

MOBILE SIMULATOR USING COMMANDS OF COMPUTER GRAPHICS

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ABSTRACT

Now-a-days mobile phones have become the necessity for each and every individual. Buyers get often confused while making the choice of the phones, taking into consideration their functionality and user-interface. Today, a large number of mobile phones are available for the buyer which fits into their budget and requirements. So to choose the best among them has become a tedious task for them..... Here comes the need of much awaited buddy '**Mobile Simulator**'. It helps the buyers to have an experience of using the phone they have opted to buy and be sure that they are going to be satisfied with the functionality and UI (User Interface). Mobile Simulator is made using Computer Graphics, it gives the basic idea of the two characteristics already mentioned. Mobile phone sellers keep a dummy phone for providing the experience of using the phone, which the buyer is willing to buy. It is nearly impossible to have such a dummy phone for each and every model. So, instead of using a dummy phone the sellers just have to install the simulator for the mobile phone they are selling and using basic input commands the customers can interact with that phone which is much similar to using the phone in reality. Using such Mobile Simulators, cost for keeping dummy phones also decreases to a negligible extent and buyers can also feel the satisfaction of using the phone they are going to buy.

Keyword: - Mobile Simulator, Computer Graphics, Basic Commands, CG Commands, User Interface Provider

1. INTRODUCTION

“A picture is worth a thousand words” is a well-known quote and highlights the advantages and benefits of the visual presentation of our data. We are able to obtain a comprehensive overall view of our data and also study features and areas of particular interest.^[1]

A well-chosen graph is able to transform a complex table of numbers into meaningful results. You know that such graphs are used to illustrate papers, reports and thesis, as well as providing the basis for presentation material in the form of slides and overhead transparencies. A range of tools and facilities are available to enable users to visualize their data, and this document provides a brief summary and overview.^[1]

Computer graphics can be used in many disciplines. Charting, Presentations, Drawing, Painting and Design, Image Processing and Scientific Visualization are some among them.^[1]

Whether it is office, hospital, shopping mall, roads or just the home, what is one thing that always accompanies us? Our mobile phone! The mobile phones are everywhere and with everyone^[2], which always accompanies the user. To buy a smartphone in the budget with more and more functionality is the aim of everyone's life. No one wants to make a mistake of buying a mobile phone which doesn't suit his/her personality and convenience which is better termed as User Friendliness.

While making the Mobile Simulator.....

I have used Computer Graphics to represent the look, feel and functionality of mobile phones. This project is to give idea that basic computer graphic commands can be used to provide users or buyers a fully functional mobile phone, which they are willing to buy, or a simulator which make user understand how the basic applications of mobile phone would look and how the different animations will work on that phone when they use it.

This idea will help users to understand that whether or not they are happy with the functioning of the phone, and also help them to choose a better option from their list which exactly suits their way of using things especially mobile phones.

The Simulator I have designed, will not be the same as old dummy phones kept for the users to have a look of the phone, but it will be a program, an interactive program in computer graphics which will help the user to use the particular mobile phone on an output screen using the basic keys of a keyboard. This will also help the dealers and the manufacturers to a great extent, as now they do not have to keep dummy mobile phones for every single product. Instead, they just have to install the program and run it on any output screen and make the buyer feel comfortable to interact with the phone.

This project is based on C++ language and hence proves that such simulators can be designed using such a core language. Basic commands of the language can be used to develop such objects that are beneficial to the society.

2. GRAPHIC COMMANDS USED ^[6]

The basic graphic commands (functions) used to make the design of the simulator are:

