Performance

Two key goals to be achieved with the design of parallel applications are:

- **Performance** – the capacity to reduce the time needed to solve a problem as the computing resources increase
- **Scalability** – the capacity to increase performance as the size of the problem increases

The main factors limiting the performance and the scalability of an application can be divided into:

- **Architectural limitations**
- **Algorithmic limitations**

Performance Metrics

There are 2 distinct classes of performance metrics:

- **Performance metrics for processors/cores** – assess the performance of a processing unit, normally done by measuring the speed or the number of operations that it does in a certain period of time
- **Performance metrics for parallel applications** – assess the performance of a parallel application, normally done by comparing the execution time with multiple processing units against the execution time with just one processing unit

Here, we are mostly interested in metrics that measure the performance of parallel applications.

Performance Metrics for Processors/Cores

Some of the best known metrics are:

- **MIPS** – *Millions of Instructions Per Second*
- **MFLOPS** – Millions of *FLoating point Operations Per Second*
- **SPECint** – SPEC (*Standard Performance Evaluation Corporation*) *benchmarks that evaluate processor performance on integer arithmetic* (first release in 1992)
- **SPECfp** – SPEC benchmarks that evaluate processor performance on floating point operations (first release in 1989)
- **Whetstone** – synthetic benchmarks to assess processor performance on floating point operations (first release in 1972)
- **Dhrystone** – synthetic benchmarks to assess processor performance on integer arithmetic (first release in 1984)

Factors Limiting Performance

Architectural limitations:

- **Latency and bandwidth**
- **Data coherency**
- **Memory capacity**

Algorithmic limitations:

- **Missing parallelism** (sequential code)
- **Communication frequency**
- **Synchronization frequency**
- **Poor scheduling** (task granularity/load balancing)

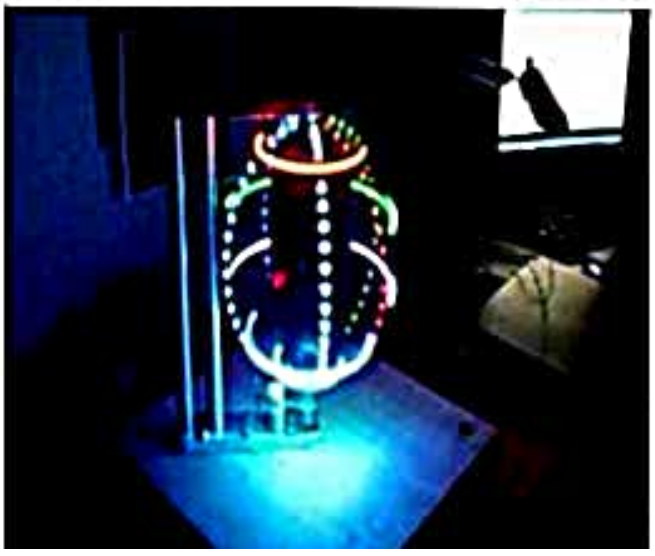
PROJECT DOCUMENTATION

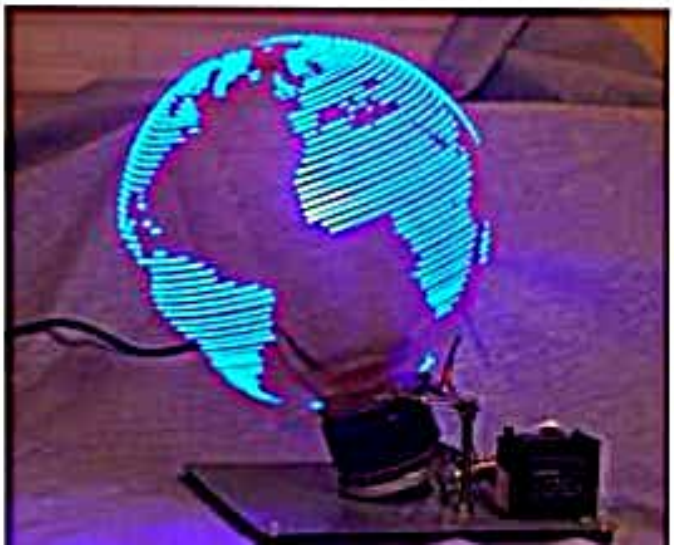
Project Title - Geotagging.
Team Members - Enayat Ullah, Ishaan Kumar, Vishal, Anshul Goyal.

Motivation

We approached the club with a lot of ideas, some our own, some plagiarised from the internet. But it turned out some were not feasible while the others required a lot of work to be completed within a span of 40 days. Like the one involving 'RFID stickers' where an object which we tend to misplace at times like a key, pen drive are embossed with an RFID sticker on top of it and a mobile app would enable us to track these lost objects. But the fabrication of such stickers was a problem and we were at sea with how to approach it.

