PEDESTRIANS AND BICYCLISTS COUNT

DEVELOPING A STATEWIDE MULTIMODAL COUNT PROGRAM

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OVERVIEW

- Why Count Pedestrians and Bicyclists?
- LTRC Project 16-4SA: Pedestrians and Bicyclists Count
  - Objectives
  - Methods
  - Case Studies
  - Draft Findings
  - Draft Recommendations
- Next Steps and Data Applications
WHY COUNT PEDESTRIANS AND BICYCLISTS?
WHY COUNT?

- To track changes in overall transportation trends over time
- To better understand travel patterns and existing demand
- To plan for and prioritize future infrastructure investments
- To evaluate impacts of previous investments
- To benchmark progress toward policy goals
- To meet federal expectations for data-driven decision-making and performance evaluation

“The best way to improve transportation networks for any mode is to collect and analyze trip data to optimize investments. Walking and bicycling trip data for many communities are lacking. This data gap can be overcome by establishing routine collection of non-motorized trip information.”

- United States Department of Transportation Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations, 2010
LTRC PROJECT 16-4SA: PEDESTRIANS AND BICYCLISTS COUNT

DEVELOPING A STATEWIDE MULTIMODAL COUNT PROGRAM
PEDESTRIANS AND BICYCLISTS COUNT: BACKGROUND

- Louisiana’s Complete Streets Advisory Committee: bike/ped data collection recommended policy implementation action
- Existing **New Orleans Regional Bike/Ped Count Program** (Pedestrian Bicycle Resource Initiative w/NORPC): Successful initiative demonstrating usefulness of multimodal data collection, but relies on manual counts and difficult to scale up efficiently
- DOTD recognized need for improved data to evaluate statewide and project/corridor-level safety, relative to increasing # of people walking and bicycling
- Emerging area of research! Limited national guidance, few states with coordinated multimodal count programs → **opportunity for Louisiana to lead**
- **Research project funded by LTRC** in 2016 to provide guidance for DOTD + local govts and MPOs to develop integrated, cost-effective count programs
PEDESTRIANS AND BICYCLISTS COUNT: OBJECTIVES

1. To research established and emerging methodologies for counting bicycles and pedestrians and identify best practices for statewide count programs
2. To evaluate available count technology equipment options and identify preferred alternatives suitable for statewide deployment
3. To identify potential funding sources for the implementation of a multimodal count program and opportunities to integrate active transportation counts into existing vehicular count programs
PEDESTRIANS AND BICYCLISTS COUNT: METHODS

1. Literature Review: What is the current state of the practice in bike/ped data collection and benchmarking, particularly in context of safety evaluation and policy benchmarking?

2. Exploration of Count Methods: Methodologies, existing and emerging technologies, alternative/supplemental data sources, identification of best practices for statewide application

3. Identify funding sources: what funding opportunities exist for state, regional, local programs, how can they be integrated with motor vehicle count programs, what regulatory & policy measures can be implemented to support Complete Streets goals?

4. Case Studies: Put research into practice! Pilot evaluation of impacts of Complete Streets interventions at 3 locations (including coordination with LTRC Video Count project)

5. Develop Final Report/Guide to (phased, scalable, integrated) program implementation
FINDINGS: CURRENT STATE OF THE PRACTICE

- Evaluated 50+ state, regional, local count programs
- Only a handful of states with coordinated programs: Colorado, North Carolina, Washington, Vermont
- Variety of methods currently in use – not “one size fits all” – tailor program to specific goals and constraints
- Emerging body of national guidance documenting best practices:
  - NCHRP Report 797 (2014)
  - FHWA Bicycle-Pedestrian Count Technology Pilot Project (2016)
  - Current research on estimating areawide and facility-specific ped/bike risk/exposure (TTI 2017/18)
FINDINGS: METHODS AND TECHNOLOGIES

- Evaluated 40+ products/vendors
- Area of rapid change! “Traditional” tech tailored to bike/ped applications still dominates (infrared, pneumatic tube, and inductive loop counters)
- Several promising emerging technologies under development or in pilot use – many based on automated video image processing technology
- All technologies have limitations! Established programs tend to incorporate multiple methods and tools based on context; phase in new tech over time → adapt!
FINDINGS: PROGRAM IMPLEMENTATION

- Data needs are different for pedestrians and bicyclists than for motor vehicles:
  - longer data collection period
  - increased sensitivity to environmental factors
  - less predictable behavior
  - QA/QC protocols must be adapted

