



Smart Traffic Lights System using Google API

P. V. C. N. Perera
(Reg. No.: MS19817736)
M.Sc. in IT
Specialized in EAD

Supervisor : Mr. Udara Samaratunge

May 2021

**Department of Information Technology
Faculty of Graduate Studies and Research
Sri Lanka Institute of Information Technology**

Declaration

I hereby declare that this dissertation is solely composed by me and to the best of my knowledge it does not contain any materials previously published or written by another person, or material that have been accepted for the award of any academic qualification of a university or institute of higher learning, except where due acknowledgement is made in the text.



.....
Signature of the candidate

21/08/2021
.....

Date

The above candidate has carried out research for the M.Sc. thesis under my supervision.

Name of Supervisor :Mr. Udara Samaratunge.....

Signature : ..

Date :06/09/2021.....

Table of Contents

Table of Contents	1
List of Figures.....	2
List of Tables	3
Abstract.....	4
Chapter 1 Problem Statement	5
1.1 Research Objectives and Research Questions	7
1.1.1 Pre-timed traffic light systems that waste time without knowing the real-time traffic details.....	7
1.1.2 Large waiting times on red lights in the traffic light signals.....	7
1.1.3 A vehicle that has stopped at an intersection due to traffic lights happens to stop at the next intersection very often.	7
Chapter 2 Literature Survey.....	9
Chapter 3 Methodology.....	13
3.1 Google distance matrix API	17
3.2 Stls synchronization service.....	19
3.3 Stls traffic API	21
3.4 Stls simulator UI.....	22
3.5 Implementation Steps	22
3.6 Pre timed based traffic light system	24
3.7 Smart traffic light system	25
3.7.1 Traffic status	26
3.7.2 Greenlight duration.....	26
3.7.3 Red light duration	28
3.7.4 Interconnected traffic lights.....	31
3.7.5 How the smart traffic light system works.....	32
3.8 Simulation of real-world traffic flow.....	35
3.9 Results and Outcome	38
References	46
Annexure.....	48
Annexure 1: Greenlight time against traffic status.....	48
Annexure 2: Red light time against green light time	50
Annexure 3: Latitude and Longitude of the considered locations.....	52

List of Figures

Figure 4-1: high-level diagram	13
Figure 4-2: sequence diagram.....	14
Figure 4-3: flow chart diagram	16
Figure 4-4:Junction	23
Figure 4-5:Junction with distance	23
Figure 4-6:Green light time graph	27
Figure 4-7:Red light time duration with green light time duration	29
Figure 4-8:Red light time duration with traffic status.....	30
Figure 4-9:Junction with GPS points	31
Figure 4-10:Junction with GPS points	33
Figure 4-11:Junction with GPS points	35
Figure 4-12:Simulator	37
Figure 4-13:Simulator	37
Figure 4-14:Simulator	38
Figure 4-15:Pre timed traffic light system simulator	39
Figure 4-16:Pre timed traffic light system simulator	39
Figure 4-17:Pre timed traffic light system simulator	40
Figure 4-18:Smart traffic light system simulator	41
Figure 4-19:Smart traffic light system simulator	41
Figure 4-20:Smart traffic light system simulator	42