**Safer Journeys**

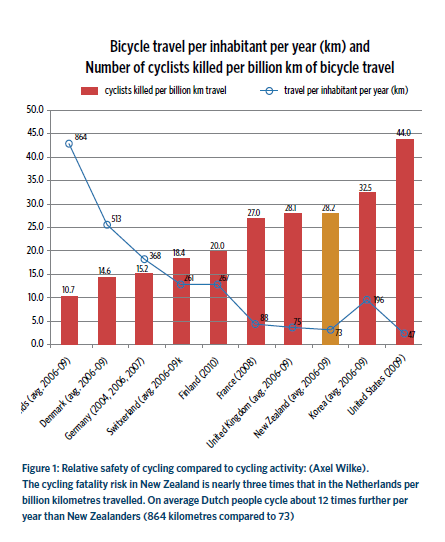
**for people Notescycle**

The majority of motor vehicle/cycle crashes occur at urban intersections and driveways.

• Usable road shoulder width is a key factor in the incidence of rural accidents.

• Heavy vehicles, especially trucks, are overrepresented in cycling fatalities.

System and User Information: Improve quantity and quality of data collection, research, sharing and analysis. Use this information to set targets; and strengthen processes for monitoring and evaluation.



Cycling surveys consistently state the number one reason people don’t cycle, or don’t let their children cycle, is they believe it is too dangerous.

Mass protests continued to demand dedicated cycling infrastructure. It is now an integral part of the Netherlands’ transport policies. Child road deaths have gone down to 14 in 2010 from over 400 in 1971

Land designated for new roads often does not make allowance for safe cycling infrastructure.

• Cyclists can feel threatened by inconsiderate driving. Cyclists have a right to space on the road and need extra room at intersections and roundabouts.

• Cyclists may ride away from the kerb or occupy a lane – not because they want to annoy drivers, but to:

-- avoid drains, potholes or roadside rubbish

-- be seen as they come up to intersections with side roads

-- discourage drivers from squeezing past where it’s too narrow.

Arduino Object Detection



Figure 6.1 How ultrasonic waves are

transmitted and received by a distance

sensor

Infrared has disadvantages as well, though. It relies on light, so in bright direct sunlight, infrared sensors often won’t work well, if at all—sunlight will saturate the sensor, creating a false reading. Furthermore, infrared is often not able to read at the same distances as ultrasonic. For instance, the SRF05 ultrasonic sensor can clearly detect objects up to 4 m away, whereas the Sharp GP2D12 infrared sensor that we’ll use in this chapter has a maximum range of 80 cm.

**Investigating the factors influencing cyclist awareness bad behaviour: An on-road study of cyclist situation awareness**

It has previously been estimated, for example, that the risk of death when cycling is 12 times higher than when driving a car

Cycle Safety:

Reducing the Crash Risk

While parking is not the key safety factor, routes where parking is little used (ie where a parking lane is marked, but the proportion of parking spaces that are used is low) have crash rates between 30% and 120% higher than for sections with average parking rates (these models are provided in appendix A). This could be a result of cyclists using the parking shoulder for most of their trip and having to pull out into the traffic lane to go around parked cars.

The overseas research indicates that the number of crashes decreased when on-roadway cycle lanes were installed; the reduction of cyclist crashes generally varied from 35% to 50%, although one source did report an increase in cyclist crashes. Total (cycle and motor vehicle) crashes were found to decline by 6.5% to 35%.

Studies conducted to compare the event rates for on- and off-roadway cycling have shown that shared-use footpaths are much less safe than other on- or off-roadway cycling options, with a wide amount of data indicating that cycling on the footpath is 1.8 to 2.5 times more dangerous than cycling on the roadway, and 8 to 11 times more dangerous than cycling on an off-roadway track (with very few or no driveways or vehicle crossings). In Denmark, before-and-after studies of off-roadway cycle paths were undertaken over a period of three years. The results showed that cyclist casualties increased by

48% following introduction of off-roadway cycle paths. In addition, vehicles, moped riders and pedestrians suffered more crashes, with an overall rise in casualties of 27%.