- 2.1. **rectangle (left, top, right, bottom):** This function is used to make rectangles with limits passed as an argument to the function. All the arguments are of integer type.
- 2.2. **circle (x, y, radius):** This function is used to make circle on the screen where x and y arguments denote the mid-point of the circle and “radius” argument gives the radius of the circle. All parameters are of integer type.
- 2.3. **ellipse (mid_x, mid_y, start_angle, end_angle, x_rad, y_rad):** It is used to draw ellipse with mid-point as (mid_x, mid_y). We can mention the starting angle and ending angle with the help of the parameters start_angle and end_angle where lowest possible value for both the angles is 0° and highest possible value is 360°. The x_rad and y_rad give the values of radius in X-direction and Y-direction respectively.
- 2.4. **arc (mid_x, mid_y, start_angle, end_angle, rad):** It is used to draw an arc with mid-point as (mid_x, mid_y). We can mention the starting angle and ending angle with the help of the parameters start_angle and end_angle where lowest possible value for both the angles is 0° and highest possible value is 360°. The rad parameter denotes the radius of the arc.
- 2.5. **putpixel (x, y, color):** This is a function used to mark the pixel with specified position screen with a particular color. Here, position of pixel is denoted by x and y parameter and “color” parameter gives the color value which have a range from 0 – 15.
- 2.6. **clearviewport ():** It clears the view port aka output screen in graphics.
- 2.7. **settextstyle (font_style, text_direction, text_size):** It is used to set the style of text to be printed on view port. The parameter font_style are inbuilt constants which text_direction gives the direction of text i.e., horizontal or vertical and these are denoted by inbuilt constants HORIZ_DIR or VERTICAL_DIR respectively and finally the text_size denotes the size of text to be printed.
- 2.8. **outtextxy (x, y, string):** It is used to print the string of characters, given by last parameter of the function, on the view port on a specified position given as parameter (x and y) to the function.

- 2.9. getpixel (x, y):** This function is used to get the color of the pixel whose position is specified by the parameters x and y.
- 2.10. line (x_start, y_start, x_end, y_end):** This method is used to draw a line on the view port from (x_start, y_start) to (x_end, y_end).
- 2.11. getmaxx() and getmaxy():** These both functions are used to get the maximum values of x and y for the output screen and more specifically the first quadrant of the view port.

3. SIMULATOR DESIGNING

Using the above mentioned commands, I have set the limits of the body and screen of the mobile phone. Then inside those limits, I have made different types of pages such as Lock Screen, Home Page, Menu Page, Application Pages, Call Logs' Page, Keypad and Contact Page. Instruction for interacting with the simulator are written on the left-top of each page that appears on view port/output screen. The volume keys, power button, speakers for call, back button, and camera are also formed on the phone's hardware body.

- 3.1.** Lock Screen page displays the time and date which is currently being used by the computer system. The key 'u' or 'U' can be used to unlock the phone. While unlocking the phone the unlocking effect is also added to make it look more realistic as shown in **Fig-1** and **Fig-2**.

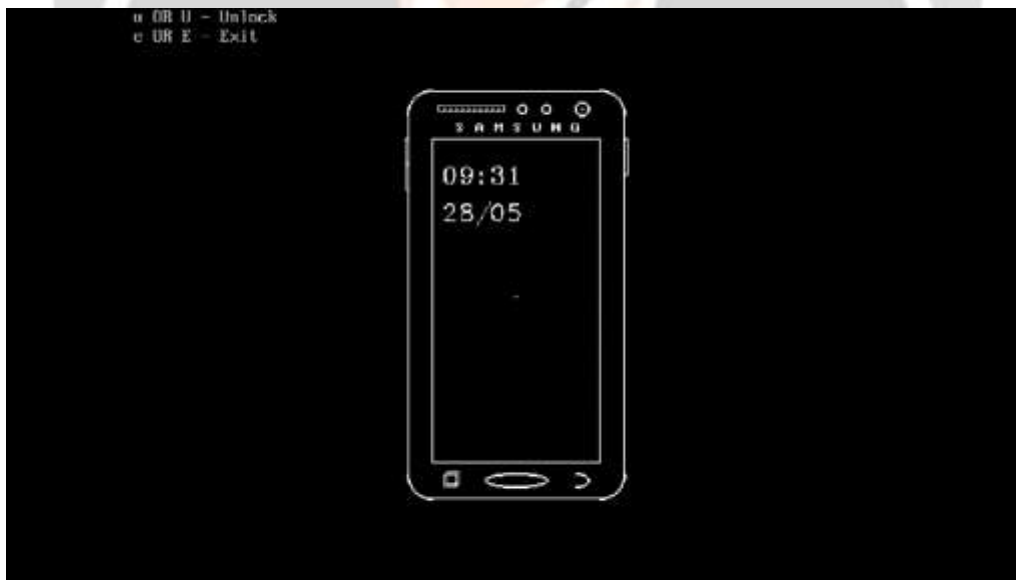


Fig-1: Lock screen Page



Fig-2: Unlocking the Phone

Unlocking effect is shown in **Fig-2** where the circle gets expanded to some extent, after which the home page appears on the screen.