Another idea of ours was a 3D LED POV, something like these :





1.3 Demonstration description

The terms 'pilot', 'trial' and 'demonstration' are frequently used interchangeably, but for the purposes of a potential Auckland project, given practical and legal constraints, the paper adopts the following description:

- The Auckland project would be a demonstration of a congestion pricing concept applicable to the local environment.
- The Auckland project would not be a small-scale enactment (pilot) of the preferred scheme options, and is not intended to be a pre-implementation stage, or a test of the final technology, charging system and enforcement model, and would not include the collection of revenue from users.

1.4 Outline

The briefing note is organised as follows:

1. **Introduction:** This section introduces the paper and contents.
2. **International Review:** This section presents a review of some international pilot and demonstration projects undertaken as part of investigations into urban congestion pricing as well as Road User Charge research.
3. **Evaluation Approach:** This section discusses the evaluation approach to assess the results from a potential demonstration project.

2 International review

2.1 Introduction

The international review conducted by D'Artagnan Consulting for the Steering Group found that only two jurisdictions currently operating congestion charging schemes conducted some form of pilot or demonstration project. Their review concluded that although not essential, these projects can be helpful, noting that Stockholm and Singapore both successfully implemented their schemes following a major pilot (6 months) and demonstration, respectively. As both cities learned, pilots or demonstrations can help for both external and internal reasons. Outwardly, they focus public discourse on something concrete, making the feedback more meaningful and relevant to the final scheme design. Inwardly, they prepare agencies for the challenges of delivery by identifying gaps in competence, systems, or inter-agency linkages. They can also reveal opportunities for technical improvements, such as Stockholm's decision to abandon costly and redundant DSRC and utilise ANPR exclusively for vehicle detection.

In addition to Stockholm and Singapore this section also discusses the 2016 Melbourne road usage study which used a light vehicle demonstration to examine issues around both congestion pricing and the sustainability of traditional transport funding mechanisms. In addition, we review the 2006 Dutch field demonstration which was designed to analyse the potential of rewards as a policy instrument aimed at incentivizing people to shift their travel away from peak periods. Finally, this section summarizes a number of recent road user charge (RUC) demonstration projects undertaken in the United States. Although these projects were not targeted at improving urban congestion, they provide insights on scale, technology, operations, participant recruitment, and communications.

Our Approach

- We approached this project to learn about the android development environment not merely to sneak the code from tutorials and copy-paste to build something.
  With this in mind, first we developed a lot of apps which implements different aspects of android ability and which were,totally unrelated to our project.

  Among those were a primitive calculator, username-password authentication window, Splash screen music player,a primitive camera app and others

  Now, after getting pretty much exposure in android development, we decided to go ahead with our project app. Ignoring the futile attempts to add many features in our app,which unfortunately could not be made possible, the work of our final app can be divided into the following phases:

- Keyword Extraction
- Card UI
- Drag and Drop
- Swipeable Tabs
- *Vani* Search Integration
- Colour Coding

Keyword Extraction

First we thought that we would let the user enter the tag location explicitly, but then an idea struck to us so as make the app smarter in which it would recognise and isolate the location part from the note.

That the functionality part,now for the part, we focussed our efforts to build an intuitive ,clean and simple UI. For the same, we encompassed *card UI* in our ap. These beautiful cards,originally inspired from google now, makes the saved notes look aesthetically pleasing.
Then there's the *drag and drop* feature, a cool way to launch activities in the app by dropping those over a specified region called *Launch pad.*
We also implemented swipeable tabs so as to provide ease in navigating between *Location notes* and *Time notes.*

Theory

Android is a Linux-based operating system designed primarily for touchscreen mobile devices such as smartphones and tablet computers.Initially developed by Android, Inc., which Google backed financially and later bought in 2005.
Android is open source and Google releases the code under the Apache License. This open source code and permissive licensing allows the software to be freely modified and distributed by device manufacturers, wireless carriers and enthusiast developers. Additionally, Android has a large community of developers writing applications ("apps") that extend the functionality of devices, written primarily in a customized version of the Java programming language.

4 Auckland demonstration project

4.1 Introduction

This section discusses the key elements required to design and undertake a potential congestion pricing demonstration suitable for the Auckland environment, and supportive of the TCQ's main objectives and considerations. It draws on the international review and discusses the potential charging concept, the project size and coverage, technology and record-keeping model.

4.2 Objectives

Before embarking on a demonstration project, the objectives of the demonstration need to be considered and defined. There may be a number of reasons for carrying out a demonstration, for example:

- To prove a technology
- To test ability to influence driver behaviour
- To undertake a soft introduction of congestion charging concept to the public
- To test ease of use/complexity of a new policy with users

Ideally, the objectives set at the beginning of the project would be used to evaluate the project and observe areas of improvement for the design of a full-scale congestion pricing scheme, were a scheme to go ahead.

4.3 Charging concept

Congestion pricing is an economics-based approach to traffic congestion that focuses on discouraging driving during peak hours through financial penalties. Legal and practical constraints around directly charging motorists for peak period travel in a demonstration situation means that another charging concept is required. Internationally this has focused on the opportunity to influence behaviour through a rewards-based model whereby drivers are incentivized to reduce their peak period vehicle trips. There are two broad potential charging concepts that utilize a rewards mechanism to modify travel behaviours: