

Light bringers

Presents:
Eishkom
2023 Exam project
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1. Executive summary

1.1 Highlights

- Eishkom was developed by the team light bringers consisting of 10 developers, namely:
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- The game Eishkom was formed in 2023 as part of an educational project in teaching and learning about the effects of load shedding in South Africa under the module ITSP 113
- Determining the players:
 - Eishkom involves two parties the student and the system
 - The student will be our system player
 - The system will be the platform that the students will use.

1.2 Overview

- Eishkom was created with the aim to educate our players about South Africa's undergoing power crisis, Load shedding, the causes, strains, and possible solutions.
- We aim to bring light to the problem by allowing the player to have fun in our game whilst learning about all the possible solutions
- We also aim to teach players on the importance of the balance between the demand and supply of electricity in order to prevent total black out

1.3 Introduction

The availability of electricity ensures the provision of social services such as lighting, operating technology, cooking, as well as economic activities. However, it is extremely difficult to store the huge quantities of electricity that people need, which means there is a need for continuous generation of large quantities sufficient for people's ever-increasing demands (Polyoak, 2011, p. 1), else there should be a way of balancing the grid hence loadshedding.

Eishkom is a game programmed using scratch. Its main focus is to simulate how a real power grid is kept stable and how power stations prevent blackouts while managing limited resources.

2. Load shedding

2.1 What is load shedding?

According to Eskom, “load shedding is a controlled process that responds to unplanned events to protect the electricity power system from a total blackout”. Briefly, the characterisation by Eskom of load shedding denotes that load shedding is a deliberate outage of electricity by the power supplier, “Eskom”

The South African energy crisis is an ongoing period of widespread national blackouts of electricity supply. It began in the later months of 2007, and continues to the present. Load shedding is the deliberate cut off of electricity to the nation to avoid the permanent failure for the overload.

Load shedding is a process of temporarily reducing the demand for electricity on the power grid by turning off the electricity supply to certain areas for a certain period of time. This is done by Eskom, the electricity provider in South Africa, when the demand for electricity exceeds the supply.

Load shedding helps to prevent total blackouts or power outages and ensures that the power grid remains stable and functional. It is beneficial for the players to understand the importance of balancing between the demand and supply of the electricity. Therefore, Eishkom is constructed in a way that the player will learn that if the demand exceeds the supply, load shedding is implemented (first game), and when there is enough supply there is no load shedding.

2.2 What are the possible solutions?

- Promote energy efficiency: Encourage consumers to use energy-efficient appliances and lighting, and to reduce their overall electricity consumption. This can be done by providing incentives such as tax rebates, and by raising public awareness about the benefits of energy conservation.
- Promote renewable energy: Eskom can promote the use of solar, wind, and other renewable energy sources, which can reduce the reliance on fossil fuels and increase the overall electricity supply.
- Improve the power grid infrastructure: Eskom can upgrade the power grid infrastructure to reduce power losses and improve the overall efficiency of the electricity distribution.
- Implement demand-side management: Implement measures such as time-of-use tariffs, which encourage consumers to use electricity during off-peak hours and reduce electricity usage during peak hours. This can help to balance the demand for electricity and reduce the need for load shedding.
- Look out for the scheduled load shedding times in your area and charge devices, or have meals ready, to avoid being too inconvenienced. (City of Johannesburg, 2018)

3. Stages of the game

3.1 Difficulty Level

The game consists of three sub-games (levels button) which represent different difficulty modes. The first game is a beginner mode, this level is included to get beginner players familiarised and evolve in their abilities. The second game is a moderate mode, the third game is an advanced mode. The player will be allowed to decide on the level he/she would like to play.

3.1.2 Level One: Free Fall

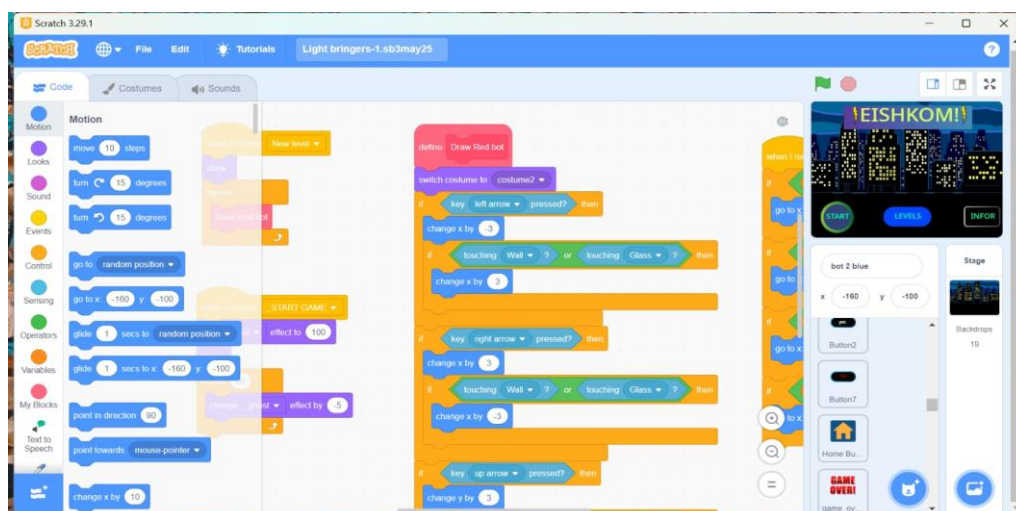
In this game the setting is a city, there are sprites that represent demand (angry faces) and supply (smiley faces) that are falling. The player will have to catch the supply sprites and avoid the demand sprite. The objective is to balance the grid. If the operator catches 20 smiled faces the grid variable increments by 5, when the grid is equal to 100 and the game stops and "Win" is displayed.

