

Implementation of Multiplayer Bluetooth Memory Game for Mobile Phones

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Abstract—With time and technology, mobiles have been revolutionized from a communicating device to something which can be used for computing, entertainment as well as communication. Entertainment is perhaps the field which attracts most of the customers to a particular model. Hence these days, the various mobile developers are releasing phones which support various forms of entertainment viz. mp3 support, attractive games, etc. Today gaming is an integral part of mobile phone. With high quality graphics and sound, mobile games are the trend of the latest mobiles. With the advent in technology mobile phones, it gave facility to play with anyone anywhere in the world. But along with that it has certain issues. We have developed a Multiplayer Memory game on Mobile phone by making use of Bluetooth functionality of the mobile phones [1]. This paper focuses on the Implementation of Multiplayer Bluetooth Memory Game on mobile phones.

Index Terms—3G Wi-Fi, bluetooth, GPRS, infrared, symbian OS

I. INTRODUCTION

Our application is 'Multiplayer Bluetooth Memory Game' that uses Bluetooth connection between two mobiles and let two players compete against each other. The game we have implemented is a two player game in which tiles are randomly placed and they are having hidden images. Players take turns opening any two tiles by clicking on them. If the images on the tiles are different, then it is the other player's turn and the images will be again hidden by tiles. If the images on the tiles are identical then they will disappear and the player who opened them is credited with a hit and a bonus chance to play. The same player takes another turn and continues taking turns until unmatched pair is opened. The game is over when all matches have been found and there are no more tiles. The winner is the player with highest points [2].

II. DESIGN OF MULTIPLAYER BLUETOOTH GAME

Basically the software is divided into five modules:-

- 1) Bluetooth Communication Module
- 2) Graphics Module
- 3) Game Logic Module
- 4) User Interface Module

The users of both the mobiles will share the same screen and can view each other's move. One player gets to act as a server and the other as a client.

A. Bluetooth Communication Module

This module is responsible for searching any Bluetooth enabled device currently active in range of 10m. It then provides host with the list of names of Bluetooth enabled devices. Host sends request to client to play the game. Now, host waits for some predefined amount of time for the receiver to send the acknowledgment. If the timer goes off or host receives negative acknowledgement, the host requests some other player. If positive acknowledgement is received, Bluetooth connection is established between the host and corresponding client [3].

B. Graphics Module

This module basically operates while starting the game. For starting the game, user is displayed the 8×8 (4×4 or 6×6) grid of hidden images. The random function generates a random 8×8(4×4 or 6×6) matrix and every time a new matrix is generated. This matrix contains numbers from 1-32(or 1-16). Each number in matrix represents particular image. Once the matrix is generated according to the numbers present in that matrix, images are displayed. Initially the user is displayed 8×8, 4×4 or 6×6 grids of hidden images.

C. Game Logic Module

This module gets activated when player starts playing the game. Player clicks on any two tiles consecutively. When second tile is clicked we need to check whether images on two tiles are same or not. The images displayed can be mapped to numbers in that matrix. Thus every image has corresponding unique number associated with it. So we just check those numbers whose images are clicked. If the numbers are equal, images are same. Thus player gets a hit and a bonus chance to play and the two images disappear. If either of the players receives a call the player can talk as well as play the game simultaneously. If any player wishes to quit the game then the current status of game needs to be saved. For the same, we generate 9×8 matrix. First 8 rows we store the status of images on grid if the image is present on the grid we insert '1' in the matrix else if the images are disappeared we insert '0' in the matrix. In the 9th row first column stores host's score and second column stores client's score. Rest all columns has '0' value.

The process of conversion from 8×8 grid to 9×8 matrix is as shown in Fig. 2.3.1:

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D. User Interface Module

This module deals with the user directly. It hides all the complex operations performed by all the other modules. It makes the game more interactive and user-friendly. It displays the three options to user viz. Easy, Medium or Difficult as modes of game to play. If user selects Easy mode, then 4×4 grid is displayed, if user selects medium mode, then 6×6 grid is displayed and if the user selects difficult mode, then 8×8 grid is displayed. Also the user is given two forms of help menu: Video help menu and the text help. The video help menu shows the demo of the game to the naive user.

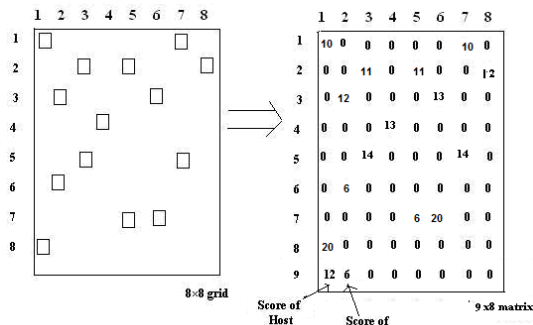


Fig. 2.3.1. Conversion process

III. IMPLEMENTATION ISSUES OF BLUETOOTH MEMORY GAME

The following are the issues that were faced during the implementation of the software

A. Size of Image

For 8×8 grid we need to display 64 images at a time on mobile screen. The size of the image to be selected was a problem initially. By trial and error method we found that 24×24 images were appropriate for mobile screen.

