Pedestrian Data Collection Issues & Techniques

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Overview

- Problem statement
- Data collection process
- State of the art and practice
- Prototype system

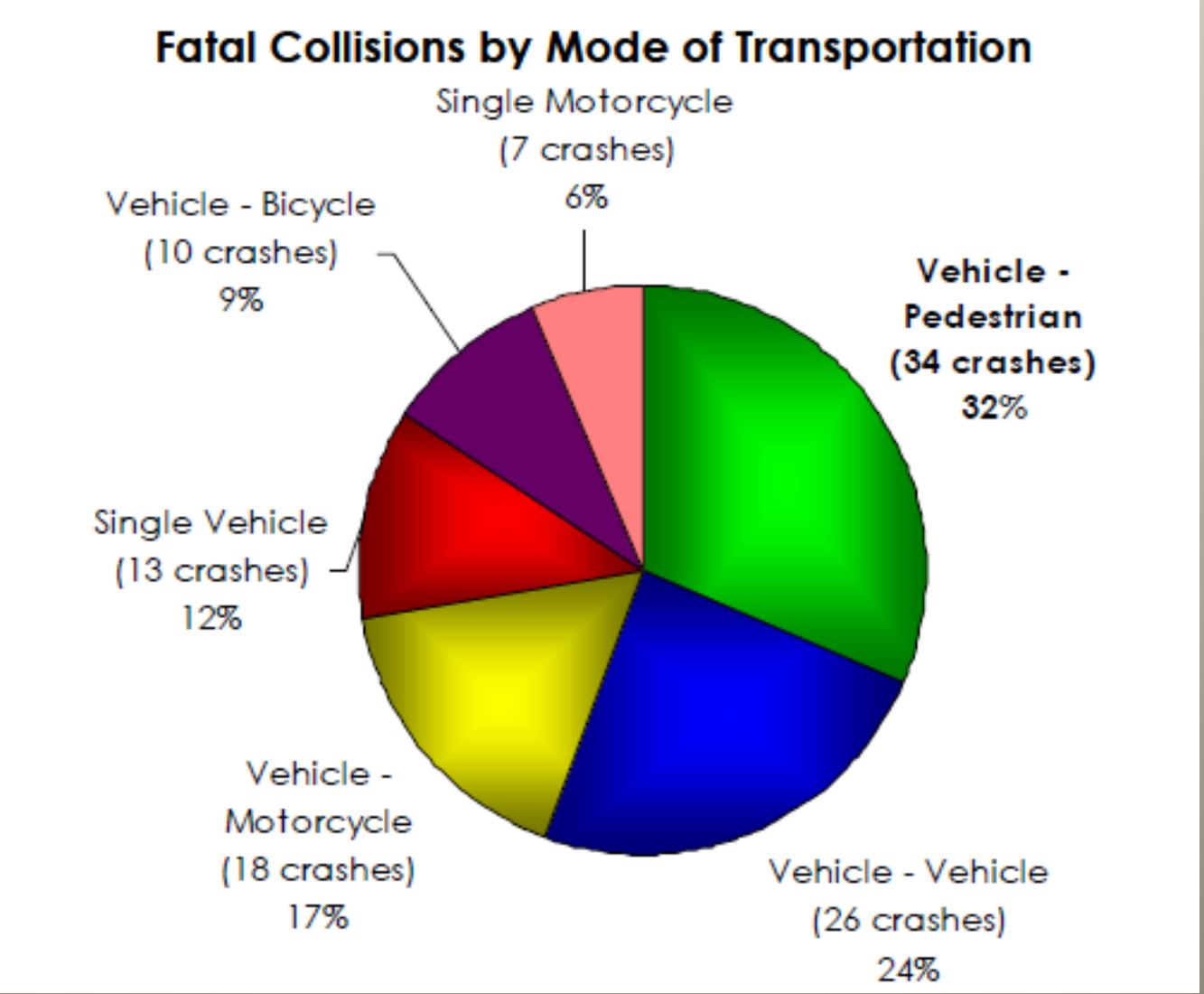
Pedestrian Data

- National data (2010)
  - 4,280 pedestrian fatalities
    - 13 % of total roadway related fatalities
    - 72% Urban environment
    - 69% Nighttime

