INTEL PERCEPTUAL COMPUTING TECHNOLOGY IMPLEMENTATION ON DEVELOPMENT OF TRADITIONAL GAMES COMPILATION

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ABSTRACT

. Nowadays with a highspeed technology development, traditional games has barely forgotten. According to Hasan the headmaster of Athirah Kajaolalido Islamic elementary school, 99% of his students not familiar with traditional games. In game development with the theme of traditional games should not forget the essence of movement. With Intel Perceptual Computing technology allows users to use gestures as a control in the game.
Intel Perceptual Computing is one form of technology that allows people to interact with computers using natural language such as body language. It then becomes interesting to be the implementation of the traditional game-themed game development so that in the effort to preserve the traditional game, the benefits of movement in traditional games can still perceived by the childrens.
Keywords : *traditional game**,** Intel Perceptual Computing*

1 FOREWORD

Rapid technological developments make children more interested in playing games than the traditional game. According to Hasan the headmaster of Athirah Kajaolalido Islamic elementary school, 99% of his students not familiar with traditional games. So far the development of game-themed traditional game with the intention to recall and preserving the existence of traditional games still considered less due to the loss of vital essence of traditional games that is movement. Therefore in game development with the theme of traditional games should not forget the essence.
Intel Perceptual Computing allows reading to the user's movement and translates it as a game control. Based on the that problems Intel Perceptual Computing technology implementation on development of traditional games compilation was built to facilitate user interaction in form of movement that should be there when playing traditional game with game environment that was built. In addition by motion control may be a preservation medium of traditional games that is interactive, fun, and full of benefit.

1.1 *Perceptual Computing*

Perceptual computing is a methodology that helps us in making subjective judgments which perceptual computer (Per-C) is an instance of perceptual computing itself. Lotfi Zadeh (1996, 1999, 2008), father of fuzzy logic, coined the term "Computing With Words" (CWW) so that the object of computation are words taken from natural language. It was inspired by the remarkable human ability to perform various tasks without the physical and mental measurements and calculations. CWW ay have an important influence on how people make rational decisions based on the perception-in inaccuracy environment, uncertainty, and partial truth. [1]
In other words perceptual computing is changing the way human interaction with computers using natural language like the words, because perceptual computer (Per-C) is able to make rational decisions based on the perceptions of appropriate human.

1.1.1. *Intel Perceptual Computing*

Intel Perceptual Computing is a product that changed the way human interaction with computers by utilizing voice recognition, hand gesture recognition, face recognition, and even augmented reality. With Intel Perceptual Computing cameras, and Intel Perceptual Computing SDK allows developers to build software by those features.

1.1.2. *Intel Perceptual Computing Module*

Control in the game is applied from the Intel Perceptual Computing modules, such as hand tracking, gesture recognition, and face tracking.

1. *Hand Tracking*

Using data from the GeoNode structure to determine the interaction by obtain positions the user's hands and mapping the actions that occurred to the system are made. GeoNode structure explain geometric structure nodes that is provide relevant data related to the object that being tracked.

2. *Gesture Recognition*

Gesture module utilize Gesture Query function in much the same way like a function QueryGeoNode. QueryGeoNode takes two parameters, reference o

PXCMGesture.Gesture struct, and a label stating gesture to do Recognize. QueryGesture return true when struct gesture capture valid gesture or pose data, otherwise it will return false.

3. Face Tracking

With a face location data application can use QueryData function PXCFaceAnalysis :: Detection to retrieve face location data. Applications can use Face Query function to retrieve the identifier provided faces in the image.

1.1.3. *Problem Solving Method*

Problem-solving method is the method used to resolve the issues contained in the study. Here's a problem-solving method that is used.

1. Rules of Play Analysis

Doing interviews with a field coordinator of the Hong Community regarding any rules of play galasin, gatrik, and boi-boian.

2. Gameplay Adaptation

Adjustments needed in the establishment of the gameplay, because not everything on the rules of the traditional game that may be poured into the gameplay.

3. Gameplay Establishment

Gameplay Establishment is done after going through an adjustment phase of gameplay. At this stage is the conceptualize the character, and the game mechanics so that the result of gameplay is appropriate.

