

# Multi-touch Mobile Application With Application Development Tutorial for Novice Developer

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**Abstract**—Multi-touch technologies is emerging to be an opening to enhance the input bandwidth between the user and the device. The two-handed and multi-finger interaction allow user to manipulate multiple degrees of freedom in a simple and coherent way. Nowadays, a multi-touch gesture is one of the main features of smart phone or tablet. For example, user can rotate photos by just touching two fingers to the touchpad and moving the images on the screen. It becomes an important role in modern user interfaces. However, the multi-touch application is often difficult to develop and implement especially for novice developer. Hence, multi-touch mobile application with application development tutorial for novice developer which is Air Hockey for Programmer (AHP) in Android platform is introduced. The application provides different features which is multi-touch game with development tutorial in order to help and find out the suitable solution to solve the difficulties in developing multi-touch application. Usability testing had proved that the proposed solution had helped the novice user in developing multi-touch application.

**Keywords**—Android, Air Hockey game, multi-touch application, multi-touch tutorial,

## I. INTRODUCTION

MULTI-touch refers to a touch sensing surface's ability to recognize the presence of two or more points of contact with the surface. This plural-point awareness is often used to implement advanced functionality such as pinch to zoom or activating predefined programs [8]. Android is an operating system for mobile devices that developed by Open Handset Alliance led by Google. It offers developers the ability to build their application in a customized version of Java Programming language[5]-[6].

Novice developer has difficulty in programming during multi-touch application development. Most of them are undergraduate's student or just finishing their degree. There

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have not much experience in embedded and mobile programming, especially in Android development. Based on the survey, 43% from 30 of the respondents who have minimal experience in developing Android multi-touch application say that the programming part is difficult and it is hard to find the resources. This research is intended to find the solution for programming difficulties in multi-touch development and the difficulties to find resources. The main objective is to help novice developer in developing Android multi-touch mobile application and at the end; tutorial will be formulated in the form of application to help novice developer in developing multi-touch application.

Compared to single-touch application, there is only a small amount of multi-touch mobile application in Android market [5]. Some of the application may not be needed multi-touch mobile application, but some of it would good if multi-touch technology being implemented. This paper introduces a prototype development of multi-touch mobile application with application development tutorial. The tutorial is meant for novice android multi-touch developer. The usability testing was conducted to test the acceptability of the prototype.

## II. RELATED STUDIES

Based on market survey and data usage done by Nielson Mobile Company [4], smart phones and the consumption of mobile data continue to grow in popularity in the US by 37% of mobile consumers now have one and Google's Android operating system (OS) is proving to be the most popular. Somehow rather, 36% of smart phone consumers now have an Android device, compared to 26% for Apple iOS smart phones (iPhones) and 23% for RIM Blackberry. Android is based on Linux and it vastly use in most of mobile devices such as such as smart phones and tablet computers. [8]. Developers can produce the mobile applications using Java programming language.

Table I compare the contact point of multi-touch works to capture interactions made with the user's fingers. It is identified to be a suitable problem-solving method. The features and user interface (UI) are identified and implemented in the prototype. The finger-count gestures [10] and pointing drag [9]-[11] are the available touch interaction with user. Thus, radial tapping drag is introduced to smoothen the interaction between user and the device.

The most important aspect of AHP is that the tutorial in the apps able to teach novice programmer to understand about multi touch development. The deployment of AHP has significant impacts to educate the novice programmer.

Secondly, AHP has special feature such as an air hockey game and application development tutorial. The main objective for the game is for novice programmer to understand the application they will develop in the tutorial which is not available in [9]-[10]-[11] and [12]. However, a non-IT people also can play the game against another player since the tutorial is for the application developer and not the end user.

Usability testing experiment as in [13] for mobile application with potential users of the application is an important steps in testing the application. This is to test the acceptability of the proposed application.