Pedestrian Data

- Arizona (2012)
  - 1,565 pedestrians Crashes
    - 1,162 No Apparent Chemical Influence
    - 818 Daylight
  - 132 Pedestrians Killed (16% of all fatalities)
    - 34 No Apparent Chemical Influence
    - 75 Crossing Road
    - 101 Dark (lighted / not lighted / dark unknown)

Phoenix


Fatal Collisions by Mode of Transportation
Single Motorcycle
(7 crashes)
6%
Vehicle - Bicycle
(10 crashes)
9%
Vehicle -
Pedestrian
(34 crashes)
32%
Single Vehicle
(13 crashes)
12%
Vehicle -
Motorcycle
(18 crashes)
17%
Vehicle - Vehicle
(26 crashes)
24%

Case Example

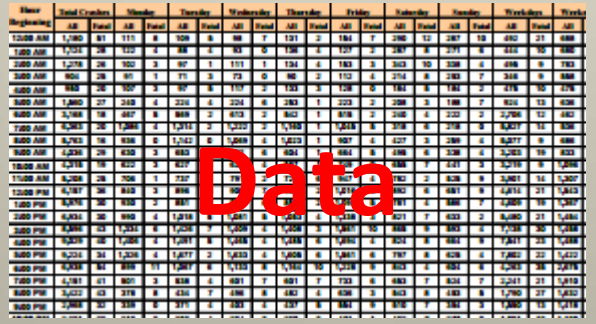
- November 2009 - Flagstaff, Arizona
  - Male with young daughter hit by bus while crossing crosswalk (Nighttime)
- September 2010 – Phoenix, Arizona
  - Female hit by car (making left turn) while crossing in crosswalk (signalized intersection, nighttime)

What can be done to improve safety?

Vehicular Traffic

Volume

Speed



Vehicle Classification

Position

Pedestrian Data

- Pedestrian traffic often understudied in favor of motorized modes of transportation
- Lack reliable data (volume, exposure – collision risk)
- Pedestrians data not widely available
  - Difficulties evaluating safety performance of new or existing pedestrian crossing facilities
  - Less efficient use of limited funds
- Lack standard methodology for conducting pedestrians counts

Pedestrian data collection systems

- The main methods are:
  - **manual field observations,**
  - manual observations from videos,
  - automated data collection / analysis.

Manual Data Collection

Limitations:

- Does not capture naturalistic pedestrian movement (?)
- Short-term data (1-4 hours) then extrapolation
- Time consuming
- Resource intensive
- Error-prone

Advantage:

Minimal equipment needs

Pedestrian data collection systems

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  - **manual observations from videos,**
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Big S.T.E.V.E


ECONOLITE
City of Phoenix
Street Transportation Department
S.T.E.V.E.
Traffic Data Collection
Speed Classification
Vehicle Classification
Turning Movement Counts
Pedestrian Counts
Event Management
Incident Management
032149
City of Phoenix
STREET TRANSPORTATION DEPARTMENT
S.T.E.V.E.
Study Traffic and Events using Video to Evaluate
Autoscope
DCMS
For Official Use Only
032149

Mini S.T.E.V.E


City of Phoenix
For Official Use Only
233225
STREET
TRANSPORTATION

Video footage

40th St at Danbury
Phoenix

Indian School Rd at 30th St.
Phoenix

City of Phoenix

Manual Observation from Video

- Equipment acquisition and installation
- Maintenance costs
- Time consuming

Pedestrian data collection systems

- The main methods are:
  - manual field observations,
  - manual observations from videos,
  - **automated data collection/analysis.**