4. Game Making

This phase is the stage of the production game. Making the game assets, implementation of the Intel Perceptual Computing, as well as coding will take place during this stage.

5. Game Testing

Game Testing is done through live game demo and give questionnaires to respondents to assess feedback from the player after trying the game.

1.2 *Testing*

Sistem Testing is done through to find flaws or mistakes that exist in the system that is being tested. The test intends to determine the system that made it meets the criteria in accordance with the design objectives. There are three tests performed in this study, that is black box testing, beta testing, and acceptance testing.

1.2.1 *Black box Test*

Black box Test is done through by observing the functional-functional contained in the system in order to determine errors in the system and determine whether the system has been in accordance with the expected goals..

1.2.2 *Beta Test*

Beta test is a test conducted objectively. tests are made directly to the respondents as users of the system to determine the extent of the feasibility of the system.

By doing beta testing, fault location as well as the shortcomings of the system is known to be fixed in the coming stages of development. This test through two phases, that is a demo program, after the provision of the questionnaire.

1.2.3 *Acceptance Test*

Acceptance Test is a test done in order to obtain consent for the system being tested. Testing is done by giving the opportunity to play to Zaini Alif, chairman of Hong Community, then afterwards asked interview questions.

2 CONTENT

2.1 *System Analysis*

There are nine stages in the analysis in this study, the analysis of the problem, an overview of the system, the storyline, the rules of play analysis, similar games analysis, the gameplay adaptation analysis, the gameplay modelling analysis with MDA, the gameplay establishment analysis, and level of difficulty analysis.

2.1.1 *Problem Analysis*

The recent game development there are those traditional themed games with the intention to preserving the traditional game, but the use of buttons, joystick, touch screen, or virtual button removes an important essence of the traditional game itself that is movement. Movement is an important element in the traditional game that is plays an important role in motoric development of children.

2.1.2 *Overview of The System*

Games that will be built is a compilation of some traditional games that is put their hand in the game so as to facilitate the implementation of the Intel Perceptual Computing, which are pletokan, gobak sodor / galasin, boi-boian, and gatrik.

2.1.3 *Storyline*

The background story set in a village that is is in the midst of modernization, a clearing where children used to play traditional games slowly disappear and make children reluctant to play the traditional game. A child is determined to keep the preservation of traditional games, and invite friends to continue to play and maintain its sustainability.

2.1.4 *Rules of Play Analysis*

After doing interviews with a field coordinator from Hong Community Cecep Imansyah, here are the rules of the traditional game play of each of which will be made into a study for the establishment of gameplay.

1. Pletokan

Pletokan is a name of a toy gun made of bamboo, and the bullet made of dampen paper, or cashew. This game is a typical game of Betawi people. Sundanese people are more familiar with the title bebeletokan resembles the sound emitted when the gun is fired.



Figure 1 Pletokan

2. Gobaksodor / Galasin

The name comes from the word Gobak Sodor gobak and Sodor. Gobag word means to move freely, while sodor means spear. There are two teams that is defender team and the attacking team.

Defender team keeping the lines survive by shifting to the right and left trying to hold back the attacking team, after all team members were arrested by a team of attackers managed to survive, then the attacking team fails to get the numbers and take turns to be the defender team. Attackers team ran towards the end of the field and trying to avoid being touched by the defender team after the team made it to the attackers reached the end of the field and the back end of the beginning of the field then the attacking team get points and take turns to be the team to defend following the next game rotating until the specified time.

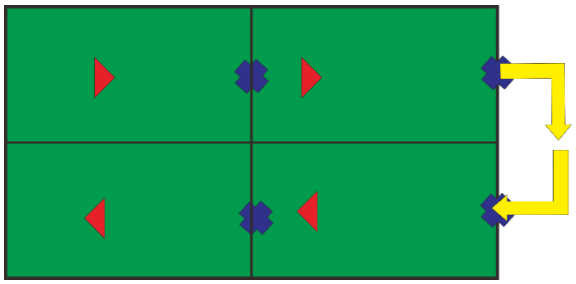


Figure 2 Galasin's Field

3. Boi-boian

This game is a game of construct stone slabs, usually taken from broken tiles or porcelen that are relatively small. The ball varies, usually made of bundles of plastic coated paper, soft and not hard, so it does not hurt. The game is divided into two teams, the team of guards and the attackers.

