

BASAVARAJESWARI GROUP OF INSTITUTIONS

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

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(Recognized by Govt. of Karnataka, approved by AICTE, New Delhi & Affiliated to
Visvesvaraya Technological University, Belagavi)

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

A Mini-Project Report

On

“ MOVING TRAIN ”

A report submitted in partial fulfilment of the requirements for the

MINI PROJECT OF COMPUTER GRAPHICS LABORATORY (18CSL67)

Submitted By

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Visvesvaraya Technological University

Belagavi, Karnataka 2022-2023

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CERTIFICATE

This is to certify that the MINI PROJECT of COMPUTER GRAPHICS LABORATORY entitle **“MOVING TRAIN”** has been successfully presented by **SANJANA KADIRI** bearing USN **3BR20CS146** and **SANKET NAIK** bearing USN **3BR20CS147** students of VI semester B.E for the partial fulfilment of the requirements for the award of **Bachelor Degree in Computer Science and Engineering** of the VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAVI during the academic year 2022-2023.

Signature of guide

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External viva

Name of the examiners

1. _____

2. _____

Signature of HOD

Dr. R.N. Kulkarni

Signature with date

ACKNOWLEDGEMENT

The satisfactions that accompany the successful completion of our mini project on **“MOVING TRAIN”** would be incomplete without the mention of people who made it possible, whose noble gesture, affection, guidance, encouragement and support crowned my efforts with success. It is our privilege to express our gratitude and respect to all those who inspired us in the completion of our mini-project.

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ABOUT THE PROJECT:-

The "Moving train" computer graphics project is an impressive endeavor that brings together animation, interactivity, and visual effects to create a captivating simulation. In this project, the primary objective is to develop a realistic train animation that can seamlessly move, stop, and start at signals while dynamically transitioning between day and night modes.

The project aims to provide an immersive experience for the users, allowing them to witness the train's journey as it traverses a virtual landscape. By incorporating various technical aspects, such as animation, simulation, and rendering, the project team has successfully brought the virtual train to life, mimicking its behavior in the real world.

The first key feature of this project is the train's ability to move smoothly along its designated track. Through meticulous attention to detail and understanding of animation principles, the team has simulated the train's motion with precision, giving it a sense of realism. Users will witness the train gliding along the track, conveying a sense of speed and fluidity.

Moreover, the project introduces an interactive element by integrating signal systems. The train intelligently responds to signals, coming to a complete stop when required and resuming its journey once the signal changes. This functionality adds a layer of authenticity, as it mimics the operational aspects of train transportation systems in the real world.

Another remarkable aspect of this project is the implementation of day and night modes. Users will be able to witness the train's journey through different lighting conditions, creating a dynamic and visually captivating experience. By seamlessly transitioning between day and night, the project team has achieved a realistic representation of time progression, adding depth and atmosphere to the simulation.

Problem Statement:-

The "Moving train" computer graphics project aims to develop a realistic simulation where a virtual train can exhibit dynamic behaviors such as movement, stopping and starting at signals, and transitioning between day and night modes. However, to achieve these objectives, several technical challenges need to be addressed.

Signal System Integration: Implementing an interactive signal system presents its own set of challenges. The train must be able to detect and appropriately respond to signals, coming to a complete stop when required and resuming movement when the signal changes. The integration of signal logic and synchronization with the train's animation is crucial for creating an authentic transportation experience.

Day and Night Mode Transitions: Seamless transitions between day and night modes introduce another challenge. The project requires dynamic lighting adjustments to simulate the changing environment. Implementing realistic lighting effects, including shadows, ambient lighting, and the gradual transition between day and night, demands careful consideration of rendering techniques and efficient handling of light sources.

Objectives of the project:-

- **Realistic Train Movement:** The primary objective of the "Moving train" computer graphics project is to achieve realistic train movement along a designated track. The train should exhibit smooth motion, taking into account factors such as acceleration, deceleration, and maintaining a consistent speed. The goal is to create an animation that closely mimics the behavior of a real train in motion and it should stop when the signal is red and it should supposed to move ahead when the signal is green.
- **Signal Interaction:** The project aims to incorporate an interactive signal system where the train can intelligently respond to signals. The objective is to implement logic that halts the train's movement when it encounters a signal, simulating a real-world scenario. After the signal changes, the train should resume its journey, ensuring an accurate and seamless interaction between the train and the signal system.
- **Dynamic Day and Night Modes:** Another objective of the project is to provide a visually dynamic environment by incorporating day and night modes. The project should enable smooth transitions between these modes, allowing the lighting and visual elements to change realistically based on the time of day. This objective enhances the overall visual appeal and immerses users in a dynamic virtual world.
- **User Control:** The project aims to provide user control over the train's movement, signal interaction, and day-night mode transitions. The objective is to create an interactive interface that allows users to start, stop, and control the train's speed. Users should also have the ability to trigger mode changes between day and night, enabling them to customize their experience and explore different scenarios.

