

1. Introduction

- Societal Problem
- Current Traffic Avoidance Methods
- Statistics
- Solution Overview

1.1. Purpose (*Lab 1: Product Description*)

- Providing Customized Traffic Monitoring
- How It Will Be Used
- Who Will Use It (*Lab 1: Target Market Customer Base*)
- What It Will Do (*Lab 1: Product Features & Capabilities*)
 - Virtual Checkpoints (GPS)
 - Real-Time Data Exchange
 - Traffic Analysis
 - Driver Profiles
- What It Won't Do
 - Prevent Traffic Congestion
 - Guarantee Decreased Delay
 - Guarantee Information Availability
 - Direct Obstruction Identification
 - Detect Emergency Response Vehicles
 - Provide Turn-by-turn Directions

1.2. Scope

- Reduced Geographical Area
 - Old Dominion University
 - Select Highway Corridors
- Pre-determined Simulated Driver Data
- Pre-recorded Routes (Real GPS Data)
- Processing Simulated Travel Data on Server (Pseudo Real-Time)

Table: Prototype Features Table

1.3. Definitions and Acronyms

See Glossary

1.4. References

See References (Lab 1), add CS 411/Lab 1

1.5. Overview

Summary of Product Specification Contents

2. General Description

2.1. Prototype Architecture Description (*Lab 1: Prototype Architecture*)

- MFCD (Prototype)
Figure: MFCD Phase 1
- Prototype Algorithms
Table: Algorithms.....(TO DO)
- Working Mobile Application
 - GUI Screens
Figure: GUI Site Map
- Virtual Machine Server
 - Apache
 - MySQL
 - PHP MyAdmin

2.2. Prototype Functional Description

- Mobile Application

- GUI: Login
- GUI: New User
- GUI: New/Edit Route
- GUI: End of Trip
- GUI: Delay Notification
- GUI: Settings
- Driver Profile
 - Store/Edit Custom Routes
 - Set Pre-analysis Times
 - Track Statistics
- Virtual Checkpoints
 - Traffic Wizard Process Flow
Figure: Traffic Wizard Process Flow (Modified Process on website)
 - Data Exchange Flow
Figure: Checkpoint Algorithm (Dropbox->Web and Slide Images -> algorithms-checkpoint-flow)
 - Server Communication (Lab 1: Comm. Between. Smartphone and Server)
Figure: Data Exchange Flow (Data Flow on website)
- Simulation Console
Figure: Simulation Console.....(TO DO)

2.3. External Interfaces

2.3.1. Hardware Interfaces

- Smartphone
- GPS Module
- 3G Internet Module

2.3.2. Software Interfaces

- MySQL Database Interface
- PHP/Java/Python/Perl (TBD) Server Interface
- Simulation Console Interface (.NET)

2.3.3. User Interfaces

- Smartphone App
Figure: GUI Sitemap

2.3.4. Communication Protocols / Interfaces

- TCP/IP
- UDP

3. Specific Requirements (COLLABORATION)****

3.1. Functional Requirements

3.1.1. Databases

Figure: Database Schema

3.1.1.1. Driver Profile Database

Figure: Customer Database ERD (site)

3.1.1.2. Virtual Checkpoint Database

Figure: Route Database ERD (site)

3.1.1.3. Speed Limit Database

Figure: Speed Limit Database ERD.....(TO DO)

3.1.2. Algorithms

3.1.2.1. Aggregate Speeds

3.1.2.2. Checkpoint Allocation

3.1.2.3. Checkpoint Reallocation

3.1.2.4. Route Analysis

Figure: Route Analysis Algorithm (site)

3.1.2.5. Next Checkpoint ETA

3.1.2.6. Driver Generator

3.1.3. GUI

3.1.3.1. Smartphone Application(w/ *Figures(screenshots)*)

- GUI: Login
- GUI: New User
- GUI: New/Edit Route
- GUI: End of Trip
- GUI: Delay Notification
- GUI: Settings

3.1.3.2. Simulation Console (TODO)(figures)

3.2. Performance Requirements

3.2.1. Database Read/Write Speed

3.2.2. Wireless Data Transmission Speed/Fidelity

3.2.3. Algorithm Efficiency

3.3. Assumptions and Constraints

- Assumptions: Driver base
Table: Assumptions Table.....(TO DO)

3.4. Non-functional Requirements

3.4.1. Security

3.4.2. Maintainability

3.4.3. Reliability

3.4.3.1. Server Uptime/Redundancy