The game begins with one person from the team of guards keeping the slab, the other of the attackers then take turns throwing the slab pile with the ball until they collapsed all. After the collapse, the team of guards have to help a slab guard took the ball and threw it to the attacking team. Tim attacker responsibility to construct a slab collapsed while avoiding pitch of the guard. Tim attacker got hit a ball that turns into a guard the dial, and the game continues with the turn exchanged between the team of guards and the attackers.

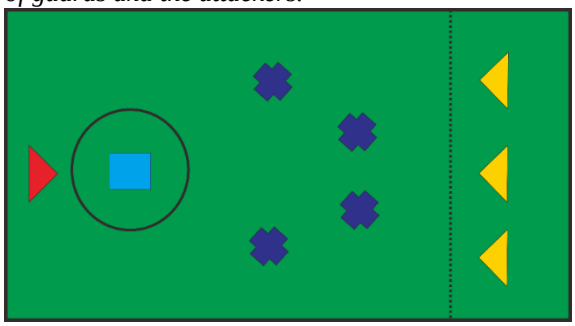


Figure 3 Boi-boian's Field

4. Gatrik

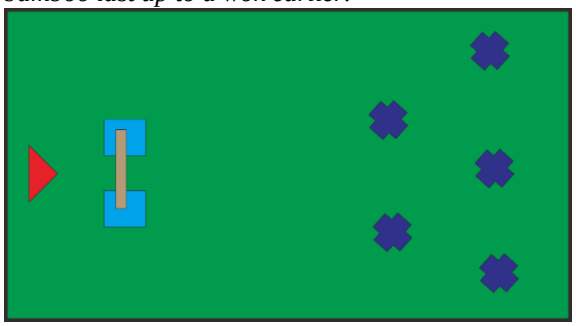
Gatrik a group game, consisting of two groups. This game uses the tools of the two pieces of bamboo that resembles a stick measuring approximately 30 cm and the other smaller.

The game begins with a short gatrik threw into wok (two stones resting place gatrik wood). The player who throws sign in or closest to the wok to begin, while the other became keeper.

There are three game sessions. The first is a short gatrik crossed over wok and ready to be thrown with long gatrik. The task is to keep the opponent gatrik throw short, as much as possible to captured so that he can play gatrik. If not can not catch, there is still one more chance with throw gatrik gatrik short to long. When hit, the group plays gatrik replace guards. The distance between the keeper and batsman approximately less than 10 meters.

If the player still lose, then go in the second session. Gatrik long and short gatrik held by the player, and short gatrik hit hard with long gatrik. Short Gatrik will be thrown and the guards preparing to catch. When caught, she gets the value that has been agreed upon and have the opportunity to play gatrik. If not, he threw short gatrik approached the wok as possible, so that players do not have any gatrik per-gatrik short distance to get the value. The last session is the so-called bundle catfish, which put short gatrik parallel to the wok, hit the tip until thrown rise, and immediately hit harder in the future. The guard remained on duty to catch short gatrik. If not caught,

the player gatrik just calculate the resulting blow distance between short gatrik with wok.
The distance is measured by the short gatrik be a value play a decisive player gatrik victory. Uniqueness of this game is a system of penalties which, after completion, the group of opponents will give the gift of a sling with a standard range of small bamboo last up to a wok earlier.



Gambar 4 Gatrik's Field

2.1.5 *Similar Game Analysis*

Similar Game Analysis conducted to determine the direction of the establishment of gameplay that will be created. The analysis carried out on four games with game mechanics that almost resembles the gameplay is going to be made

1. *The House of The Dead 2*

The House of the Dead 2 is an action game that offers players shoot zombies crashing out of the hiding place, so players required for swift and thorough in crossfire targeting (targeting cursor reference point). This game belongs to the railshooter genre where the player's movements to crossfire limited to what is on the screen, so the player is required to defeat the enemies that are on display.

