A Micro project on

TRAFFIC SIGNAL SYSTEM

Submitted in partial fulfillment of the

GRIET Lab On Board (G-LOB) BY

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CERTIFICATE

This is to certify that the micro project titled “TRAFFIC SIGNAL SYSTEM” is a Bonafide work done by Sai Meghanadh (21241A05M5), Harshith (21241A05N8), Ch.Vishal kumar (21241A05L8),Ranjithkumar(21241A05M2),Sai charan(21241A05L9),Devarjun Chowdary (21241A05L1) under Operating Systems - GRIET Lab On Board (G-LOB) practice of our institute and that this work has not been submitted for the award of any other Degree and Diploma of any Institution/University.

PROJECT GUIDE

Ms.D. Usha Sree

INTRODUCTION

Traffic lights, signals, stop lights also known as robots in South Africa. Traffic signals that are displayed at the intersection for guiding the movement of vehicles on roads. The purpose of traffic signals is to maintain complete order to avoid fatal incidents on roads. The Traffic Signal works on light Signals and includes three colors: Red, Yellow and Green.

Traffic jams are one of the major problems in a densely populated mega city like Dhaka whereas its population and number of running vehicles are much more than its road capacity. Traffic signaling systems, inadequate manpower, narrow road spaces and overtaking tendency of drivers create prolonged traffic jams. Due to traffic jams a substantial portion of working hours must be left on streets which indirectly put an adverse impact on economy and unavoidable road accidents which results loss of lives. As the number of road users constantly increases, and resources provided by current infrastructures are limited. Intelligent traffic control systems have become a very important issue. In this study based on Round Robin Scheduling Algorithm an automatic traffic control system is proposed. The main objective of this study is to reduce the overall waiting time of the vehicle at the cross-junction point. For doing this a microcontroller is used which will make the drivers bound to follow the traffic rules by controlling traffic system that brings the result of decreasing the rate of accident, controlling crowd, lowering the tendency of road blocking etc. This approach can be applied in crossroad junction which are so busy and the sectors those experience a great traffic load.

PROBLEM STATEMENT

Urban traffic congestion is a significant challenge in modern cities, leading to increased travel times, fuel consumption, air pollution, and decreased overall quality of life. The existing traffic signal systems often fail to efficiently adapt to dynamic traffic conditions, resulting in traffic jams during peak hours and underutilization of road capacity during off-peak times.

The project aims to design and implement an intelligent Traffic Signal Optimization System (TSOS) that can analyze real-time traffic data, predict traffic patterns, and dynamically adjust signal timings to minimize congestion, reduce travel time, and enhance overall traffic flow efficiency. The TSOS should take into account various factors such as traffic volume, vehicle types, pedestrian crossing requirements, and time of day to optimize traffic signal cycles.

Objectives:

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1. Develop a data collection mechanism to gather real-time traffic information, including vehicle count, speed, and traffic density, from various intersections in the urban area.
2. Implement a predictive algorithm that can forecast traffic patterns based on historical data and current trends to anticipate congestion-prone areas and times.
3. Design an adaptive traffic signal control system that dynamically adjusts signal timings to optimize traffic flow and reduce congestion hotspots.
4. Integrate the TSOS with the existing traffic infrastructure to allow seamless communication between the central control system and individual signal controllers.
5. Conduct extensive simulations and real-world testing to evaluate the effectiveness of the TSOS in reducing traffic congestion and improving overall traffic management.
6. Analyze the environmental impact of the optimized traffic signal system, including reductions in fuel consumption and greenhouse gas emissions.
7. Develop a user-friendly interface for traffic authorities to monitor and manage the system efficiently, allowing manual interventions when necessary.

The proposed Traffic Signal Optimization System (TSOS) seeks to revolutionize urban traffic management, enhancing the commuting experience for residents, promoting sustainable transportation, and contributing to a greener and more efficient urban environment.

Project Overview:

The traffic signal system project aims to simulate the functioning of a traffic signal using an operating system and the round-robin scheduling algorithm. The project focuses on managing the allocation of time for each traffic signal light, ensuring fairness and efficient use of resources.

A traffic signal system is a control mechanism used at intersections to manage the flow of traffic and ensure safety. The round-robin algorithm is a common approach used in traffic signal systems to allocate green signal time to different traffic movements in a cyclical manner.
Here's an overview of how a traffic signal system using the round-robin algorithm typically works:

1. **Intersection layout**: The intersection is divided into multiple traffic movements, such as left turn, right turn, through traffic, and pedestrian crossings. Each movement is associated with a signal phase.

2. **Signal phases**: Each signal phase represents a specific combination of movements that can proceed simultaneously without conflict. For example, one phase may allow traffic from all directions through, while another phase may allow left turns.

3. **Cycle length**: The traffic signal operates in a predefined cycle, which is the time taken to complete one full sequence of signal phases. The cycle length is determined based on the traffic demand and the time required to clear the intersection adequately.