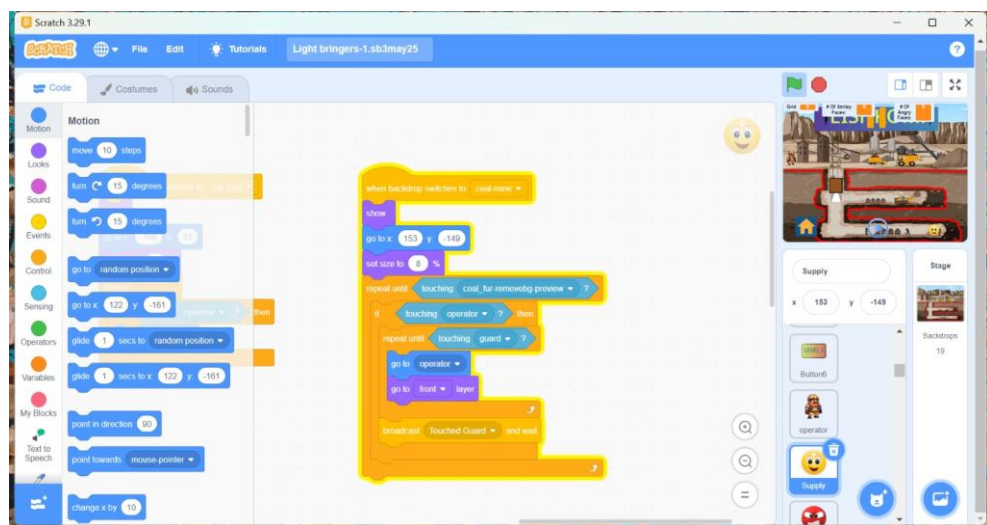
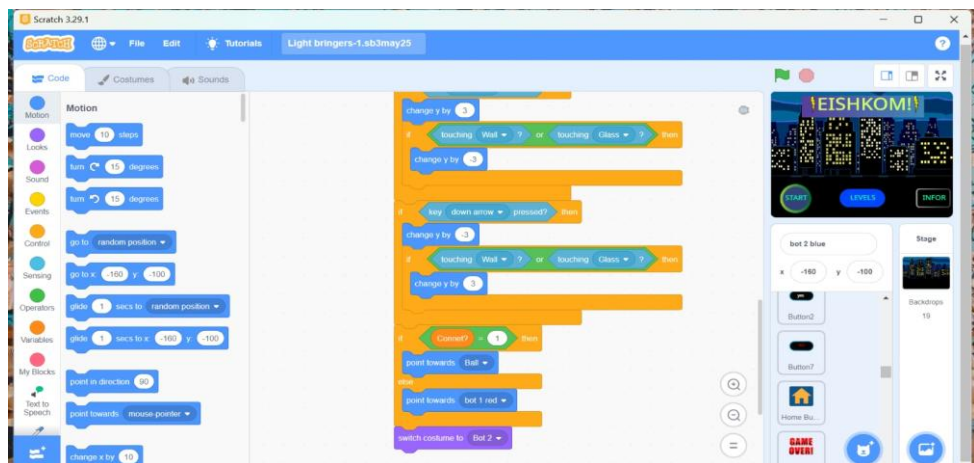
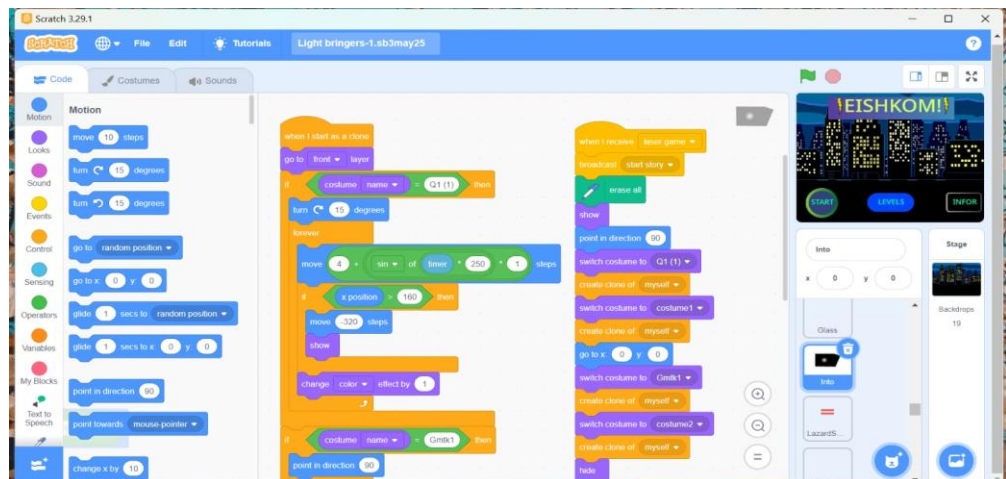
3.1.2 Level Two: Mine Runner

