SMART TRANSPORT SYSTEM

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ABSTRACT

The bus arrival time is primary information required by most city transport travellers. The proposed system is a prototype with different types of Android-based mobile phones and comprehensively experiment with the NTU campus shuttle buses as well as Singapore public buses over a 7-week period. The evaluation results suggest that the proposed system achieves outstanding prediction accuracy compared with those bus operator initiated and GPS supported solutions. It further adopt our system and conduct quick trial experiments with London bus system for 4 days, which suggests the easy deployment of our system and promising system performance across cities. At the same time, the proposed solution is more generally available and energy friendly.

Keywords:

Reduced waiting time – participatory sensing – GPS based solution – high accuracy in tracking – easy deployment

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1.INTRODUCTION

Public transport, especially the bus transport has been well developed in many parts of the world. The bus transport services reduce the private car usage and fuel consumption, and alleviate traffic congestion. As one of the most comprehensive and affordable means of public transport, in 2011 the bus system serves over 3.3 million bus rides every day on average in Singapore with around 5 million residents. When traveling with buses, the travelers usually want to know the accurate arrival time of the bus. Excessively long waiting time at bus stops may drive away the anxious travelers and make them reluctant to take buses. Nowadays, most bus operating companies have been providing their timetables on the web freely available for the travelers. The bus timetables, however, only provide very limited information (e.g., operating hours, time intervals, etc.), which are typically not timely updated. Other than those official time tables, many public services (e.g., Google Maps) are provided for travelers. Although such services offer useful information, they are far from satisfactory to the bus travelers. For example, the schedule of a bus maybe delayed due to many unpredictable factors (e.g., traffic conditions, harsh weather situation, etc)

In this paper, we present a novel bus arrival time prediction system based on crowd-participatory sensing. We interviewed bus passengers on acquiring the bus arrival time. Most passengers indicate that they want to instantly track the arrival time of the next buses and they are willing to contribute their location information on buses to help to establish a system to estimate the arrival time at various bus stops for the community. This motivates us to design a crowd-participated service to bridge those who want to know bus arrival time (querying users) to those who are on the bus and able to share the instant bus route information (sharing users). Our bus arrival time prediction system comprises three major components:

Sharing users: using commodity mobile phones as well as various build-in sensors to sense and report the lightweight cellular signals and the surrounding environment to a backend server.

Querying users: querying the bus arrival time for a particular bus route with mobile phones.

Backend server: collecting the instantly reported information from the sharing users, and intellectually processing such information so as to monitor the bus routes and predict the bus arrival time.

No GPS or explicit location services are invoked to acquire physic allocation inputs. Such a crowd-participated approach for bus arrival time prediction possesses the following several advantages compared with conventional approaches. First, through directly bridging the sharing and querying users in the participatory framework, we build our system independent of the bus operating companies or other third-party service providers, allowing easy and inexpensive adoption of the proposed approach over other application instances Bus detection: since the sharing users may travel with diverse means of transport, we need to first let their mobile phones accurately detect whether or not the current user is on a bus and automatically collect useful data only on the bus. Without

accurate bus detection, mobile phones may collect irrelevant information to the bus routes, leading to unnecessary energy consumption or even inaccuracy in prediction results.
Bus classification: we need to carefully classify the bus route information from the mixed reports of participatory users. Without users' manual indication, such automatic classification is non-trivial.
Information assembling: One sharing user may not stay on one bus to collect adequate time period of information.
Insufficient amount of uploaded information may result in accuracy in predicting the bus route.
In the following of this paper, we first introduce the background and motivation in .In the next section, we detail the challenges of our system and describe our technical solutions. The evaluation results are presented, performed trial study in London and the results are shown. The related works are described and the summery is provided.

2. LITERATURE SURVEY

2.1 PHONE-BASED TRANSIT TRACKING

Our work is mostly relatedto recent works on the transit tracking systems EasyTracker presents an automatic system for low-cost, real-time transit tracking, mapping and arrival timeprediction using GPS traces collected by in-vehicle smart-phones. work differs from them in that it predictsthe bus arrival time based on cell tower sequence information shared by participatory users. To encourage moreparticipants, no explicit location services (e.g., GPS-basedlocalization) are invoked so as to reduce the overhead ofusing such special hardware for localization.

2.2 CELL TOWER SEQUENCE MATCHING

StarTrack [9]providesacomprehensive set of APIs for mobile application development. Applying new data structures, [15] enhancesStarTrack in efficiency, robustness, scalability, and ease ofuse. CAPS [21] determines a highly mobile user's position using a cell-ID sequences matching technique whichreduces GPS usages and saves energy on mobile phones.Unlike those proposals, our work does not aim to positionthe mobile users though similar in spirit to these existingworks in utilizing the cell tower sequences.

