جامعة أم القرى
UMM AL-QURA UNIVERSITY

Computer Graphics proposal (14012501)

Professor: Omniah Nagoor

Group Lecture: 2

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Task Distribution

Team members	*Tasks*
Noran Mousa Almughamisi (Leader)	Designing Lotso character, scene #4, scenario writing, and report
Budur Abdulaziz Alghamdi	Designing Alien character, scene #0 and #5, code collection and transitions, scenario writing, demo, and report
Aseel Abdulrahman Keleeb	Designing Mr. Potatohead character, scene #3, scenario writing, report, and presentation
Teif Abdulrhmn Alhrbi	Designing Jessie character, scene #6, user manual, report, and scenario writing
Nrdeen Mahmood Sahrah	Designing Woody character, scene #2 and scenario writing

Project Name

You've got a friend in me.

Project Category

Interactive Story and Animation.

Introduction

Our project is a fun, made-up interactive story highly inspired by the animated movie Toy Story. We chose to feature five characters—out of many others—to be redrawn and designed by us and displayed as the main characters of this story: Woody, Jessie, Alien, Mr. Potatohead, and Lotso—the star of the show. We were aiming to create an enjoyable, meaningful story that attracts attention and shows the strong friendship and deep connection that our characters have. We contributed the work as fairly as we could; each one of us had a character and a scene to work on in a span of two weeks, and it was expected to be fully coded with all the characters and other objects as well as transformations and interactions.

In this report, we will explain the detailed idea of the project, the methods that we used to graph our characters and scenes, how we collected and organized our code, how we connected all the scenes together, and what interactions we used in the project. Then, we will show how each character turned out to look, and a displayed output window for each scene.

The project idea, as mentioned before, is a story about a group of five toy friends who find themselves on quite an adventure. It all begins when Lotso goes missing one day, which makes his friends worried about him. So, determined to rescue their friend, they create a secret plan to sneak out of the house unnoticed. After that, they decide that Woody and Jessie should climb out the window to go and find Lotso. The scary part is when they find out that Lotso is in the neighboring house, specifically inside a kid's room that is known for destroying toys. Thankfully, they were able to save him and return home safely and as quickly as possible.

Methodology

In this project, we have seven main scenes that will be explained briefly and shown later in the report. We used basic shapes to draw our characters and scenes, like *GL_QUADS, GL_LINES, GL_LINE_LOOP, GL_POLYGON, etc*. We also used the ***drawFilledCircle()*** and ***drawHollowCircle()*** that we referenced in the code's comments as well as the **"Resources and references"** section of this report. Additionally, we used other functions derived from the ***drawFilledCircle()*** method, which we modified to get our desired shapes and results. These functions are ***drawHalfupCircle()***, ***drawHalfdownCircle()***, and ***drawFilledCircleOval()***.

We used the ***drawString()*** method to display texts in our scenes, we got this method from a website referenced at the end in the **"Resources and references"** section of this report.

The texture image we used is an image of a wooden floor, which we have used in multiple scenes. We used a website to convert the image from .jpg to .bmp so it could be read and used in the code. All sources and links to both the image and the website will be attached at the end, along with the ***loadTexture()*** function source.

As we have coded our own scenes individually, obviously we had to collect all the scenes to get the full project, so we gathered all code segments in a single source code and divided the code into sections with comments to enhance the readability of our code and explain each part on its own. All characters were placed in a section together; they were placed in functions named after every character—***Jessie(), woody(), bear(), MrPootatoHead(),*** and ***alien()***. Each scene was collected and organized into a single function named after its ordered number ***(e.g., s0(), s1(), s2(), etc.)*** as well as its other helping methods associated with the scene—such as ***hat(), Room(), Door(), redDevice(), Scanse(), boat(), drawStar(), etc.***—in the same section of code. Then, we used an if statement and a global variable ***int scene*** in the ***display()*** function to display our scenes one by one so they would not overlap with each other.

As for interactions and animations, we used the ***idle()*** function to animate the clouds in the cover(scene #0) to move horizontally, the characters going out the

door in the second scene, the car moving on the road in the fourth scene, the boat in the fifth scene, and the stars in the ending scene.