4. **Allocation of green time**: In the round-robin algorithm, each signal phase is assigned a specific duration of green signal time within the cycle. The allocation can be based on factors such as traffic volumes, historical data, or predefined ratios. The green time is distributed fairly among the different signal phases to provide each movement with an appropriate share of the available time.

5. **Transition between phases**: As the cycle progresses, the traffic signal system transitions smoothly between different signal phases. This ensures a smooth flow of traffic and minimizes conflicts between movements. There may be short periods of all-red signal time known as clearance intervals to allow for the safe clearing of the intersection before the next phase begins.

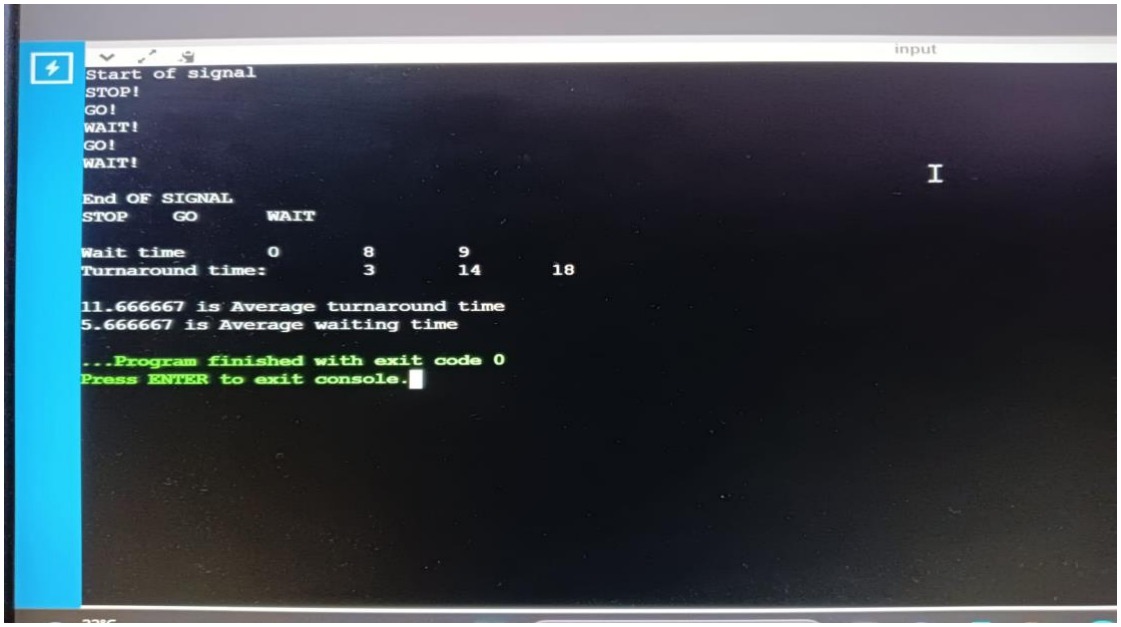
6. **Adaptive features**: Some modern traffic signal systems incorporate adaptive features that can dynamically adjust the allocation of green time based on real-time traffic conditions. These systems use various sensors, cameras, or vehicle detection technologies to gather data and optimize the traffic signal timings accordingly.

CODE:

```
#include<stdio.h>
#include<unistd.h>
int main()
{
int tt[3],wt[3];
int arrival_time[3]={0,0,0};
int burst_time[3]={3,6,9};
int bt[3]={3,6,9};
int tq=5;
float average_wait_time, average_turnaround_time;
int c=3;
char name[3][10]={"stop","go","wait"};

int i=0;
printf("start of signal\n");
int cur=0;
while(c!=0)
{
  if(burst_time[i]>0)
   {
   if(burst_time[i]<tq)
        {
          sleep(burst_time[i]);
          cur=cur+burst_time[i];
          tt[i]=cur;
        }
    else
        {
           sleep(tq);
           cur=cur+tq;
        }
     printf("%s\n",name[i]);
     burst_time[i]=burst_time[i]-tq;
     if(burst_time[i]<0)
            c--;
   }
   i=(i+1)%3;
}
printf("\nend of signal\n");
printf("stop\tgo\twait\n");
float tt_av,wt_av;
tt_av=wt_av=0;
```

```
for(int i=0;i<3;i++)
{
  tt_av+=tt[i];
  wt[i]=tt[i]-bt[i];
  wt_av+=wt[i];
}


printf("\nWait time\t");
for(int i=0;i<3;i++)
  printf("%d\t",wt[i]);

printf("\nTurnaround time:\t");
for(int i=0;i<3;i++)
{  printf("%d\t",tt[i]); };
printf("\n");
tt_av=tt_av/3;
wt_av/=3;
printf("\n%f is Average turnaround time",tt_av);
printf("\n%f is Average waiting time",wt_av);
}
```

OUTPUT:



CONCLUSION:

We have demonstrated the usage of Round robin scheduling in a real life situation.We have simulated traffic signal system successfully in c language. It can be extended and used in other programming languages also.