2.3 PARTICIPATORY SENSING

Many recent works develop participatory platforms for people-centric mobile computingapplications [8]. MoVi [12] studies the problem of socialactivity coverage where participants collaboratively sense ambience and capture social moments through mobilephones. Escort [14] obtains cues from social encountersand leverages an audio beacon infrastructure to guide auser to a desired person. WILL [29] designs an indoorlogical localization technique leveraging user mobility andWiFi infrastructure while avoiding site survey. Althoughtargeted at totally different applications and problems, the common rationale behind these works and our design is that the absolute physical locations of users though some-times sufficient are not always necessary to accomplish particular tasks

3. MODULE DESCRIPTION

3.1 Admin Login

Admin login have user name and password for authentication.

3.2 Bus routes and status

Admin have rights to add bus details, routes, and Update status. The bus details have bus name and location. The routes contain source and destination stop and the stoppings between source and destination. Update status contain where the bus currently located.

3.3 User registration

User Registration has the details User name, Name, Password, Gender, Location, Chennai, Mobile Number. The user registration is stored in server.

3.4 User Login

Verified user only authenticated by application.

3.5 View Routes

User can entered source and destination location. It displayed all the routes between the source and destination with timings.

3.6 Track Bus

Track bus displays the Map view of source and destination requested by user. The map marker displays the current location and distance and timing to reachfrom source to destination.

4. INPUT AND OUTPUT DESIGN

4.1 INPUT DESIGN

The input design is the link between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put transaction data in to a usable form for processing can be achieved by inspecting the computer to read data from a written or printed document or it can occur by having people keying the data directly into the system. The design of input focuses on controlling the amount of input required, controlling the errors, avoiding delay, avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and ease of use with retaining the privacy. Input Design considered the following things:

4.2 OUTPUT DESIGN

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system's relationship to help user decision-making.

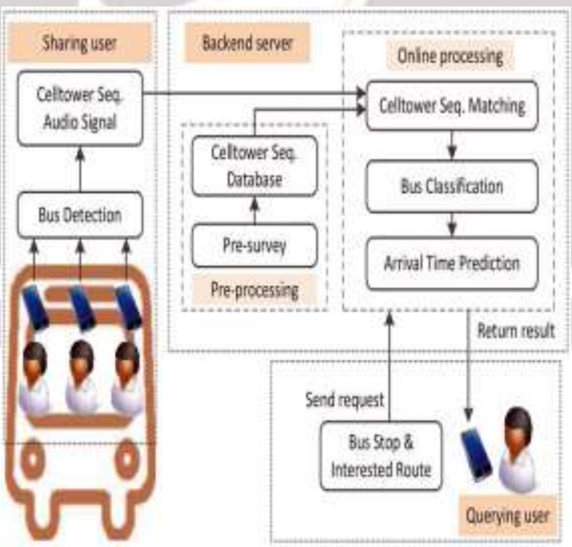
Designing computer output should proceed in an organized, well thought out manner; the right output must be developed while ensuring that each output element is designed so that people will find the system can use easily and effectively. When analysis design computer output, they should Identify the specific output that is needed to meet the requirements.

Select methods for presenting information.

Create document, report, or other formats that contain information produced by the system.

5. SYSTEM DESIGN

5.1 System architecture:



Querying user. As depicted in Fig (right bottom), a querying user queries the bus arrival time by sending the request to the backend server. The querying user indicates the interest bus route and bus stop to receive the predicted bus arrival time. Backend server. We shift most of the computation burden to the backend server where the uploaded information from sharing users is processed and the requests from querying users are addressed. Two stages are involved in this component. In order to bootstrap the system, we need to survey the corresponding bus routes in the offline pre-processing stage. We construct a basic database that associates particular bus routes to cell tower sequence signatures. Since we do not require the absolute physical location reference, we mainly war-drive the bus routes and record the sequences of observed cell tower IDs, which significantly reduces the initial construction overhead. The backend server processes the cell tower sequences from sharing users in the online processing stage. Receiving the uploaded information, the backend server first classifies the uploaded bus routes primarily with the reported cell tower sequence information. The bus arrival time on various bus stops is then derived based on the current bus route statuses.

6. FUTURE ENHANCEMENT

Future work includes how to encourage more participants to bootstrap the system because the number of sharing assengers affects the prediction accuracy in our system. This common issue of crowd-sourced solutions is largely influenced by the penetration rate and popularity of the services. One may actively promote the service to reach a critical penetration rate so as to ensure that at least one sharing user is on the bus willing to report the bus status.At the initial stage, we may encourage some specific passengers (like the bus drivers) to install the mobile phoneclients.

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