Implement a supplemental system to prioritize repairs and plan new construction
City of Atlanta – Primary Study Area

- Transportation mode share
  - 4% walk to work
  - 13% transit to work
- ~2200 mile sidewalk system
- $130 million repair backlog
- ADA and injury-related lawsuits have become a significant cost burden

Downtown Atlanta
( Photo: City of Atlanta Office of Planning)
Sidewalk Assessment System

- Android tablet application attached to a basic wheelchair
- Post-processing
  - Sidewalk width
  - Crack density
  - Surface roughness
  - Surface discontinuities
  - Presence of obstructions
  - Absence of ramps
  - Grade and cross-slope

(Photo: City of Atlanta Office of Planning)
Vehicle Detection and Tracking
Video Post-Processing

- Sidewalk width
- Crack density
- Stationary obstructions
- Etc.
Sidewalk Quality Expert Survey

- Experts and stakeholders rate and rank sidewalks
- Stakeholders identify their criteria
- Statistical analyses link rankings to objective data
Expert Survey Status

- Data and video for 40+ sidewalk segments
- Representing a range of quality conditions
- Expert survey begins April 16th
- Potential for expansion
- Potential for ongoing implementation
Stakeholders: Engagement and Outreach

- Present research to public agencies, community organizations, and local professionals
- Implement outreach plan to solicit volunteers for widespread deployment
  - Neighborhood planning units (NPUs)
  - High schools
  - Other community groups
GIS and Web Interface Integration

- GPS positioning enables map integration of sidewalk quality data
- OpenStreetMap web interface makes data accessible
Prioritization of Repairs...

Density of pedestrian-vehicle crashes in Atlanta (2000-2008)

Downtown, Midtown, Peachtree Street, Buckhead, Buford Highway, Piedmont Road, etc.

Transit stations, parks, schools, etc.
Summary

- Data collection will serve as a baseline for local, regional, and statewide sidewalk inventories
- Potential for broad national application
- Ongoing research:
  - Prioritization process for sidewalk repair
  - Linkages to pedestrian infrastructure planning
  - Possible use of the Pace supercomputer cluster for data processing
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