# CHAPTER ONE: INTRODUCTION

## 1.1 Introduction

This project focuses on the development of an automatic fare collection (AFC) device for Gweru – Shurugwi Transport Operators Association (GSTOA). Passengers swipe an issued Radio Frequency Identification (RFID) card or get a journey token on boarding a minibus and the Global Positioning System (GPS) coordinates at a point at which a customer boarded the minibus will be recorded. On dropping off a passenger will swipe the card again and an amount will be deducted from the customer account which will be deduced by the system from the pick-up point GPS coordinates and drop off point GPS coordinates.

## 1.2 Background of Study

Fares charging on many routes in Zimbabwe, is at most times determined by the conductor and at most times not according to the transport operator/bus owner’s set amount or the amount expected to be charged by the Road Motor Transportation Department (RMT), the Ministry of Transport and Infrastructure’s (MTI) wing that deals with regulating fare charges on different routes. The transport operator at most times does not have access to monitor if his/her staff are following the set fares. The RMT has the advantage of police checking passenger tickets against a fare table to check whether the correct fare was charged but the police do not usually check that. The situation has now even worsened since there are not many roadblocks no longer being mounted for police that could verify with passenger tickets and fare tables if passengers are being charged the correct fares. This has resulted in passengers being charged large sums of money compared to the actual amounts they should pay for a given route.

### 1.2.1 Organisational Structure

Define and cite

According to the GTSOA constitution (citation) GSTOA organisation consist of the following members

#### Board of Directors

Define and duties

#### Chairperson

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#### Finance Director

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#### Secretary General

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#### Recording Secretary

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#### Organising Secretary

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#### Secretary of the Finance Director

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#### ….

Define and duties

Fig 1.1 Organisational structure

### 1.2.2 Vision

Gweshu vision

### 1.2.3 Mission

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### 1.2.4 Values

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## 1.3 Problem Definition

GSTOA members who happen be to be the minibus owners for minibuses operating on the Gweru – Shurugwi route are not benefiting much from their minibuses as conductors have a tendency of faking the fares paid by passengers on log sheets and the number of passengers who boarded the minibus for a journey. The minibus crew that is the conductor and the driver can also lie on the number of trips travelled in a day and the transport operator or his/her manager have no means to detect the lies. This has resulted in the crew benefiting more than the minibus owner.

On the other hand, passengers are being charged fares that exceed the approved fare from the RMT as stated from the fare table. Other passengers who board for example from Gweru to Guinea Fowl pay $1 which is unfair considering that it costs $1 from Gweru to Shurugwi is $1 and someone dropping off halfway the journey pays the same amount.

## 1.4 Aim

The aim of this project is to assemble and automatic fare collection device to be used by GSTOA minibuses that records the GPS coordinates where a passenger boards a bus and the GPS coordinates where a passenger drops off and deducts an amount that has the value of the distance travelled, that can be monitored its activities by the transport operator/manager through a web application.

## 1.5 Objectives

To design and assemble an automatic fare collection device that allows passengers:

1. On boarding a bus to swipe an RFID card and note the passenger’s identity as well as the pick-up GPS coordinates for the passenger
2. On dropping off to swipe an RFID card and note the drop off point GPS coordinates and calculate the bus fare for the distance travelled in the bus
3. Estimate the number of people boarding or dropping off the bus at every stop through the use of a motion sensor that will be part of the device.

To develop a web application that enables the transport operator / fleet manager to:

1. View bus operations (fare collections, number of people, estimated number of people from the motion sensors) in real time
2. View current location of a bus
3. Monitor and analyse best pick up points and times from the system data history

## 1.6 Instruments and Methods

Instruments and methods refer to the means by which the researcher will be able to acquire the information for the project and the means by which the information will be manipulated to produce the required system outcome, Trochim (2003).

### 1.6.1 Data collection tools

Internet Text books

Journals and Articles

Internet

Statistical Tools

Interviews

Focus groups

Questionnaires

### 1.6.2 Device Assembling Instruments

The developer is going to make use of the following technology and devices in assembling the automatic fare collection device

#### 1.6.2.1 Arduino

What else ??

#### 1.6.2.2 RFID

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### 1.6.3 Web Application Development Instruments

The developer will make use the following software, programming languages, scripting languages and frameworks to develop the web application:

#### 1.6.3.1 MySQL5

Is an open source database management system for secure data storage. The information in the system will be a database that will allow for access to data and allow for queries to be made when need be. The specifications of mySql are suitable for use with the capacity of the proposed system.

#### 1.6.3.2 PHP 7

A server side programming language. Php is suitable for the development of web based software systems.

#### 1.6.3.3 Code Ignitor

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#### 1.6.3.4 Apache

this is a server application for running web pages locally. This will ensure that the system can be accessed even when there is limited internet connection and updates can be made automatically when the connection improves.

#### 1.6.3.5 HTMLX

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#### 1.6.3.6 CSS3

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#### 1.6.3.7 Bootstrap

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#### 1.6.3.8 JavaScript

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#### 1.6.3.9 Google Maps

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## 1.7 Justification and Rationale of Study

The proposed system is of great benefit to passengers using GTSOA vehicles and the transport operators as well.

**To the Passengers**

Fair fares charged to the customer according to the actual fare stated by the transport operator, pickup point and drop off point.

Ability to pay fares using plastic money as the cards are preloaded with money

**To the Transport Operators**

Automatic collection of fares therefore no cheating by the minibus crew

The system comes with a coordinates tracking therefore a minibus can be tracked its movements

Ability to view best pick up points and best pick up times by the fleet managers and hence know how to timetable their minibuses

## 1.8 Conclusion

This chapter, the introduction chapter covered the problem definition that has led to undertaking the research, highlighted the aim and the objectives of the proposed system and outlined the need for the research. The next chapter will focus on the project planning activities.