TABLE 1  
COMPARISON OF EXISTING APPROACH

Apps / Features	Multi-touch Application	Air Hockey Speed	Glow Hockey	Propose Apps
Touch interaction with user's finger	Finger-count gestures	Pointing drag	Pointing drag	Radial tapping drag
Intended User	Business oriented user	General type of user	General type of user	Novice Developer

### III. PROPOSED APPLICATION

AHP is an application that provides two different features which are game and tutorial. It is different with other existing air hockey games because user is not only can play the air hockey game but they can gain new experience by learning new knowledge about multi-touch technology. This application is intended to help the target user which is novice developer in developing multi-touch mobile application. The sources of application development production are from [1]-[2]-[3]-[4] and [6].

Fig. 1,2,3 and 4 are some of the screen cast of the AHP application. User can navigate through the application home application.

The step by step of using the air hockey for programmer application :

- Run AHP application on android smart phone / tablet.
- Make selection whether to play game, view faster time
- read about information and tutorial or exit.
- If game, air hockey game displayed.
- Play the game.
- If faster time, view list.

- If development tutorial, read and learn the steps.
- Expand to website for viewing more detail of the steps.
- Picture and coding will be displayed.
- Finish and exit. Helpful Hints



Fig. 1 Main Menu Screen



Fig. 2 Game Screen

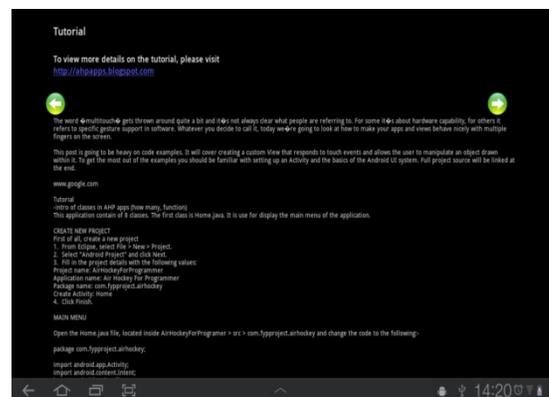


Fig. 3 Tutorial Screen



Fig. 4 Faster Time Screen

#### IV. METHODOLOGY

The research methodology is described on fig. 5. Information gathering is the first phase on development of multi-touch mobile application. At these phase, the method approach is questionnaire. The main purpose of the questionnaire is to identify the problem statement in developing multi-touch mobile application among novice developer. The questionnaire will be distributed through online forum (forum.xda-developers.com) and Universiti Kuala Lumpur, Malaysian Institute of Information Technology's student( UniKL MIIT)

A literature research with respect to the previously published literature is the initial stage of any project. Studies of the methods in developing multi-touch mobile application and the existing system as gateway from previous multi-touch mobile application development before a suitable problem-solving method is finalized. It is seen as an essential task as it will ensure that a thorough understanding of a project is gained and subsequently lays a solid foundation on our future task.

RUP Methodology (fig. 6) is used to develop the prototype which is an iterative software development process framework created by the Rational Software Corporation. Based on UML, RUP organizes the development of software into four phases, each consisting of one or more executable iterations of the software at that stage of development.