SYSTEM REQUIREMENTS AND SPECIFICATIONS:-

Hardware Requirements:

Processor	: i3
Hard Disk	: 500GB
RAM	: 8GB

Software Requirements:

Operating System	: Windows 8.1
Software Tools	: OpenGL
Coding Language	: Python, React ,HTML ,CSS and Javascript
Toolbox	: Image processing toolbox

Function/Method Description:-

- `moveTrain(speed, direction):`
Description: This method controls the movement of the train along the track.
- `stopAtSignal():`
Description: This method halts the train's movement when it encounters a signal.
Parameters: None
Returns: None
- `startAfterSignal():`
Description: This method resumes the train's movement after the signal changes.
Parameters: None
Returns: None
- `changeToDayMode():`
Description: This method transitions the environment to the day mode.
Parameters: None
Returns: None
- `changeToNightMode():`
Description: This method transitions the environment to the night mode.
Parameters: None
Returns: None

These methods serve as the key functionalities in the "Moving train" computer graphics project. They enable the control of the train's movement, its interaction with signals, and the ability to switch between day and night modes. The provided parameters allow for customization, enabling adjustments such as modifying the train's speed or specifying the direction of movement.

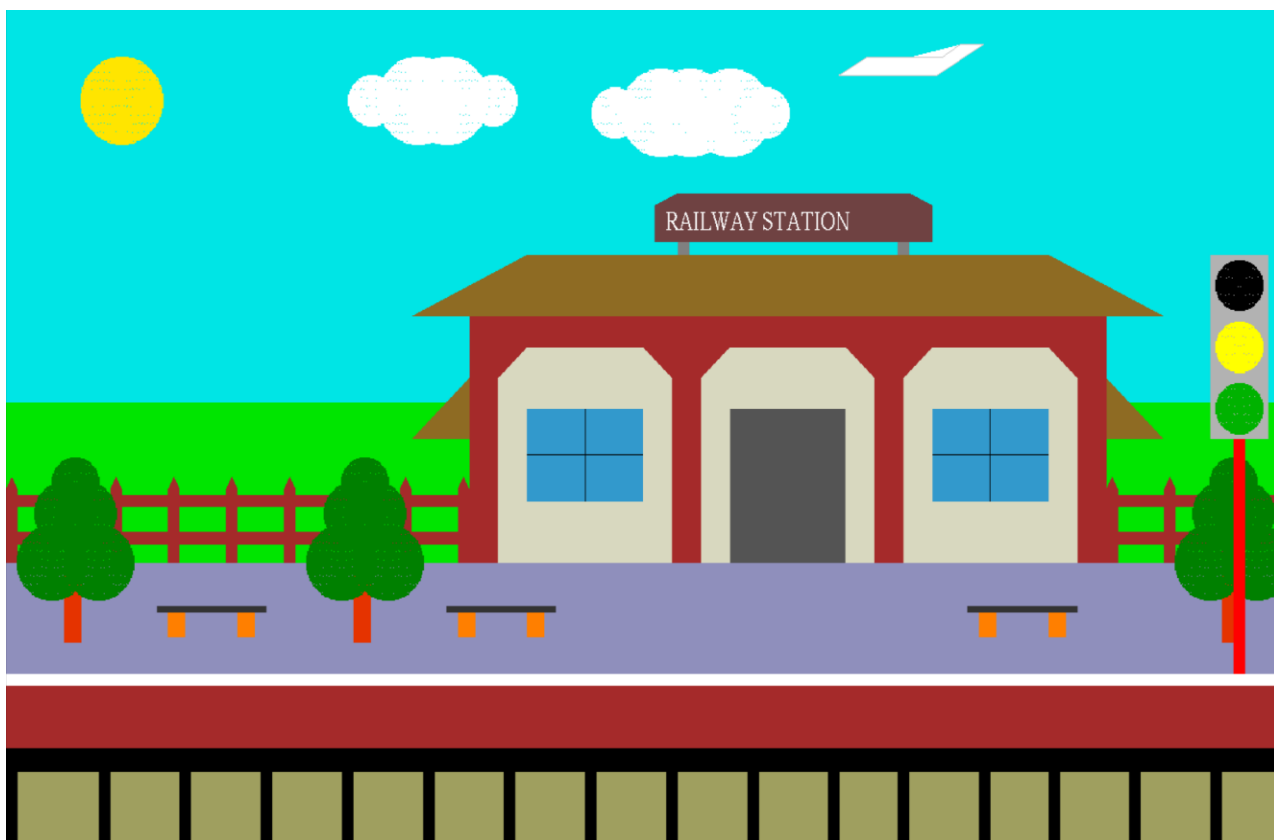
By utilizing these methods, developers can implement a dynamic and interactive simulation. The integration of these functionalities ensures a realistic experience where the train moves, responds to signals by stopping, and resumes its journey after the signal changes.