- 3.2.** Home Page shows Google search bar, the menu button, call icon, contact icon and some apps which are used regularly by user as shown in **Fig-3**.



Fig-3: Home Page after unlocking the phone

- 3.3.** Menu Page contains all the application installed in the phone i.e., all the menus available to the user of the phone. User can open any of the application by clicking the key specified in the app icon as shown in **Fig-4**



Fig-4: Menu Page

- 3.4. Let's take an example of opening the application named **D** on the menu page. Clicking **D** will take us to the application **D**. The command 'b' or 'B' stands for back and can take us back to menu page, and 'h' or 'H' can be used to take us back to Home Page. All these commands are mentioned on the screen also on left-top corner. **Fig-5** shows the working of the application **D**. **Fig-5** is just a sample for any application, we can make it more realistic by creating the actual application and the view and their use. Menu Page can also be made more realistic by displaying the actual app icons of the phone like Settings, WhatsApp, etc.

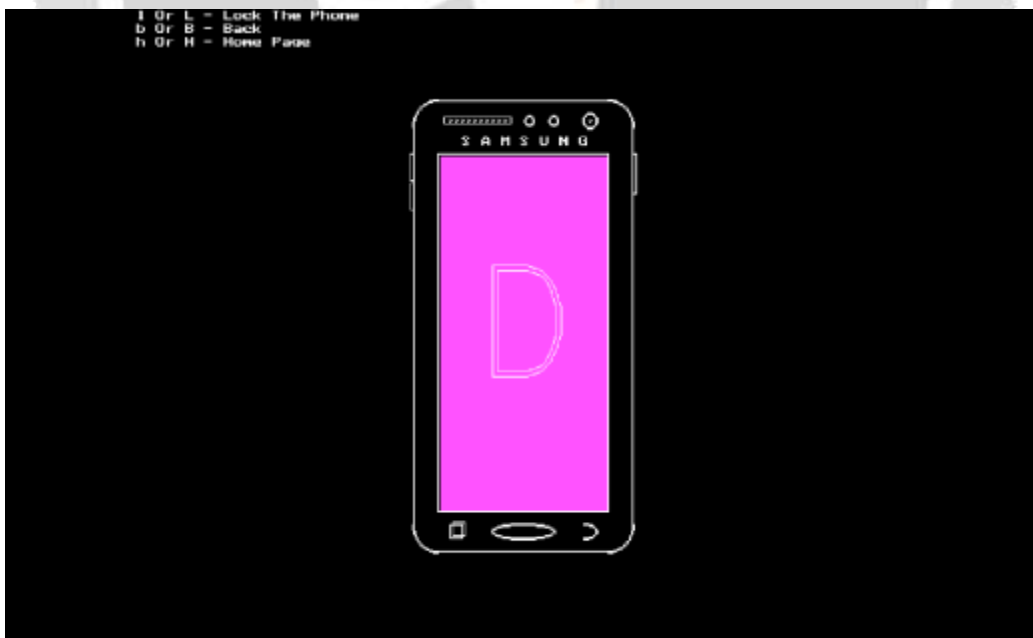


Fig-5: Application Page

3.5. On clicking 'h' we are directed to the Home Page and then if we click 'p' or 'P' we get to use the number-pad of the phone and also get to access the other functionality such as Call-Logs Page and Contacts Page as shown in Fig-6.



Fig-6: Number-pad

User can take the feel of using the dial pad of the phone which contains button for erasing typed numbers, call button and button for video call.



Fig-7: Call Logs Page

The red arrow indicates the outgoing calls and green arrow indicates the incoming calls.



Fig-8: Contacts Page

The contacts page contains circles on the left of names for holding image of that user or icon containing the first letter of the name of the user.

The bar on the top of the screen pops up in **light blue color** showing the current application being used. This can be seen in Numpad-Icon, Call-Log-Icon and Contact-Icon in figures **Fig-6, Fig-7 & Fig-8**

- 3.6. The applications on the home page works in the same manner as it was shown in **Fig-5**. Let us click any of the application available on home Page (**Fig-3**) say F, we will get the output as shown in **Fig-9**.

