Pedestrian and cycling counters – South East Queensland

Measure it so we can manage it

Monitoring Cycle and Pedestrian Network Usage

Robyn Davies for Michael Langdon
Queensland Transport
Integrated Transport Planning Division

Walk 21 Conference
October 2008
Who we are

- Queensland Transport
- Integrated Transport Planning Division – develops transport plans and strategies for state of Queensland
Who We Are

- Active Transport Planning Unit – strategically plans and provides for cycling and pedestrian transport
SEQ Principal Cycle Network

- **Existing**
- **Future**

245km

140km
Why acquire and manage data?

- To know how the network is performing
- To guide investment and enhancement decisions
- To demonstrate how the network is delivering the desired community and Government outcomes
Bicycle and Pedestrian Data Issues

- Currently, major barriers to gathering better demand/usage data are cost and effort:
  - Counts and surveys are labour-intensive
  - Mechanical counting technology is more difficult to apply to bicycles and pedestrians than to motorised vehicles
  - To date, little incentive for investment in bicycle & pedestrian counting technologies

Data collection recommendations

- Ideal is a combination of **regular field monitoring to obtain volume patterns** combined with occasional surveys to collect more detailed data on origin-destination patterns, user characteristics, etc.

  U.S. Department of Transportation, Bureau of Transportation Statistics, 2000, Bicycle and Pedestrian Data: Sources, Needs, & Gaps, BTS00-02, Washington, DC

- **Local authorities install:**
  - at least one permanent automatic traffic counter at a control site where flows are high
  - permanent or temporary sites to count cycles at two or more other sites where measures to promote walking & cycling are being introduced.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Trigger</th>
<th>Limiting factors</th>
<th>Implications</th>
<th>Bike</th>
<th>Ped</th>
<th>Car</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microwave</td>
<td>Receives a beam reflection after hitting an object</td>
<td>Software required for interpretation</td>
<td>Accuracy dependant on software interpretation</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Ultrasonic</td>
<td>Receives a beam reflection after hitting an object</td>
<td>Software required for interpretation</td>
<td>Accuracy dependant on software interpretation</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Acoustic</td>
<td>Receives a beam reflection after hitting an object</td>
<td>Software required for interpretation</td>
<td>Accuracy dependant on software interpretation</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Radio Beam</td>
<td>Receives a beam reflection after hitting an object</td>
<td>Software required for interpretation</td>
<td>Accuracy dependant on software interpretation</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Pressure Mat/ Acoustic slab</td>
<td>Acoustic footprint</td>
<td>Not detailed enough for individual classifications</td>
<td>Inconsistently may also detect bicycles</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Video image</td>
<td>Image change</td>
<td>Software required for interpretation</td>
<td>Accuracy dependant on software interpretation</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Piezoelectric film</td>
<td>Pressure on the film</td>
<td>Not detailed enough for individual classifications</td>
<td>Cannot detect pedestrians</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Passive infrared</td>
<td>Heat signature detected crossing the beam</td>
<td>Not detailed enough for individual classifications</td>
<td>May detect large animals with no differentiation</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Active infrared</td>
<td>Receives a beam reflection after hitting an object</td>
<td>Software required for interpretation</td>
<td>Accuracy dependant on software interpretation</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Passive optical</td>
<td>Light levels in a narrow field of view</td>
<td>Can only operate during daylight hours</td>
<td>Unsuitable for overcast conditions</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Magnetic</td>
<td>Metal object passing over</td>
<td>Not detailed enough for individual classifications</td>
<td>Cannot detect pedestrians or non-metal bicycles</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Inductive loops</td>
<td>Metal object passing over</td>
<td>Not detailed enough for individual classifications</td>
<td>Cannot detect pedestrians or non-metal bicycles</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Pneumatic tubes</td>
<td>Pressure on the tube</td>
<td>Not detailed enough for individual classifications</td>
<td>Cannot detect pedestrians</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Motion sensitive still frame camera</td>
<td>Movement of an object in front of the camera</td>
<td>Software required for interpretation</td>
<td>Accuracy dependant on software interpretation</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

But there are so many! Which one?
What were our requirements?