We also used the ***KeyPress()*** function in two scenes specifically. First, we used it in the fourth scene, where it uses the 'd' to move Woody to the left, 'f' to the right, 'r' upwards, and 'c' downwards, and it was used again in the fifth scene with the same functionality.

The ***special()*** function was used as well in the fourth and fifth scenes to move Jessie around using the arrow keys—up, down, left, and right.

Most importantly, we used the ***mouseClick()*** function to transition from one scene to the next using the *'NEXT'* button we created, in addition to the third scene, in which we used the mouse to click the buttons on the red device. Clicking the left mouse on the right button shows the graph of the sneak-out plan, and clicking the right mouse displays a secret message to the user.

Obviously, we made sure that the user knows the interactions he can have with every scene, as well as the scenario behind it. As we have used a text displayed on the window.

Detailed Project Scope

As mentioned in the **Methodology** part, we have a total of seven scenes in this project, here is a written explanation of each scene:

First scene: The cover scene. A basic scene of Andy's room (the kid who owns the toys) with a rectangular shape containing the name of the project and a hat on top of it. **Helping methods: *hat(), myClouds(), rectangle(),*** and the method of the actual scene ***s0().***

Second scene: The introductory scene. Lotso introduces himself and starts telling the story. **Helping methods: *Room(), Cloud(), bear(),*** and the method of the actual scene ***s1().***

Third scene: The toys notice Lotso being lost and start looking for him outside Andy's room and around the house. **Helping methods: *Room(), Cloud(), Door(), Jessie(), woody(), MrPootatoHead(), alien()***, and the method of the actual scene ***s2().***

Fourth scene: The planning scene. They start thinking of a plan to go out, find their friend and save him from potential danger. **Helping methods: *Room(), Cloud(), redDevice(), Sketch(), clearScreen(), Jessie(), woody(), MrPootatoHead(), alien()***, and the method of the actual scene ***s3().***

Fifth scene: The window scene. This is where they put their plan into action and decide that Woody and Jessie should be the ones to go out and look for Lotso. **Helping methods: *Scanse(), drawCarWithDetails(), Jessie(), woody(), MrPootatoHead(), alien(),*** and the method of the actual scene ***s4().***

Sixth scene: The neighbor's house scene. Jessie and Woody suspects that their evil neighbor who destroys toys is the one keeping Lotso hostage. Therefore, they immediately go there to try and save Lotso. **Helping methods: *line(), circle(), triangle(), sky(), mountain(), house(), river(), longGrass(), boat(), ground(), field(), Jessie(), woody()*** and the method of the actual scene ***s5().***

Seventh scene: The ending scene. Jessie and Woody find Lotso at their neighbor's and they were happy to see him safe. Lotso says important words that display the deep friendship they share. **Helping methods: *drawStar(), Background(), Jessie(), woody(), bear()*** and the method of the actual scene ***s6().***

User Manual

mouseClick()	**- Using CLICK button in SCENE#0** **- Using NEXT buttons in SCENES# 1, 2, 3, 4, 5** **- Using device buttons in SCENE#3:** **right button: plan appears(right click), secret message(left click)** **left button: clear device screen**
KeyPress()	**This function is called when keyword button is pressed in SCENES# 5, 4:** **- d: move Woody to the left, f: to the right, r: upwards, c: downwards**
special()	**Handle special keys in SCENES# 5, 4** **- Move Jessie around using arrow keys**

