

THE OPEN UNIVERSITY OF SRI LANKA
DEPARTMENT OF ELECTRICAL AND COMPUTER
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BACHELOR OF SOFTWARE ENGINEERING
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EEX5362 – Performance Modelling

Mini Project – Deliverable 01

Y. Thilukshan

REG NO: 321429753

Student ID: S92069753

Fuel station with multi fuel and payment System

1. Background

The chosen system in the current mini project is a Fuel Station Operation System, which is improved to reflect a more real world scenario. This simulation is used to represent the way vehicles come to a fuel station, queues, take fuel, and get payments.

This improved system is more complex and realistic in the sense that it considers various types of fuel and various methods of payment as opposed to a simple queue-based model.

1.1 System Components

Fuel Pumps - The pumps can serve one vehicle at a time. Pumps are grouped by types of fuel

- Octane 92 Petrol
- Octane 95 Petrol
- Diesel
- Auto Diesel

Vehicles - Each vehicle has a type of fuel required and quantity. The arrivals of vehicles are random.

Payment method - Vehicles are refueled and then sent to payment. It may be paid either in cash or by card with a transaction in card paying a bit longer as there is a delay in the processing of the payment.

1.2 Performance Aspects within the System

Queue Length - This is the number of vehicles under waiting service.

Average Waiting Time - The period of time a vehicle takes before beginning to fuel.

Throughput - The total number of vehicles attended during a certain period.

Pump Utilization - Percent of time spent working on all pumps.

Payment Delay - Extra time used in card payments as compared to cash payment.

2. Performance Objectives

The main aim of the project is to examine and enhance the efficiency of the fuel station system by researching the major operational measurements at different load conditions.

Specific Objectives

- Minimize Vehicle Waiting Time - Minimize the waiting time of vehicles.
- Maximize System Throughput - Increase the number of vehicles served within a specific simulation time.
- Identify Performance Bottlenecks - Find out whether lines occur more at the fueling pumps or payment counters.
- Analyze Resource Utilization - Assess the efficiency of the use of pumps and payment counters.
- Compare Payment Methods - Determine the impact of card and cash payments on total system delay.
- Optimize Pump Allocation by Fuel Type - Identify whether increasing the number of pumps for high-demand fuel types improves performance.