- An automated counter that:
  - provided separate directional counts of both pedestrians and cyclists
  - provided twenty-four (24) hour counts, with total counts at minimum fifteen (15) minute intervals
  - reduced likelihood of mischievously enhanced counts or vandalism (invisible)
  - could be powered by both battery and mains/solar power
  - could be installed on existing infrastructure
  - allowed remote access for data retrieval (GSM Modem or similar)
  - provided a data output file that was either simple to use (reformat/analyze) or complicated but was already in use by local governments and Main Roads
  - was not cost prohibitive for smaller projects (<$100,000)
Table 2: Brisbane City Council automated pedestrian/cyclist counter key criteria evaluation of off the shelf technology

<table>
<thead>
<tr>
<th>Key Criteria</th>
<th>The Tracker</th>
<th>The Scanner</th>
<th>Chambers RBBP</th>
<th>MetroCount 5600</th>
<th>MetroCount 5710</th>
<th>C&amp;A induction loop</th>
<th>INID PeopleStats 3D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Must distinguish between pedestrians and cyclists.</td>
<td>X</td>
<td>X</td>
<td>✓</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>✓</td>
</tr>
<tr>
<td>2. Can send data to client automatically via modem.</td>
<td>X</td>
<td>X</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>✓</td>
</tr>
<tr>
<td>3. Data output must be compatible with Microsoft Excel or another standard program.</td>
<td>X</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>4. Must count in 15 minute intervals as a minimum.</td>
<td>X</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>5. Should be able to be powered to mains electricity/solar power.</td>
<td>X</td>
<td>X</td>
<td>12 Volt converter</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>✓</td>
</tr>
<tr>
<td>6. Record direction and speed of travel if required.</td>
<td>X</td>
<td>Direction Only</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Direction Only</td>
<td>✓</td>
</tr>
<tr>
<td>7. Provide a tamper proof installation kit.</td>
<td>X</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>8. Be reasonably priced for purchase, installation and maintenance.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>X</td>
</tr>
</tbody>
</table>
We created our own prototype using...

- MetroCount box
- Piezo electric strips
- Ped sensor – IRISYS system (used for shopper tracking)
- Plug-in box
- Telemetry solution (in Australia, Telstra’s ‘Next G’ GSM modem & sim card)
- Write program to transmit data
- Computer set up to receive data
MetroCount

MC5710 Installation Guidelines

MetroCount 5710 with MSI BL Piezo Sensor

MSI Roadtrax BL Sensor

Source: 2007 Cycle Congress, presentation given by Peter Pennisi, Director, Pentagon Systems, 23 November 2007
Pedestrian Counter

Taken from 2007 Cycle Congress, presentation given by Peter Pennisi, Director, Pentagon Systems, 23 November 2007
<table>
<thead>
<tr>
<th>COUNT</th>
<th>Count line 1 (IN)</th>
<th>Count line 2 (OUT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Taken from 2007 Cycle Congress, presentation given by Peter Pennisi, Director, Pentagon Systems, 23 November 2007.
Beam Break Comparison - Dithering

COUNT Count line 1 (IN) 4

Count line 2 (OUT) 1

Taken from 2007 Cycle Congress, presentation given by Peter Pennisi, Director, Pentagon Systems, 23 November 2007
Beam Break Comparison - Groups

COUNT 1

Count line 1 (IN) 2

Count line 2 (OUT) 0

Taken from 2007 Cycle Congress, presentation given by Peter Pennisi, Director, Pentagon Systems, 23 November 2007
MetroCount

MC5600 – Classifier Basics

Source: 2007 Cycle Congress, presentation given by Peter Pennisi, Director, Pentagon Systems, 23 November 2007

AXLE SENSORS
B A

Known sensor spacing (usually = 1m)

Source: 2007 Cycle Congress, presentation given by Peter Pennisi, Director, Pentagon Systems, 23 November 2007
The MetroCount “Time-Stamped” philosophy – store every axle
Daily Cycle Volumes and 7 day moving average
Normanby Cycle Link

Bike Count
7 day moving average

Bike Week

Integrated Transport Planning
Shaping tomorrow's transport system today
Daily Pedestrian Volumes and 7 day moving average
Normanby Cycle Link

Pedestrian Count
7 day moving average
Standardize and roll-out
Standardize and roll-out
Questions?

For further information contact:

Michael Langdon  
Senior Advisor – Active Transport Planning  
Integrated Transport Planning Division  
Queensland Transport

Ph: (07) 3117 5544  
Fax: (07) 3117 5554  
E-mail: Michael.j.Langdon@transport.qld.gov.au