Our Characters

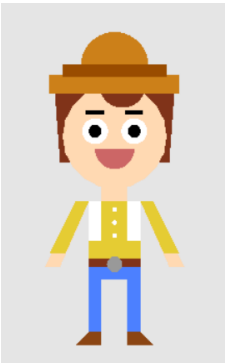
Woody

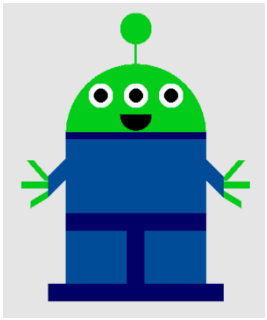
Jessie

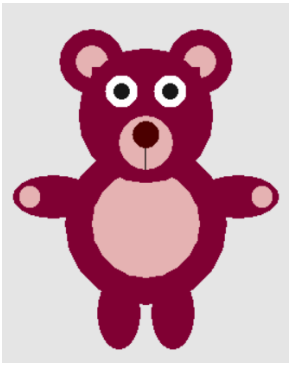
Alien

Mr.Potatohead

Lotso





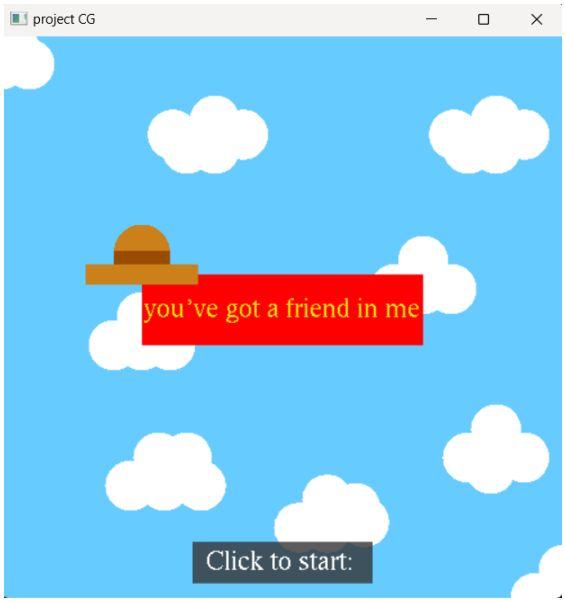


Result

1- The start scene/cover

In this scene the clouds are moving horizontally,

and the user must click the button to start.



2- Introductory scene

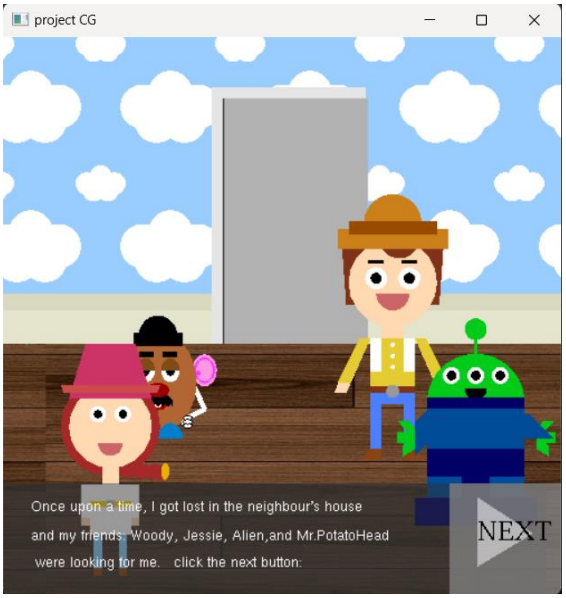
Lotso introduces himself and

starts telling the story.

3- The toys realize that Lotso is missing

In this scene the toys move to get out of the room.

They are looking for Lotso in the house.



4- The planning scene

They start thinking of a plan to get out and

save their beloved friend Lotso.

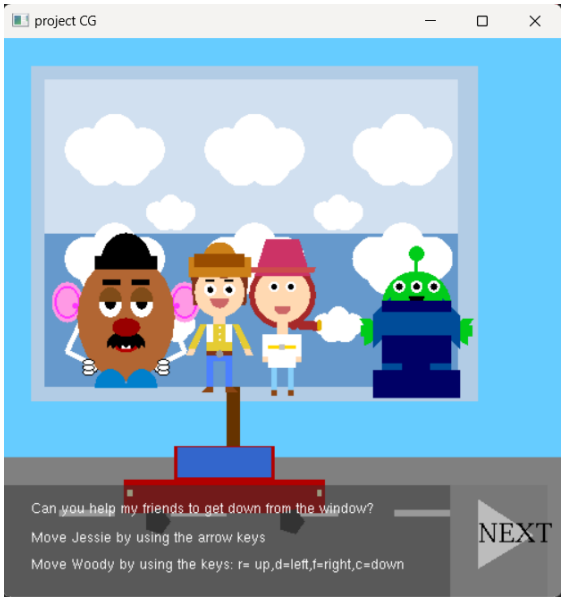
In this scene, the user can click the button of

the red device to show/erase the plan and

a secret message.