Munster et al (2001) reported that on-roadway cycle crashes in New Zealand occurred mostly in a location not specifically allocated for cycling. Forty-eight percent of crashes occurred in the traffic lane, 32% on the shoulder and 13% on the footpath. Only 7% occurred in a cycle lane.

Turner et al (2006) also interviewed casualties at Christchurch Hospital and those who had made an

ACC claim. Of the 192 cyclists surveyed who had an injury crash on the road, 73% involved a motor vehicle, 3% involved a pedestrian and the remainder were cycle-only crashes. Crashes that occurred off the roadway were not included in the study.

Hunter also found that the distance between passing motor vehicles and cyclists was greater without red shoulders, which was a statistically significant result. It was noted that cyclists who were surveyed considered the red shoulders too narrow. Pg 22 paragraph 3

**Real-time Air Quality Monitoring Through Mobile Sensing**

**in Metropolitan Areas**

Several manufacturers such as Aeroqual or Variable Technologies have recently introduced handheld pollution measurement devices. These devices are small enough to be carried by walking people for personal use and measure all the criteria pollutants contributed by vehicle emissions [9,10,11,12]. But none of these off-the-shelf devices has been evaluated with respect to their real-time sensing performance when installed on mobile platforms such as vehicles. To the best of our knowledge, we have not come across any work that study the long-term stability, reliability and impact of realtime pollution monitoring systems using commodity sensors and the problems associated in deploying such systems.

The second sensing model relies on air quality-aware drivers who install a Personal Sensing Device (PSD) in their cars, connected over Bluetooth to their smart phone. Drivers can use this setting to measure the air quality for themselves, or they can register to participate in a **social community-based sensing**. The pollution data is geo tagged and posted to the central server over cellular network.

The cost of assembling one unit came to about $700. In addition, we signed up for a $25 per month prepaid data plan with 1.5 GB data cap per month. The MSB generates 1600 bytes/minute of data when sampling every 5 seconds. With an average driving time of 2 hours per day for 30 days, the MSB produces about 5.5 MB of data per month, which is a small fraction of a typical lowend data plan.

Our software on the Arduino uses a ‘software serial’ library to control and communicate with the carbon monoxide sensor, dust sensor, GPS chip and the cellular modem.

In addition, user’s existing iPhone device and data plan will be used to transmit data periodically to server. The personal sensing device generates 1536 bytes/minute of data when sampling every 5 seconds. With an average driving time of 2 hours yet does not support some advanced features such as smart aggregation and automatic device registration. First, we describe some essential technical features, and then, we describe a typical workflow in order to show the data processing procedure.

Among the popular cloud storage services, Google Fusion Tables (GFT) has proven to be the best fit. It is designed as a new file type within Google Drive, with all the capabilities associated with a compact database. It supports a special data type for location storage, and supports various visualization tools for large data sets. This provides a convenient data storage in the cloud with Google’s cloud visualization support. The share feature proposed in Section 2.2 is implemented using Google Drive API. This API provides the ability to add, modify, or delete permissions for a file that resides in Google Drive. To perform these actions, the user simply needs to authorize requests using OAuth 2.0 and provide the email address of subscribers. In our case, server can create tables for users when necessary and then transfer ownership to the users. In this way, data producers retain full control of their raw data, by taking the role of the *owner*.

**Segregated bike lanes are safest for cyclists**

Dr. Steven Friedman, a co-author with Winters and a Toronto emergency department physician, says many of the cycling injuries he sees are the result of shared routes between bikes and motor vehicles. The result is what he calls a “nudging accident,” where a cyclist may have been riding appropriately, but an obstacle in the lane nudges him or her towards a vehicle or another dangerous obstacle.

**Evidence on Why Bike-Friendly Cities Are Safer for All Road Users**

Aside from the environmental advantages, there is now growing evidence to suggest that cities with higher bicycling rates also have better road safety records.

Our data suggest that improving the streets and street networks to better accommodate bicycles may lead to a self-reinforcing cycle that can help enhance overall safety for all road users.