2. *Kungfu Pow Kevin*

Kung Pow game Kevin is applied by utilizing the Intel Perceptual Computing hand tracking module. Hand gesture used in such games is to match the position of the hands, clapped his hands, shifting hands, and pushing.

3. *Super Dodgeball*

Super Dodgeball dodgeball is a sport game types that played with throwing, and avoid the ball with the points that are calculated when the ball is thrown on the opposing team. The game is played by two teams with equal number of members. When the ball is thrown captured, then the team's turn to throw the ball. Team members got hit must exit the field and maintain a line outside the field to keep helping the attack.

4. *Baseball Heroes*

Baseball Heroes is the kind of baseball game is made with some simplification so different from the original rules of the game of baseball. In the original baseball game after hitting a ball thrown pitcher, players are required to run toward the base to earn points, while scoring the game Baseball Heroes of the players are determined on the timeliness of hitting.

2.1.6 *Gameplay Adaptation Analysis*

By considering the existing limitations such as limitations of the game engine is used, and the limited control that can be handled by Perceptual Computing SDK, then made some adjustments. The adjustment will be carried out as follows.

1. *Pletokan*

Pletokan gameplay would be made up like first person shooter (FPS) where players are required to hold a gun pletokan and defeat the enemy by shooting every enemy there.

2. *Gobak sodor/ galasin*

Galasin original rules of the game are divided into two teams, attacking team, and a team of guards. Tim attacker will fully perform the movement ran, therefore this control can not be handled by the control of perceptual computing. Therefore the existing adjustment in Galasin gameplay is assumed to be a team player guards, so that movement is needed only right-left shift and can be handled by the control of perceptual computing.

3. *Boi-boian*

Adjustments in the game is the player will be the team attacker who avoid pitch leveled enemies, by simply moving the head from side to side with no movement ran back and forth in preparing the stone slab as the original, so the movements are performed to approach the stone slab will automatically when the right or left hand grasping the stone slabs, and the player had to avoid the throw players by moving the head.

4. *Gatrik*

In the gatrik game adjustments conducted is to put the player into a player who hit gatrik. Only limited to hitting motion is represented by PowerBar is stopped when the player move the hand. For movements such as punching gatrik hit can be handled by perceptual control, only parameters that affect the quality of the player blows can not be simulated, so as to be able to simulate the movement as required PowerBar hit gatrik to be able to represent the parameters of the quality of the player blows.

2.1.7 *Gameplay Modelling Analysis with MDA*

Below are descriptions of aspects on each gameplay is needed on every model of MDA, so that it can be done after the formation of gameplay with regard MDA framework.

Table 1 Pletokan Gameplay Model

MECHANIC	*DYNAMIC*	*AESTHETIC*
1. *Gesture : Hand*	1. *Healthbar : . Health Bar will*	1. *First person: Players are*

MECHANIC	DYNAMIC	AESTHETIC
tracking, hand gesture 2. Weapon : Pletokan 3. Amunition: Single shoot 4. Enemy spawn point : Fixed 5. AI behaviour : Read player position	decrease as the attack of the enemy, if healthbar runs out it will be declared lost. Healthbar remainder at the end of the game will be counted as a score. 2. Scoring: Health bar remaining amount multiplied by the number of enemies defeated	given a first person perspective in play. 2. Railshooter: Forward and backward movement handed over entirely to the system, when the enemies in the screen runs out, then the player will automaticall y move to where there are enemies.

Tabel 2 Galasin Gameplay Model

MECHANIC	DYNAMIC	AESTHETIC
1. Gesture : hand tracking, hand gesture 2. AI behavior : Calculating match position tangan 3. Hand spawn point : Random	1. Hand movement match indicator: Indicators that show the position of the hand is placed, consisting of four sides of the upper-left, top-right, bottom left, and bottom right. If the player fails to put a hand correspon ding indicator, then the enemy will break through the defense. 2. Scoring: Every enemy who successful ly attacked are given -1 points, while the enemy attacks was foiled gain points +1	1. Hand movement match: Players are required to follow the movement of the hand position as instructed.

