**REPORT**

**on**

**AUTOMATIC CAR WASH SIMULATION**

**Introduction:**

Simulation is the part of imitation of real world process or system over time. A computer simulation is to model the real life or hypothetical situation on the computer so that it can be seen to see the how system works.

In the automatic car wash simulation the station consist of tunnel like buildings into which customers or attendants drive. The car is always placed on the conveyor belt.

**Types of Car Wash:**

* Superdog.
* Topdog.

**Resources used for car wash:**

* Water
* Electricity
* Washing liquids.

**Data requirement:**

* Electric car wash one queue and one station.
* Station is opened for 24 hours a day from Monday to Saturday.
* Average number of cars that visit the station each day is 55.
* Traffic hours is 10.00 a.m to 4 p.m.
* $1000000 million has been required to build the station.

**Kinds of wash**

**Superdog Topdog**

**Cost: $11 $13**

**Timeslot: 5minutes 7minutes**

**Average of cars: 25 20**

**Properties of Superdog:**

* Underbody spray.
* High pressure and wheel cleaner.
* Scrub and rinse the car.
* Pro-touch foam cleaner.
* Pro-touch wash spray.
* Brilliant Gloss.
* Spot free rinse.
* Pro swing super power dry.

**Properties of Topdog:**

* Pro touch foam cleanser.
* Pro touch wash process.
* Spot free rinse.
* Pro swing super power dry.

**Simulated Parameters**:

* Arrival time.
* Service time.
* Departure time.
* Maximum queue length.
* Average customer wait times.
* Daily and monthly revenue for each wash.
* Cost and profit.
* Return on investment.
* Revenue.
* **Monte Carlo Analysis on return on investment to get back the range of time period has been performed.**
* **Normal distribution and histogram analysis on return on investment.**

**Maximum queue lengths:**

Total number of cars in the queue.

Average wait times of the customer= total customers wait times/ number of cars.

**Revenue Calculations:**

Revenue is the normal income that a business has from its normal activities.

Here we have calculated the revenue from two types of wash.

* Superdog revenue = number of customers \*$11
* Topdog revenue = number of customers \* $ 13
* Daily revenue = Superdog revenue+ Topdog revenue.
* Monthly income = Daily revenue \*30.

**Cost and Profit calculations:**

* Profit for carwash**=** Monthly income – monthly expense.
* Monthly resource cost= For both type of liquids

( electricity+ water+ washing liquids)

* Monthly profit = monthly income- monthly expense
* Return on investment(days)= investment/daily profit.

**Monte Carlo Analysis**

Monte carlo analysis is the probability simulation is a technique used in forecasting models. Its a broad class of algorithms which depends on random sampling to obtain the numerical results.

A general pattern of monte carlo analysis:

* Define a domain of possible inputs.
* Generate inputs randomly from probability distribution over the domain.
* Perform a [deterministic](https://en.wikipedia.org/wiki/Deterministic_algorithm) computation on the inputs.
* Aggregate the results.