Automated data collection/analysis

Radar

Advantages

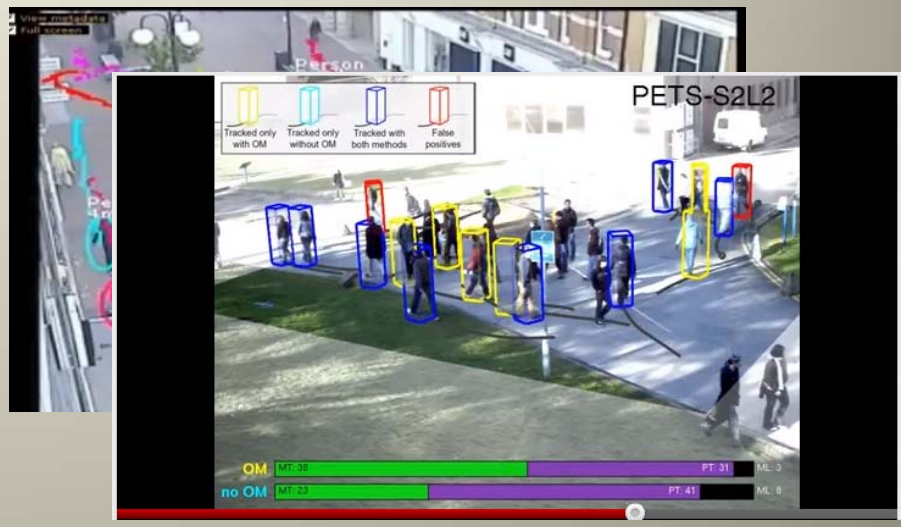
- Detect and retain large quantities of information in a short time
- Operates in all weather
- Possible to link several sensors
- Data delivery evaluated at any time (online or from data base)
- Measurements highly reliable and accurate

Disadvantages

- Cost
- Battery
- Limited radius 15 m

New technology in pedestrian data collection

Video – Image processing



Advantages

- High quality
- High accuracy
- Software technology use for processing and grouping
- Real time detection

Disadvantages

- Complexity of pedestrian tracking
- Programming involved

Automated Video – Image processing system prototype

Requirements

Method

System Users

- Record real-life images of site (Video)
- Cover areas surrounding dedicated crosswalk and vehicular approach
- Easy to install with minimum modification to new / existing pedestrian facilities e.g. PHB
- Trigger event: pedestrian presence (even if pedestrian did not activate system)
- Flexible pedestrian detection zone
- Connect detection system with video system (different manufactory)

Automated Video – Image processing system prototype

Requirements

Method

System Users

- @ trigger, captures images of pedestrians & vehicles within established area
- Record up to X seconds prior to pedestrian being detected
- Minimize amount of equipment
- IP transmission
- Storage data management and maintenance
- Develop open - ended system to allow image-data processing in future

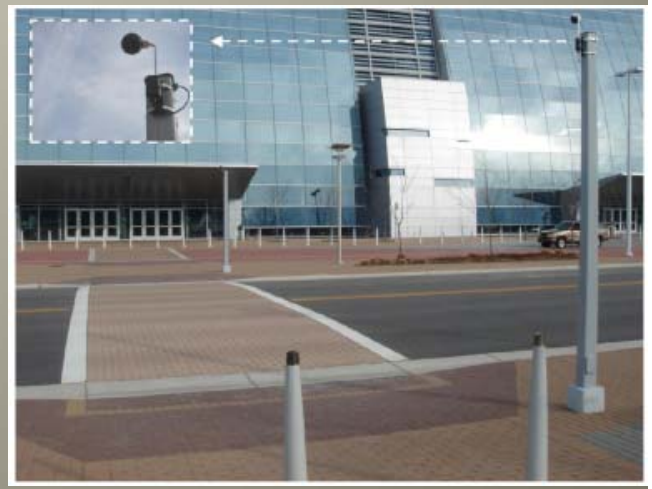
Automated Video – Image processing system prototype