Tabel 3 Boiboian Gameplay Model

MECHANIC	DYNAMIC	AESTHETIC
1. Gesture : hand tracking, hand gesture, face tracking 2. Ball spawn point : Random	1. Timer: Througho ut the game will be given a long count backwards the game before the stone slabs arranged, if the stone slabs have been arranged, then the game is over and the countdown time remaining used as the score. 2. Scoring: During the	1. Hand grab: Pemain diberikan kendali untuk menggengga m lempengan batu dan menyusunnya 2. Dodge: Pemain diharuskan menghindari lemparan bola yang dilemparkan oleh musuh.

	game, players have the opportunity to hitten by balls 3 times, the remaining players will lose. The final score is obtained by multiplying the remaining time left to chance.	

Tabel 4 Gatrik Gameplay Model

MECHANIC	DYNAMIC	AESTHETIC
1. Gesture : hand tracking, hand gesture	*1. Power bar: Power bars are used to represent the speed of blow players, consisting of a few bars of red, green, and yellow. When players hit, the cursor will stop at one of the color bar. The green color represents a successful blow, while the red color represents the blow that failed, and yellow represents blow almost succeeded.* *2. Scoring: Scores are calculated based on the level of accuracy of the player blow. From three chance to hit, blow failed to be 0, blow succeeded worth 2, and blow almost worth 1.*	*1. Timing: Players must match the time when hitting so it can hit gatrik appropriately.*

2.1.8 *Gameplay Establishment Analysis*

After some adaptation, conducted the establishment of gameplay with attentive to every aspect of MDA (Mechanics, Dynamics, and Aesthetics) on gameplay design, and referred to similar games with various adjustments, is formed as follows gemplay design.

1. Pletokan

Gameplay will be established for this game is a kind of FPS (First Person Shoot). With a first-person perspective amidst pletokan war, players are required to shoot all the enemies to win the game. The control is given to users of hand tracking module, the left fist is used to direct the crossfire (aiming the cursor reference point), while the right fist to shoot.

2. Galasin

In this game the player will be placed as a guard player in the game Galasin. Players will keep the enemy can not go past the defensive line by predicting enemy movements based on the indicator movement match. The control used in this game is hand tracking, and finger tracking. The camera will read beforehand whether both palms open or closed, and then with open palms number of fingers that appear on the palms read by the camera.

3. Boi-boian

For gameplay adaptation players will act as an attacking team which develops the stone slabs, while avoiding tosses the ball from the team of guards. Players must dodge ball with face tracking control, meaning the player must move the head to the left and right to avoid the ball. Hand Tracking is used when a player preparing stone slabs one by one.

4. Gatrik

Gatrik is a game that emphasizes hand coordination with promptness hitting, in order to form gameplay that can bring these elements, adapted gatrik game like baseball. Control used in the game are hand tracking. Players will perform jerking movements such as punching to stop the power bar, while making

gatrik bouncing accordance with the accuracy and stopping power players hit the bar.

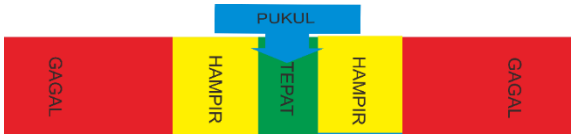


Figure 5 Power Bar Indicator

2.1.9 *Level of Difficulty Analysis*

By considering the aspects that exist in every gameplay, level design can be created and adapted to the type of gameplay there is to add an element of challenge in the game. The whole game has four levels ranging from level 0 to level 3. At level 0 users are given a tutorial how to play and the rules of play. The difficulty and complexity of the game began to stand out at every level of the game as in pletokan enemies that there will be increased, gobak sodor complexity movement and speed of the displacement movement is increasing, boi-Boian ball speed and the number of balls that avoided increasing, and gatrik increase in difficulty as extensive opportunities getting hit the right target at the power bar is getting smaller.

2.2 *System Design*

The system design aims to design solutions to problems that have been proposed on systems analysis. Menu architectural design is the design of the main elements in applications that describe the relationship between structural elements.