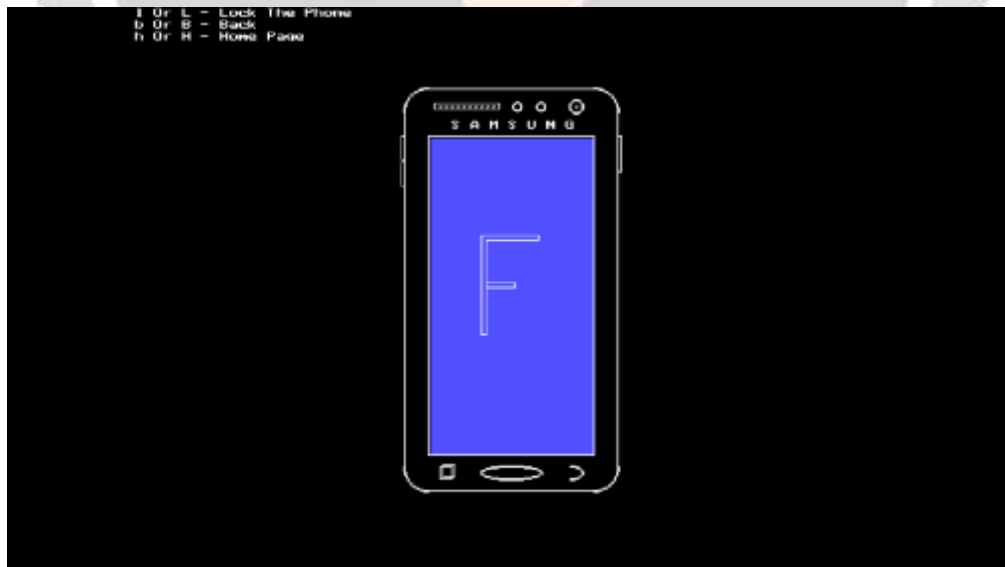


Fig-9: Home Page Application's Page

This section just gave an idea of a basic simulator of a phone and its functionality and UI.

4. FUTURE SCOPE

- 4.1. The input commands mentioned in this section are the commands entered from the keyboard, but one can enter the commands using touch screen to experience the much similar usage of the actual smartphone.
- 4.2. Thinking from the seller's point of view again leads us to the tempting thought that now no seller is forced to keep dummy phones, for each smartphone they are selling, to provide user the experience of using that model. Now, they just have to install the simulator, whenever required, for the customer and make them have the experience virtually.

5. BENEFITS OF C++ IN COMPUTER GRAPHICS ^{[3]-[5]}

- 5.1. C++ is a highly portable language and is often the language of choice for multi-device, multi-platform app development ^[3]
- 5.2. C++ is an object-oriented programming language and includes classes, inheritance, polymorphism, data abstraction and encapsulation ^[3]
- 5.3. C++ has a rich function library ^[3]
- 5.4. C++ is a powerful, efficient and fast language. It finds a wide range of applications – from GUI applications to 3D graphics for games to real-time mathematical simulations ^[3]
- 5.5. C++ is generally seen as the best option, since the language is close to machine code level ^[4]
- 5.6. It support OpenGL, CUDA, and a number of other graphics libraries. It will also compile into fast code ^[5]

6. CONCLUSION

Keeping the need of the people in mind where the customers/buyers of any smartphone frequently get confused between various brands of mobile phones and also the functionality of the phones with the choice of varied UI's leads us to create such Mobile Simulators using computer graphics. These simulators will be very helpful as they will provide the solution for the crux of the problem mentioned in this article. Imagining the world where we can actually take the feel of using a mobile phone before actually buying it fascinates a lot and thinking from the retailer's point of view, who actually sell smartphones, also carries us to the same fascination as now no mobile sellers' have to keep dummies of different phones they sell. Simultaneously they can easily grab the attention of the customers/buyers by providing the facility of MOBILE SIMULATOR in their shops, where the only thing they have to bother about is the installation of Simulators that will fulfill every single requirement of buyers.

7. REFERENCES

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