Requirements

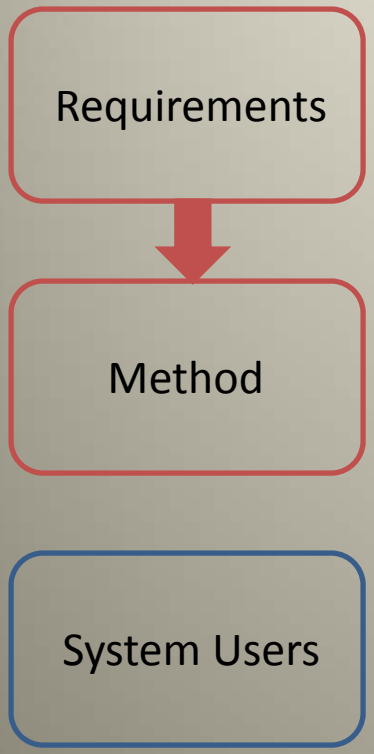
Method

System Users

- External storage location
- Semi – automated data analysis
  - Photogrammetry approach to evaluate vehicle approach speed
  - Aftermarket methodology

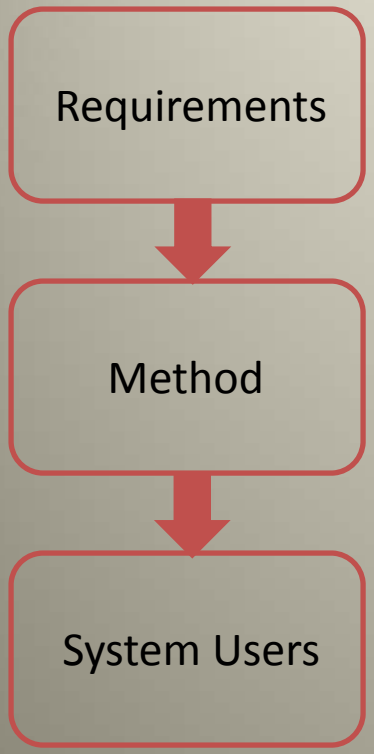


Automated Video – Image processing system prototype



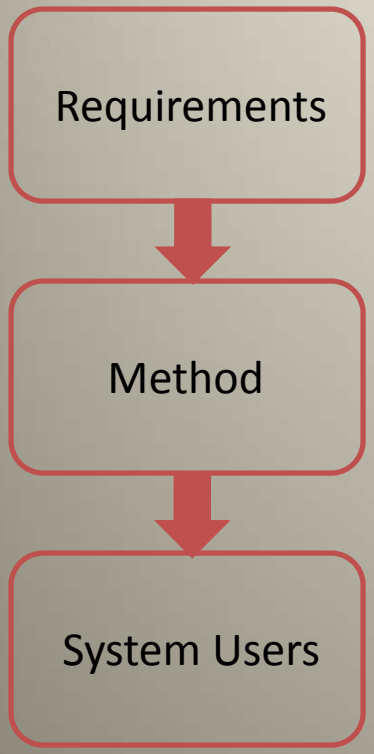
- Automated pedestrian detection system
  - Use aftermarket detection system (e.g. SafeWalk or C-Walk, others)
- Video recording systems
  - Use aftermarket image capture system (CCTV, Autoscope, others)
    - Pedestrian recording
    - Vehicular movement recording

Arizona prototype for a low-cost pedestrian data collection system



- # of drivers who did and did not yield to pedestrians in crosswalks
- # of vehicle/pedestrian conflicts that involved evasive action taken by driver or pedestrian
- # of pedestrians trapped at centerline by drivers failing to yield
- % of drivers who yielded within an established range

Arizona prototype for a low-cost pedestrian data collection system



- # of drivers who passed or attempted to pass stopped vehicle
- # of drivers in following vehicles who engaged in hard braking behind stopped car
- # of pedestrians who did not activate the system
- Distance from selected crosswalk that pedestrians crossed (if not within the selected system)
- “Head-checks”
- Ped. characteristics
- Other data possible….

Questions ?


the new DON'T WALK signal
the new WALK signal
"... he didn't notice that the lights had changed..."