This level has three backdrops which all take place in a mine setting, the first backdrop consists of a single supply sprite that has to be collected and taken to the next backdrop without touching the guard. In the next backdrop the player will have to avoid the demand sprites that are coming in from the right. If the player touches a demand sprite, then 10 points will be deducted. The player goes to the next backdrop and then burns the supply sprite, then the grid will go up by 350 kw/h.

3.1.3 Level Three: Laser connector

This game simulates load shedding whereby the player will be given an opportunity to reconnect the inverter to bring the power back. It takes place in the power station control room. When load shedding is implemented, the player is given a time frame of 60 seconds to connect the inverter in different backdrops. The player will have to move through the borders and obstructions, like glass without touching them. If they do touch the obstructions the game will restart. After the player has successfully connected the inverter, the lights will be turned back on. The game will end when the time runs out





3.2 The design of the game

The entire game will consist of three sub games, free fall, mine runner and a Laser connector. We added a sense of momentum that makes our players attracted to the game. This implies with the theme and the difficulty.

3.2.1 Main menu contains:

- Night city backdrop
- Buttons (start, levels, info)

3.2.2 Each game will have:

- Different backdrops
- Sprites
- Buttons

3.2.3 The main sprites used:

- The angry face emoji represents the demand for electricity.
- The smiley face represents the supply of electricity.
- The grid operator, this sprite will be controlled by the player.

4. The aim of the game

Light bringers aim is to educate our players about the implications of load shedding and to provide with possible solutions. Through our game our players understand that South Africa has high demand for energy, due to this high demand South African power company Eskom has experienced struggles with meeting electricity supply.

The premise of our game is to educate players the importance of balancing demand and supply in order to prevent load shedding.

We intended for the player to be challenged and to think critically, all while having fun. As the player progresses through the game the challenges become increasingly difficult, the more challenges the player gets through the more accomplished they will feel. (Smith, 2020)

5. The Human and Computer Interaction

5.1 The human component

- Emotions - our emotional response as human beings affects how we perform. As a problem that may be easy to solve when we are relaxed will become difficult if we are frustrated or afraid.
- Individual differences - we are aware to account for individual differences as much as possible within our design.

5.2. Models of interaction

- Interaction - The player and the system considered in the project as interaction involves two parties. The interface effectively translates between these two parties for interaction to be successful, according to Norman's cycle.

5.3. Ergonomics

- Arrangement of controls and displays - functional, Sequential, Frequency.
- Health issues are important to consider, such as eye strain and repetitive strain injuries.
- The use of colour plays a big role in the design of our game, as it affects mood and enhances gameplay

5.4. Interaction Styles

- Command line interface
- Menus
- Natural language

5.5. Basics of Interaction

- Humans – We consider the players.
- Prototyping – Design -> analysis

6. Conclusion

Computer games are software which creates an interaction between the human, who is a player, and machine, which is the computer. In the design of our game, we realised that it will be impossible not to include design rules for software and ergonomics for the efficiency of the players of our game.

Ergonomics dictate that provision be made for, arrangement of controls and displays, physical environment, health issues that may arise as players engage with our software, and the use of colour in the design of the game especially during interaction that may take longer.

Our game was made with the intention of bringing light to South Africa's on going power crisis, and make the player aware of the possible solutions to the problem. We intended for the user to be challenged and entertained and informed all while playing the game.

In this documentation we have provided you with definitions for both our games and the scope thereof, we concluded the objectives of the game and a brief design of the game.

Entirely, Eishkom is a simulator game in which the player tries to balance the supply and the demand of electricity in order to minimize the electricity outages currently affecting South Africa. In summary our game can provide the player with a comprehensive understanding of load shedding, encourage energy management practices, develop problem-solving skills, raise public awareness and foster empathy towards this affected by power outages.

7. Bibliography

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