- State leadership + interjurisdictional outreach and partnerships are needed: most streets where people walk and bike are local (but disproportionate share of crashes may occur on state roads)

- Clear best practice: begin establishing strategic permanent count locations for various “factor groups” from which to contextualize and adjust short-term counts

Data source: New Orleans Pedestrian and Bicycle Count Report 2017
FINDINGS: PROGRAM FUNDING AND SUPPORT

- Research and interviews to evaluate potential program implementation costs and funding sources:
  - Capital, maintenance, operational expenses; Staffing needs; Vendors and contractors
  - Potential federal, state, local, private resources in use

- **Key State-level investments:**
  - Initial planning/program development (research funds/university partnerships common)
  - Capital costs for equipment, and installation especially permanent (one-time grant or budget allocation)
  - More modest operational costs for long-term counts and support for local partnerships/coordination (absorbed into DOT budget)

- Many federal funding sources can potentially support bike/ped data collection activities, according to FHWA (and some states!)
- Phased approach is typical; one-time philanthropic partnership (e.g. Kaiser Permanente in Colorado) often key to initial equipment purchase
- Few jurisdictions fully house bike/ped count programs with vehicle counts due to divergent data needs and objectives (but many coordinate closely)
- Use of independent contractors/full-service vendors increasingly common
- Successful programs rely on interjurisdictional partnerships: establish protocols and guidance to allow collaborative programs; ensure compatible data
FINDINGS: AUTOMATED VIDEO-IMAGE COUNTING (LTRC)

- Literature review suggests that though this is a newer area of research, applications are promising.
- Potential to solve some of primary challenges in the field – counting where infrastructure is sub-optimal, intersection counts, understanding conflicts, all modes.
- Lots of traffic cameras already installed, but few at locations appropriate for bike/ped monitoring.
- Promises to become the most cost-effective method for accurate short-term counts; already 'gold-standard' for validating other tech (via manual analysis) - Cameras are becoming more affordable, but processing software still proprietary, expensive.
- 3 key parts of algorithm: Motion detection, tracking, user classification.
- Case study and related field data collection with LTRC algorithm yielded limited success/high error rates, highlighted technical challenges (viewpoint angle and consistency, background richness, occlusion, lighting).
- Additional research underway to improve preliminary results.
CASE STUDY FINDINGS: PILOT DATA COLLECTION

- Case study outline submitted to PRC, feedback received with greatest support for 3 count locations:
  - Tulane Avenue (New Orleans)
  - Esplanade Avenue (New Orleans)
  - Government Street (Baton Rouge)
- Existing UNO Count Equipment from EcoCounter supplemented with additional pneumatic and infrared sensor devices to facilitate bi-directional counts for sidewalk and on-street bikeways (delay due to procurement time)
- Background data and planning
- Data calibration/validation protocol
- Objective: 2 weeks high-quality data per site
- Concurrent camera installation w/LTRC team (mixed results!)
Tulane Avenue, New Orleans, June/July 2017

- State Road, Dedicated bike lane completed 2017
- Objective: measure baseline usage of new facility
- Key challenge: maintenance! Heavy vehicle damage

TULANE AVENUE - SUMMARY COUNT DATA (Raw)
Tulane Avenue, New Orleans, June/July 2017

- **Validation Counts:**
  - Pedestrians – 96% accuracy, (occlusion errors, + 5% systemic undercount outside sensor area)
  - Bicyclists – 100% accuracy ( + 18% systemic undercount outside sensor area – sidewalk & bike lane obstructions)

- **Bike/Ped Crashes:**
  - PBRI data (short term manual counts) indicates 34% increase in bicycle, 39% decrease in pedestrian activity on corridor since 2013
  - Crash data for 5 years before intervention indicates consistent safety concerns for all modes, including several fatal and severe crashes
CASE STUDY FINDINGS: ESPLANADE AVENUE, NEW ORLEANS

Esplanade Ave, New Orleans, Aug/Sept 2017

- Local Road, Dedicated bike lane completed 2013
- Objective: Develop adjustment factors to contextualize 7 years manual count data
- Key challenges: Site selection and obstructions, weather

![Chart of ESPLANADE AVENUE - SUMMARY COUNT DATA (Raw)]

Case Study Location 2: Esplanade Avenue, New Orleans, Sept 2017
Validation Counts:
- Pedestrians – 91.5% accuracy, (occlusion errors, 0% systemic undercount outside sensor area)
- Bicyclists – 97.5% accuracy (+ 5% systemic undercount outside sensor area)

