

CHAPTER ONE

INTRODUCTION

1.1 Introduction

As the number of vehicles and the needs for greater transportation has grown in recent years, city streets and highways frequently face serious road traffic congestion problems. Traffic congestion problem is a phenomena that has negative in the transportation system in a country. This causes many problems represented in increasing waiting time which affected on economic and environment. Besides, it creates problem when there are emergency cases at traffic light intersections where it is always busy with many vehicles.

Generally, traffic signal controls are implemented with pre-timed or actuated control. In a pre-timed controller (PTC) type (conventional), green/red phase for each traffic signal cycle is constant. Although this operation mode is simple, its performance is generally poor for heavy traffic. An actuated controller computes phase durations based on real-time traffic demand obtained from the detection of passing and stopping traffic on all lanes leading into an intersection. Traffic flow is usually characterized by randomness and uncertainty, thus designing an intelligent controller instead of a pre-timed traffic light control system can be a sensible alternative. Fuzzy logic is known to be suited for modeling and control in such problems.

Beside, conventional traffic light cannot detect whether there is emergency vehicles or not. To overcome this situation RF (Radio frequency) circuit is used.

This project covers the implementation of an intelligent traffic lights control system using fuzzy logic which has the capability of mimicking human intelligence for controlling traffic lights. The fuzzy control not only can sense the presence of car waiting at the junction but also can sense the number of car that waiting at the junction. In addition, the RF (radio frequency) used to solve emergency cases problems.

1.2 Problem Statement

The conventional traffic light controller was established to avoid congestion in road, long waiting times and to facilitate the passage of the ambulance process, the lights change at constant cycle time, which is clearly not the optimal solution. The emergency vehicles have no ability to change the traffic light which causes a problem.

1.3 Proposed Solution

To change the cycle time depending upon the density of cars behind green and red lights and the current cycle time use fuzzy logic based microcontroller to control traffic lights system. Beside this, an RF circuit should be added to give the ability of changing the traffic light according to emergency cases.

1.4 Aim and Objectives

The aim is to optimize traffic controller for effective traffic management, improve safety and better traffic.

The main objectives of this project are:

1. To propose a control system for traffic light.
2. To propose a control algorithm using fuzzy logic.
3. To simulate the propose system.
4. Practical implementation for the system.
5. Performance evaluation.

1.5 Methodology

This project purpose is to design an intelligent traffic light controller using fuzzy logic based on microcontroller. It provides information which is used to control traffic light in order to reduce waiting time. In this project load cell sensor is used to calculate number of vehicles in the street. In each line there is a load cell sensor that put in specific distance, when the vehicle in the range of specific distance that mean it pressures the sensor and immediately the equilibrium of the bridge will change so the output voltage changes. Atmega16 microcontroller reads the continual analog signal that read by the sensor and converts it to digital value. The microcontroller compares between the voltages of each road and then applies the fuzzy logic rules. Fuzzy logic rules use IF THEN statement. The traffic lights operate consequently to the rules.

1.6 Research Outlines

This thesis composed of five chapters their details are as follows:

1. CHAPTER ONE: provides introduction, states problem and proposed solution as well as objective and aims.
2. CHAPTER TWO: shows the Related Works and basic components of project.
3. CHAPTER THREE: discuss system design and description of all sensor, control unit, basic components and show the concept of fuzzy logic.
4. CHAPTER FOUR: shows the results of simulation work and many scenarios.
5. CHAPTER FIVE: provides conclusion and recommendations.