Field Testing Evaluation of Pedestrian/Bicycle Counters

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Project Background

- SWUTC project conducted by the Texas Transportation Institute (TTI)
- Project objective: evaluate accuracy and reliability of automated ped/bike counters
- Comparative and quantitative analysis

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Introduction

- Growing need to measure/forecast ped/bike volumes
- Some products available, but information is lacking relative to vehicle counters
- Comparison of current products helps potential users to make informed decisions

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Counter #1

- Infrared
- Marketed for trails, outdoor walkways, commercial areas
- Total volumes, time-stamped individual counts, binned counts, direction of travel

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Counter #2

- Infrared (thermal)
- Marketed especially for nature/hiking trails; small size easily camouflaged
- Total volumes, time-stamped individual counts

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Counter #3

- Break-beam (reflector target)
- Intended for long-term installations on trails in remote areas
- Total volume counts only

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Study Site Selection

- Sufficient ped/bike traffic volumes
- Consistent shade coverage
- Location to install the counters

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Study Sites

Site #	City	Location	Date of Study Period	Time of Study Period
1	College Station	Wolf Pen Creek Trail	7/6/06	8:00 am – 12:00 pm
2	College Station	Texas A&M University Student Rec. Center	9/15/06	7:30 am – 11:30 am
3	Austin	Town Lake Pedestrian Bridge	10/13/06	7:30 am – 11:30 am

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Data Collection

- Synchronized clocks on each unit
- Installed counters

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Data Collection

- Synchronized clocks on each unit
- Installed counters
- Set up camcorder

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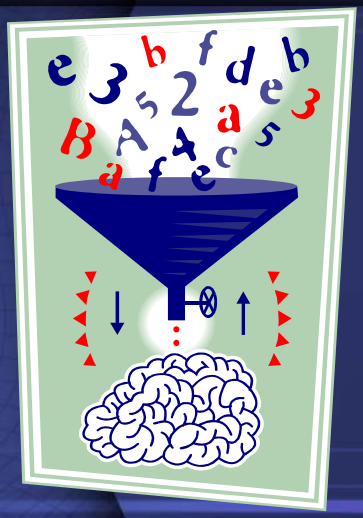
Data Reduction



- Downloaded counter data
- Reviewed video
- Compared with counter data based on timestamps

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Controlled Tests (Site 1)

- Target speed (5)
- Group spacing (1 to 5 ft)
- Target distance (10, 30, 40, 50 ft)
- Mounting height (3 to 5 ft)

- 30 passes (15 in each direction)

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Field Tests (Sites 2&3)

- Count of 470/327 at Site 2
- No noticeable problems with shade or conspicuity

- Count of 970 at Site 3
- No noticeable problems with sunlight
- High number of groups posed challenge

Calculation of Error Rates

- $$\text{Overall Error Rate (\%)} = \frac{(\text{test device count} - \text{ground truth count})}{\text{ground truth count}}$$

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Calculation of Error Rates

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- $$\text{Missed Detection Error Rate (\%)} = \frac{\text{count of missed detections}}{\text{ground truth count}}$$
- $$\text{False Detection Error Rate (\%)} = \frac{\text{count of false detections}}{\text{ground truth count}}$$

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Findings (Controlled Tests)

- Baseline walking – no errors
- Baseline bicycling (10 mph) –
  - Counter 1 -97% error
  - Counter 2 0% error
- Group spacing –
  - Counter 1: 4 ft
  - Counter 2: >5 ft
  - Counter 3: 2 ft

Findings (Controlled Tests)

- Target speed –
  - Jogging OK
  - Stopping overcounted (7-43%)
  - Running undercounted (20-67%)
- Bicycle speed – missed >5-10 mph
- Detection range – Counter 3 OK 30-50 ft, all within ranges specified by vendor

Findings (Site 2)

- Overall error rate
  - Counter 1: -34%
  - Counter 2: -11%
  - Counter 3: -7%
- False detections ~ 0%
- Counter 2 had a lower error rate for most categories, especially bicycles

Findings (Site 3)

- Overall error rate
  - Counter 1: -36%
  - Counter 2: -26%
  - Counter 3: -24%
- False detections ~ 0%
- Counters 1 & 2 missed 52% of groups; Counter 2 errors <5% for others

Conclusions

- Walking: OK
- Counter 1: Difficulty with bikes, average with groups, good user interface
- Counter 2: Some difficulty with bikes, fair with groups, very inconspicuous
- Counter 3: Good performance in controlled tests, good overall error rate, no timestamps, long-term use

Questions?

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