Bike/Ped Crashes: Findings encouraging, but inconclusive
- PBRI data (short term manual counts) indicates 250% increase in bicycle, 123% increase in pedestrian activity on corridor since 2010
- Crash data for 3 years before and after intervention (2013 excluded for construction) indicates 183% increase in bicycle crashes, 20% increase in pedestrian crashes.
- CAUTION: total numbers are too small for statistical reliability

Bonus: Use of permanent counter (Jeff Davis) to develop improved estimates for bike/ped AADT
CASE STUDY FINDINGS: GOVERNMENT STREET, BATON ROUGE

Government St, New Orleans, Oct/Nov 2017

- State Road → Local Road, Dedicated bike lane planned
- Objective: Test data collection capability in challenging pre-intervention context, provide baseline data for project evaluation
- Key challenge: installation, active user travel behavior

GOVERNMENT STREET - SUMMARY COUNT DATA (Raw)
CASE STUDY FINDINGS: GOVERNMENT STREET, BATON ROUGE

- Validation Counts: (4 hrs manual + 15 hrs video review)
  - Pedestrians – 98% NET accuracy, (+/- systemic undercount due to occlusion + OVERcount due to bikes on sidewalk) Bicyclists – 100% accuracy 4-hr manual review (but + 60% systemic undercount outside sensor area);
  - Secondary video validation indicates that tube damage impacted accuracy of one unit in 2nd week of data collection – significant systemic overcount = malfunction

- Bike/Ped Crashes:
  - Crash data project area for 5 years before intervention (2012-2016)
  - Very high crash totals (though no fatal and few severe injury crashes during data period)
  - Sample too small for statistical analysis, but presence of bike/ped crashes despite low user volumes suggests hazardous conditions
NEXT STEPS

PUTTING BICYCLE AND PEDESTRIAN DATA TO WORK
CASE STUDY SYNTHESIS: DATA APPLICATIONS FRAMEWORK

- Final Report includes:
  - Supplementary data to contextualize short-term count findings + inventory of data needs
  - *Preliminary* adjustment factors (modified AASHTO method) and suggested factor groups for typical Louisiana contexts based on PBRI long-term data sets
  - Draft cost-benefit analysis/ROI framework to evaluate investment impact (not enough data at this stage to fully run model for any case study location/project)
  - Preliminary guidance how count data can be used in corridor-level exposure analysis (pending forthcoming FHWA guidance, anticipated late 2018)

- LIMITATIONS
  - estimating exposure and calculating ROI fully require more data (direct counts, travel survey, etc) than currently available; additional research needed
  - report reflects sketch planning estimates only in this phase
FINAL STEPS, PHASE I: GUIDE TO STATEWIDE MULTI-MODAL COUNTS

- Synthesis of findings to create program development, funding, and implementation guide for flexible, coordinated state, regional, and local pedestrian and bicycle counts
  - Recommendations for initiating multi-modal counts at various scales and levels of government
  - Recommended technological solutions for various street contexts
  - Cost estimates and funding source ideas
  - Recommended non-motorized data storage, use, and QA/QC protocols for inter-jurisdictional data coordination and reliability
- Putting the Data to Work → initial recommendations for using count data to:
  - Evaluate project and system-wide performance (including safety)
  - Benchmark Complete Streets policy implementation
  - Fortify & calibrate long-range planning efforts with new data and tools
- Project concludes in May 2018
Continuous, long-term data is key foundation for any program, most applications. Start small if needed, but start soon!

Array of different tech solutions appropriate for different contexts – programs should evolve over time, flexible to include multiple data sources

Full integration with vehicle count programs is uncommon due to divergent objectives, timelines, sensitivities – focus on coordination and communication; build capacity and/or insist on contractors with bike/ped expertise

Make multimodal data collection routine part of complete streets project planning and delivery! (Hard to effectively evaluate without baseline data)
NEXT STEPS: RECOMMENDATIONS FOR FUTURE RESEARCH

- Expansion of long-term continuous datasets → development of adjustment factors for multiple factor groups
- Pilot program for hard-to-count physical contexts using emerging technology
- Continued development of automated video-image count methods
- Pending national guidance (late 2018), continued refinement of exposure and safety analysis framework and approach
- Continue analysis of complete streets intervention outcomes, especially state-involved projects (e.g. Tulane, Government)
THANK YOU!

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