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Investigating a Mobile Tool for Tracking and Supporting Green Transportation Habits

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iSchool, UW

HCI Institute, CMU
If you asked me to name the three scariest threats facing the human race, I would give the same answer that most people would: nuclear war, global warming and Windows.

- Dave Barry
  humor columnist, satirist, writer
The danger posed by war to all of humanity - and to our planet - is at least matched by the climate crisis and global warming. I believe that the world has reached a critical stage in its efforts to exercise responsible environmental stewardship.

- UN Secretary General Ban Ki-moon
  General Assembly, March 2007
America is addicted to oil.

- President George W. Bush
  State of the Union Address, January 2006
CO₂ emissions (2003)

- United States: 21.20%
- China: 15.20%
- European Union: 13.70%
- Russia: 5.40%
- India: 4.60%
- Japan: 4.50%
- Germany: 2.90%
- Canada: 2.10%
- United Kingdom: 2.00%
- South Korea: 1.70%
- Italy: 1.60%

2003 United Nations Statistics Division
http://www.un.org/
persuasive technology

technology that intentionally changes attitudes or behaviors through persuasion and social influence.

we’re interested in studying how mobile phones can be used as persuasive technologies to affect daily transportation practices.
Sunny Consolvo, Ph. D. Thesis

at-a-glance determination of:
• active or inactive week,
• variety in routine,
• this week’s goal met
• recent goal met

runs on the background screen of mobile phones, so it’s frequently seen by the individual

strength

cardio

flexibility

walk

this week’s goal met

recent goal met
transit activities

Three sources of transportation data:
1. a Mobile Sensing Platform (MSP)
2. the phone’s own GSM cell signals
3. the participants themselves.
wearable sensing (msp)
gsm sensing

sensing vehicle travel

Carpool vs Drive Alone
We asked

Manual Survey

It looks like your last trip was made 'walking.' It was recorded automatically and lasted for approximately 11.5 mins ending at 03/31/08 6:56:34 PM. If you've traveled since then, please press OK to fill out a survey.

Survey Panel: 1

What type of trip did you take?
1. ○ I did not take a trip
2. ○ I drove in a car alone
3. ○ I carpooled
4. ○ I took a bus
5. ○ I took a train/trolley
6. ○ I walked
7. ○ I biked
8. ○ I ran
### 3-week study

<table>
<thead>
<tr>
<th>Location</th>
<th>Condition</th>
<th>Days</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Pittsburgh</td>
<td>27</td>
<td>Sales Clerk</td>
</tr>
<tr>
<td>*P2</td>
<td>Pittsburgh</td>
<td>N/A</td>
<td>Attorney</td>
</tr>
<tr>
<td>P3</td>
<td>Pittsburgh</td>
<td>21</td>
<td>Law Enforcement</td>
</tr>
<tr>
<td>P4</td>
<td>Pittsburgh</td>
<td>9</td>
<td>Student</td>
</tr>
<tr>
<td>P5</td>
<td>Pittsburgh</td>
<td>20</td>
<td>Technical/Engineering</td>
</tr>
<tr>
<td>P6</td>
<td>Pittsburgh</td>
<td>12</td>
<td>Student</td>
</tr>
<tr>
<td>P7</td>
<td>Pittsburgh</td>
<td>16</td>
<td>Student</td>
</tr>
<tr>
<td>P8</td>
<td>Seattle</td>
<td>6</td>
<td>Student</td>
</tr>
<tr>
<td>P9</td>
<td>Seattle</td>
<td>42</td>
<td>Office Admin</td>
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<tr>
<td>P10</td>
<td>Seattle</td>
<td>19</td>
<td>Consultant</td>
</tr>
<tr>
<td>P11</td>
<td>Seattle</td>
<td>25</td>
<td>Program Manager</td>
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<td>P13</td>
<td>Seattle</td>
<td>37</td>
<td>Programmer</td>
</tr>
<tr>
<td>P14</td>
<td>Seattle</td>
<td>30</td>
<td>Consultant</td>
</tr>
<tr>
<td>P15</td>
<td>Seattle</td>
<td>6</td>
<td>Student</td>
</tr>
</tbody>
</table>
observed transit

Bar Chart:
- Walk: 400
- Drive Alone: 300
- Carpool: 200
- Bus: 100
- Bike: 50
- Run: 10
- Train: 5

Pie Chart:
- Walk 31%
- Bus Rides 19%
- Carpools 19%
- Drive Alone 22%
- Bike 6%
- Run 1%
- Train 2%

Legend:
- Walk
- Bus Rides
- Carpools
- Drive Alone
- Bike Rides
- Run
- Train
Composition of Transit Activity By City

<table>
<thead>
<tr>
<th>Activity</th>
<th>Pittsburgh</th>
<th>Seattle</th>
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</thead>
<tbody>
<tr>
<td>Bike</td>
<td>5%</td>
<td>7%</td>
</tr>
<tr>
<td>Bus</td>
<td>15%</td>
<td>12%</td>
</tr>
<tr>
<td>Carpool</td>
<td>35%</td>
<td>30%</td>
</tr>
<tr>
<td>Drive Alone</td>
<td>20%</td>
<td>25%</td>
</tr>
<tr>
<td>Run</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>Train</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>Walk</td>
<td>25%</td>
<td>30%</td>
</tr>
</tbody>
</table>
source of data

![Source of Data Diagram]

- Manual
- GSM
- MSP

<table>
<thead>
<tr>
<th>Mode</th>
<th>Train</th>
<th>Carpool</th>
<th>Walking</th>
<th>Runs</th>
<th>Bus</th>
<th>Biking</th>
<th>Driving Alone</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td>GSM</td>
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<tr>
<td>MSP</td>
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</tbody>
</table>
I liked the tree because it was, to my mind, a pretty progress bar. There was enough of a clear distance between each state that I could tell the difference at a glance.

- Participant 11

“I want to have different stories every week ... to maintain curiosity in the app” (P8) and that we, or others, could “generate their themes online and share them.” (P11)

I would like more information about carbon emission savings.

- Participant 15
One participant complained that when a trip hadn’t been automatically recorded, “I felt like I was being cheated out of my ‘points’” (P15).

Future designs could incorporate a more overt gaming model.
- “more points” for zero-carbon trips
- reward user for reducing # of trips
- Incorporate carbon tracking
• Anticipation and Curiosity
  – I liked that we didn’t know what it was going to do. Like when your phone turned from leaves into flowers and then apples. (P15)

• Social Sharing of Transportation Activity
  – “Some people at work knew about the polar bear and every day they asked me about it. ‘Did you get a seal today?’” (P14)
After installation, Ecorio runs in the background on your phone, keeping track of when you're moving in a car or a bus and tallies up the trips that you take each day.

When you first start Ecorio, you will see a summary of your activity and the current trip that Ecorio is tracking.
How many generations in all of human history have had the opportunity to rise to a challenge that is worthy of our best efforts. A challenge that can pull from us more than we think we can do.

-Al Gore
TED Conference, March 2008
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