B. Conversion

Images of 24×24 size were not readily available. Hence we converted some large sized images using PAINT, ADOBE PHOTOSHOP, GIF ANIMATOR to 24×24 size. But those images appeared blank on mobile screen. Hence we had to download batch converter and convert some .jpeg images to .png and resize them.

C. Selecting Interface

Selecting high level or low level interface was also a difficult task. Initially, we tried with high level interface but high level interface did not have proper event handling.

Later we selected CANVAS (Low level interface) due to easy event handling. Low level requires absolute values and again using absolute values would be difficult as the screens of different mobiles are not of same size. We then came across getWidth() and getHeight() methods which returns the size of the canvas on the mobile screen [4].

D. Cursor

We had to show a cursor to show the current position of the user on screen. By trial and error method we could draw a rectangle that could be used as a cursor to show the current position. The cursor was properly shown on emulator but not on mobile screen. We tried different coordinates for the

cursor and finally we could judge the exact coordinates and thus succeeded in drawing proper cursor on mobile screen but affected cursor display on emulator [4].

E. Bluetooth Connection Problem

Our Bluetooth connection code worked perfectly well on emulator but used to give an exception on mobile phones. On scrutinizing the source code we realized that in the function call [5]:

Get Connection URI (service Record, No authenticnoencrypt, false) the second argument if given true, then the both becomes the master.

IV. TEST CASES DESIGNED FOR TESTING THE GAME ON MOBILE PHONES

Following are the different test cases for our application [6]:

A. Test Case I: While playing the game if either of the players tries to receive data via Bluetooth

Output: Game play is not disturbed. The player intended to receive data needs to accept or reject reception. Once accepted, the players can continue playing game without any degradation in performance.

B. Test Case II: Either of The players Receives an SMS

Output: SMS icon is displayed on the mobile screen indicating the respective player about the message. Game play is not disturbed.

C. Test Case III: Either of the Players Receives an Incoming Call

Output: The player which receives a call gets a screen displaying the name and number of calling party. The screen gets superimposed over game and unless user accepts or rejects the call the game is paused. Once accepted, the user can continue playing as well as attend the call. Other player remains unaffected.

D. Test Case IV: If two mobiles tries to initiate the game

Output: In this case both the mobiles try to act as a master and are not detectable by each other.

E. Test Case V: While game play is on, some other master sends request slave for game play

Output: At any given time, one slave can be connected to single master hence request from the new master is automatically refused.