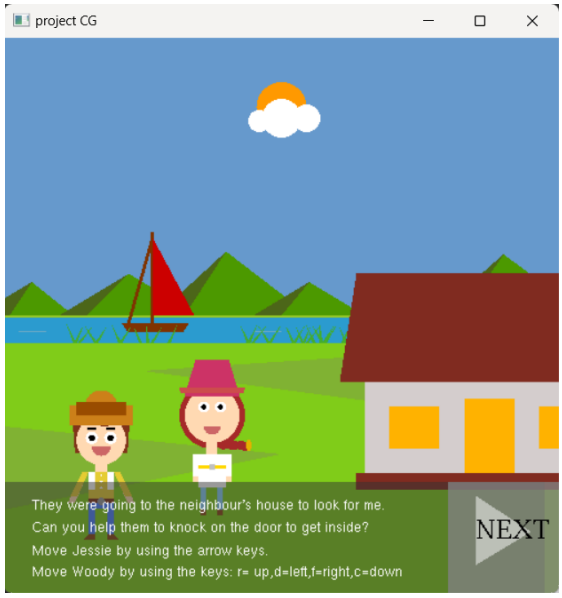
5- The window scene

They decided that Woody and Jessie will climb out of the window. In this scene, the user can move Jessie and Woody. Instructions are written in User Manual and on window screen and the car is moving.



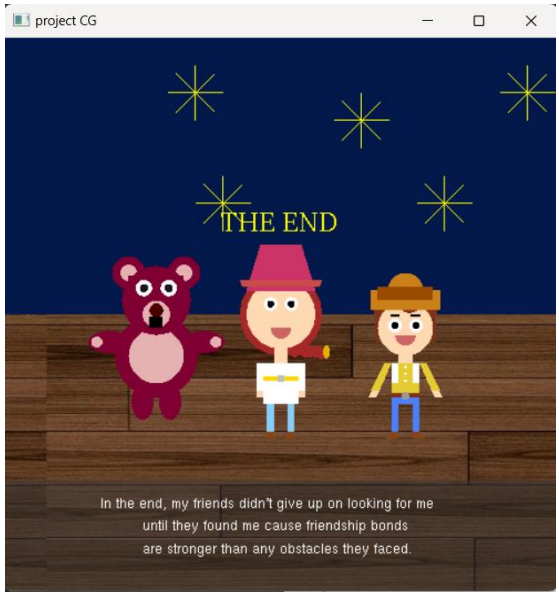
6- The neighbor's house scene

They suspected that Lotso is at their neighbor's and decided to go there and save him. They knock on the door before going in. In this scene, the user can move Jessie and Woody. Instructions are written in User Manual and on window screen and the boat is moving.



7- The ending scene

They find Lotso and are happy to see him safe. Lotso appreciate them and says important words about friendship. In this scene the stars are moving.



Conclusion

This project is an application of what we have learned in the “Computer Graphics” course. It was completed with a ton of effort and passion from all the team members involved as it is a childhood treasure of ours that we wanted to cherish and share with others. We gave it all we got and learned a lot from it, and we hope it’s a work that others can learn from and evolve in the future. Special thanks to our professor, Omniah, and all those who supported and helped us.

As a wise toy once said, friendships last 'To Infinity and Beyond!'.

Future Works

In the future, we will work to complete all parts of the film, develop our idea, and make it in 3D instead of 2D, and we will include more interactive and creative ideas.

Resources and References

- **Drawing of a circle:** https://gist.github.com/linusthe3rd/803118
- **DrawString method:** https://www.openglprojects.in/2012/04/tutorial-how-to-display-strings-in.html#gsc.tab=0
- **Font Type:** https://www.opengl.org/resources/libraries/glut/spec3/node76.html
- **Texture code:** https://stackoverflow.com/questions/12518111/how-to-load-a-bmp-on-glut-to-use-it-as-a-texture
- **Texture image:** https://www.pinterest.cl/pin/349591989837410639/
- **Website to convert image to BMP:** https://convertio.co/ar/jpg-bmp/
- **To have a better understanding of the glRasterPos2f(x, y):** https://registry.khronos.org/OpenGL-Refpages/gl2.1/xhtml/glRasterPos.xml