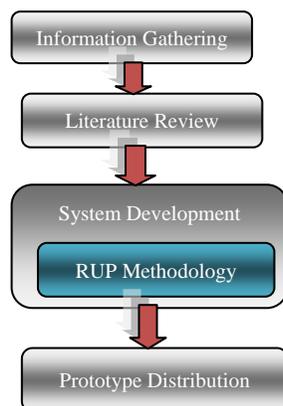


Fig. 5 Research methodology

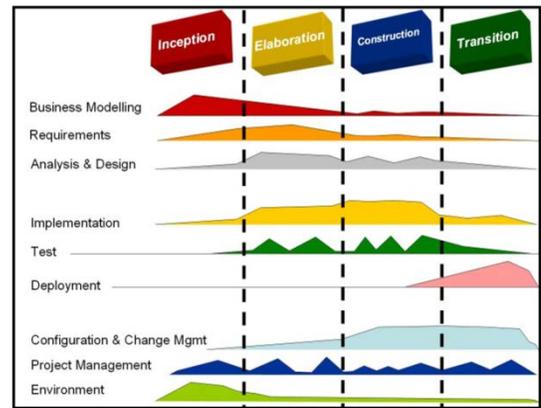


Fig. 6 RUP Methodology

#### V. RESULT AND FINDING

This section discusses the functionality and usability testing of the prototype model (Air Hockey game with development tutorial). The prototype has been tested and evaluated based on its function and usage on Android platform. This is to ensure that the application is free of error and deliver the quality standard required. The respondents were eight final year undergraduate student majoring in software Engineering program of UniKL MIIT.

The reason of choosing these respondents because they are considered as novice developer and the application target user .This is to avoid biases. The feedback from them could help the improvements of the application functionality and the usability on Android platform that can meet the user requirement.

Users were acquired to test the tablet and smart phone pre-loaded with the Android application, by doing tasks relevant to each interface. For example, respondents were told to enter the main menu as shown at section III.

Functional testing refers to activities that verify a specific action or function of the source code. These are usually found in the code requirements documentation, although some development methodologies work from use cases or user stories. Functional tests tend to answer the question of “can the user do this” or “does this particular feature work”. By using the test cases will implement functionality testing. The functional testing is successfully conducted and passed. Sample of test cases are shown at table II. For example, the main menu and faster time module is tested and passed.

Usability testing is to test the acceptability of the proposed application. The testing is adapted from the method in [12] . It is successfully conducted and the result is showed at table III. The entire questionnaire had been collected right on time after all respondents answered it. Each questionnaire had be sorted by each section and rating system will be use to show how the satisfaction achieved. All the respondents will answer the qualitative evaluation of usability by ( by rating a score of 1 - very poor, 2 - poor, 3 - average, 4 - good and 5 - very good) for each tested feature.

From table III, the total average is 3.6, which mean the respondent has answered the question with average level.

Hence, the AHP prototype had support the target user in developing the android mobile application.

TABLE II  
SAMPLE TEST CASES

Test case Id	Test case name	Test case description	Test steps		
			Step	Expected	Actual
Button01	Play Game	To check whether the Button	1- Press on Play	The Play Game button must function successfully	The Play Game button function successfully
	(Main Menu)	have function or not	Button Game page	and go to Game page	
	Faster Time	To check whether the Button	1- Press on Faster	The Faster Time button must function successfully	The Faster Time button function successfully
	(Main Menu)	have function or not	Button Faster Time	and go to Faster Time page	

TABLE III  
USABILITY TESTING RESULT

Respondent	Q4	Q5	Q6	Q7	Q10
Resp. 1	5	3	3	4	4
Resp. 2	4	3	3	2	3
Resp. 3	5	3	3	3	3
Resp. 4	5	4	4	4	4
Resp. 5	5	3	3	3	3
Resp. 6	4	4	3	2	3
Resp. 7	5	4	4	3	4
Resp. 8	5	3	3	4	4
Average	4.75	3.38	3.25	3.13	3.5

1 - very poor, 2 - poor, 3 - average, 4 - good and 5 - very good

## VI. CONCLUSION

In conclusion, the basic aim and objectives of Multi-Touch mobile application with application development tutorial for novice developer (Air Hockey for Programmer) has been successfully developed and accepted by the respondents. By using this application user can get different experience which are playing the game and learning about multi-touch development and can be used as a guideline for development of various early stages of multi-touch mobile applications.

Therefore, the project as a whole can be considered valuable for the target user which is novice developer. Future improvement is to provide AI Support that allow quick play mode which is single player and different difficulty levels.

The prototype in-game movement between paddle and puck are static which mean the speed is already set by default speed. It is suppose to have a different speed( movement Speed Control) if user hit with high speed than the puck will move faster but if user hit with low speed the puck will move slowly. Current platform of this prototype is Android, so it will be great advantages to non-Android users too such as iPhone or Windows mobile. The tutorial part only provide one tutorial which is the development exactly same as prototype game, so with more and variety tutorial of multi-touch application will give the user more understanding on how to develop multi-touch application.