Results:-

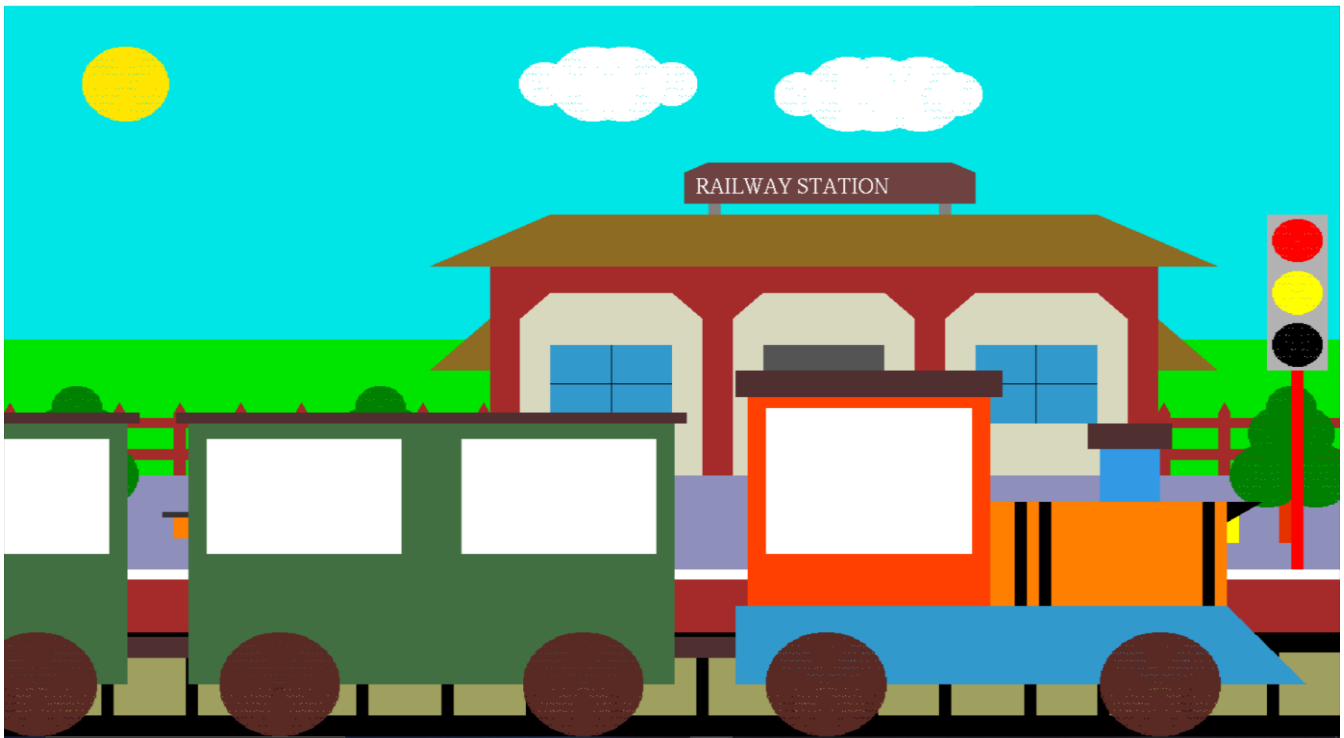
Controls:-



Train not yet arrived at station (day mode):-



Train stops because of signal red (day mode):-



Train starts moving when the signal is green (night mode) :-



Conclusion:-

The "Moving train" computer graphics project has successfully achieved its objectives of creating a captivating simulation where a virtual train can move, stop and start at signals, and transition between day and night modes. Through the implementation of key functionalities, including train movement control, signal interaction, and mode transitions, the project has delivered an immersive and visually appealing experience.

By utilizing the provided methods, such as `moveTrain()`, `stopAtSignal()`, `startAfterSignal()`, `changeToDayMode()`, and `changeToNightMode()`, the project enables users to witness realistic train motion, as it smoothly travels along the track, responds to signals, and adapts to the changing lighting conditions.

The integration of interactive elements, such as signals, adds a layer of authenticity to the simulation, mimicking real-world train operations. Users can observe the train coming to a halt when encountering signals and resuming its journey after the signal changes, enhancing the overall realism of the experience.

Additionally, the day and night mode transitions contribute to the visual appeal of the project. The seamless change between day and night lighting creates a dynamic environment, offering users a captivating simulation that reflects different times of the day.