V. SCREENSHOTS OF THE GAME

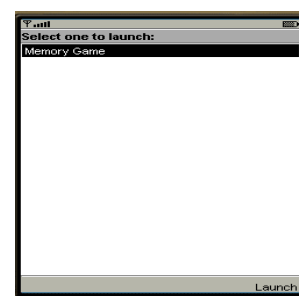


Fig. 5.1. Initial screen before the game is launched



Fig. 5.2. Game logo screen on the two mobile phones

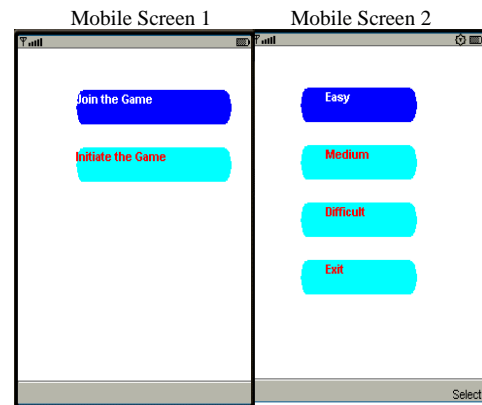


Fig. 5.6. master (right) is selecting the mode of the game

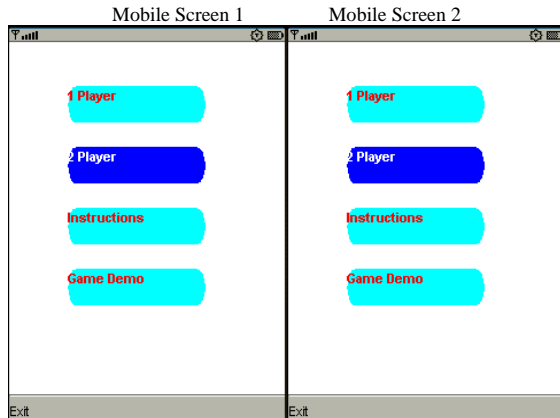


Fig. 5.3. GUI screen to select the mode of the game

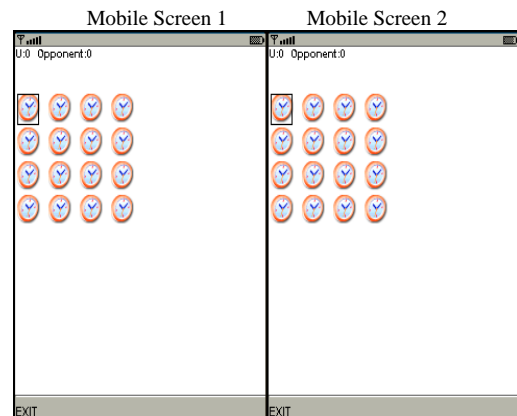


Fig. 5.7. Game has started at both the ends

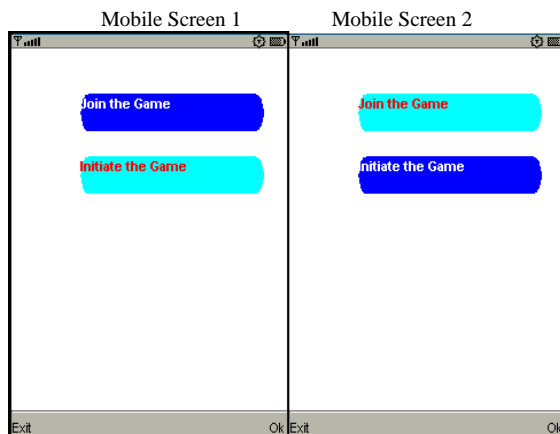


Fig. 5.4. Slave joins and Master initiates the game

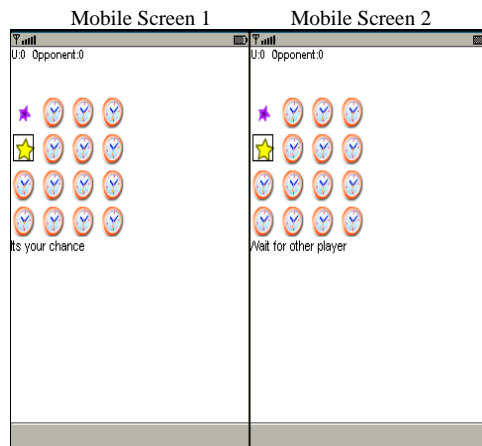
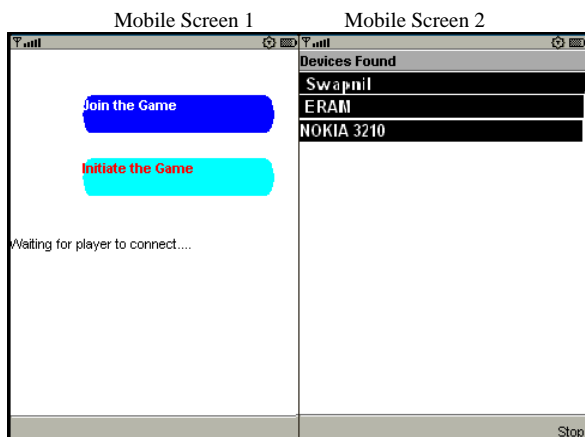


Fig. 5.8. Master has opened 2 images and loses chance as images opened are dissimilar



5.5. Slave is waiting for the request from master and master is selecting a device to play the game

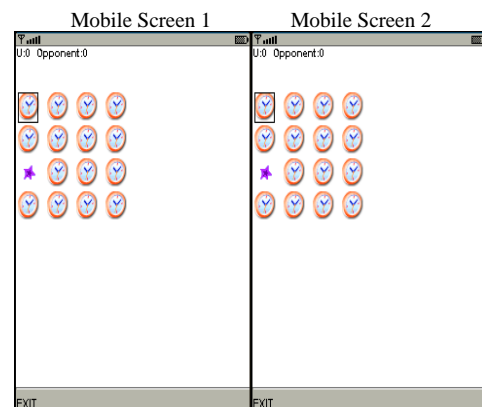


Fig. 5.9. Slave has opened first image

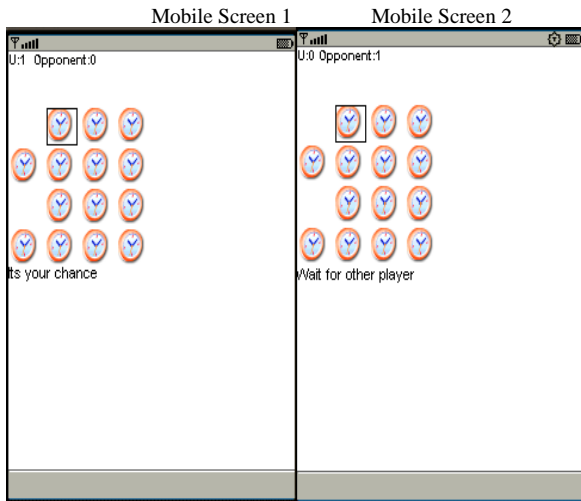


Fig. 5.10. Slave has got a hit and a bonus chance to play. The score of the slave increases and it is displayed on the master's screen as well

VI. CONCLUSION

There are numerous single player games available on mobile phones. The technique like infrared, GPRS and Wi-Fi exists for multiplayer games on mobile phones but all these techniques are having their own issues such as line of sight, client server communication via GSM and expensive in terms of operation and communication respectively. In this paper, Multiplayer Bluetooth Memory Game on mobile phone is attempted with the purpose of understanding the basic issues involved in developing multiplayer games. This game is having synchronous connection between two players of mobile phones. The game is successfully implemented on the mobile phone and it works efficiently on all handsets that have Symbian as its operating system.

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