Currently, the prototype is using a simple graphic library and it cannot contain more sprites, so the developer needs to make limitation on the sprites usage by using onDraw() method because of performance problem. Thus, OpenGL is one of the method to overcome this problem. It can reduce this problem and will give stable interface for smooth and better performance.

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# Study of Cluster Based Approach and Security Query Routing in Peer to-Peer Networks

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**Abstract**— In Peer-to-Peer network, the previous work does not concentrate more on availability of nodes and peer status for searching the queries. Query routing process can be guaranteed to allow the resources in a secured way. Hence in this paper, we propose a study of cluster based approach and security query routing in peer to peer networks. Initially a node with high score value is selected as a cluster head. Query processing and routing can be done with all the elected cluster head. This paper explains how the query routing process can be done effectively and efficiently in a secured manner.

**Keywords** — Clustering approach, Query Processing, Query Routing, Security management.

## I. INTRODUCTION

PEER to Peer Network plays an important role to distribute the resources in a decentralized model and security aspects are more challenging than other P2P application. Peer nodes are moving from the initiating node to a neighboring node until it locates the requested resources. Query is routed to a number of relevant peers instead of being broadcast to the whole network. Peer to Peer network need to search the queries in a larger number of peers to locate the target file resulting in high message overhead. WWW requires infrastructure and it is difficult for individual users to share their files in an easy and independent way and the users have no direct control over the published file to make them available for immediate search. To overcome the above problem we have proposed cluster based searching technique. Peers are initially formed into clusters and communication can be done with their neighbor CHs to process all the queries. Every agent approaches the CH in search of resources by launching the semantic queries. The agent records the routes that have been selected and each time it finds a resource, the data is sent via the route established. Initially the agent verifies the current CH it has reached, for availability of resources. If resources is available, it updates the table and feedbacks via the available route. Otherwise, it enquires the neighboring CH and selects the matching peers. The peer with the higher rank will be selected for fetching the resources. During ranking methodology the ranking table does not enough information.

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Whether the node is active (or) any failure occurs only after searching the node it gets the information and it is a time consumption process. Here the study paper explains how the resources can be extracted from the clusters in a secured manner.

## II. RELATED WORK

CAI Biao et al., [2] have proposed a structured topology for trusts management in portable P2P network based on DHT (discrete hash table), in which includes trust management strategies and peer operations on certain DHT circle. And also the authors have proposed a trust-computing model for the structured P2P network and the main trust decisions in the structured network are introduced too. And the advantage of this approach is that it will have information, which peers can join or leave at anytime and anywhere to address the portability in a portable P2P network.

Mei Chen et al., [4] have proposed a cluster-based reputation model (CBRM). The model is consisted by reputation mechanism for realizing the security transaction and the network topology structure of CBRM adopts the cluster, so efficiency of reputation management is noticeably raised. In order to improve security, reduce the network traffic brought by management of reputation, and enhance stability of cluster, when we select reputation, the average historical online time, and the network bandwidth as the elementary components of the comprehensive performance of node.

Joonhyun Baet et al., [5] have proposed VegaNet, a peer-to-peer overlay network enhancing the performance and reliability of DHT routing using social links. The nodes in VegaNet are identified by the users' social identity, and it is structured by underlying DHT overlay exploiting social identities and social relationships. And also the authors have presented algorithms for handling churn and routing over the VegaNet in this paper. The advantage of this proposed approach is that the communication costs and device capacities are relatively limited.

## III. CLUSTER CONSTRUCTION

Initially peers are clustered based on their semantic interest by geographical location. Here we are concentrated more on formation of clusters. Each peer broadcast a message to all the neighbor nodes with ID, score value. Each neighboring nodes identifies itself and also maintains the neighboring list. All the nodes compare the value of score and check whether it is