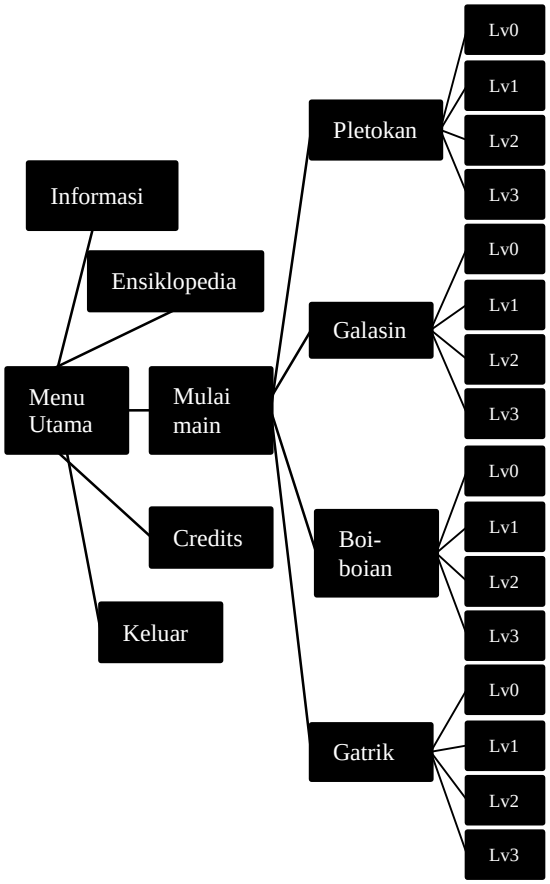


Figure 6 Menu architectural design

The design of the interface is a description of the design of the interface system to be built.

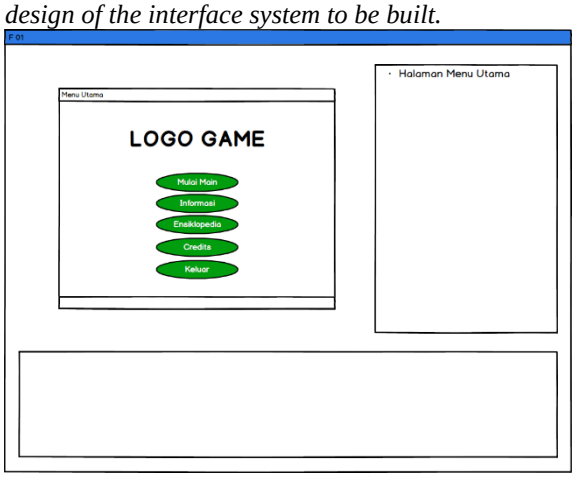


Figure 7 Main Menu Interface Design



Figure 8 Main Menu Interface Implementation

2.3 *System Testing*

Testing conducted to the system to find flaws or mistakes that exist in the system that is being tested. The test intends to determine the system that made it meets the criteria according to the design objectives.

2.3.1 *Balackbox Test*

Here are the results of black box testing has been done on each function contained within the system.

Testing Class Test	*Test Item*	*Types of Tests*
Start game	*Entering choose game menu.*	*Black box*
Information	*Showing instructions game.*	*Black box*
Encyclopedia	*Showing traditional game encyclopedia.*	*Black box*
Credits	*Showing credits.*	*Black box*
Exit	*Exit game.*	*Black box*
Choose game	*Entering choose level menu.*	*Black box*
Choose Pletokan level	*Showing the level of the pletokan game.*	*Black box*
Choose Galasin level	*Showing the level of the galasin game.*	*Black box*
Choose Boiboian level	*Showing the level of the boiboian game.*	*Black box*
Choose Gatrik level	*Showing the level of the gatrik game.*	*Black box*
Select Pletokan level	*Entering pletokan game screen.*	*Black box*
Select Galasin level	*Entering galasin game screen.*	*Black box*
Select Boiboian level	*Entering boiboian game screen.*	*Black box*
Select Gatrik level	*Entering gatrik game screen.*	*Black box*
Pletokan calibration	*Conducting calibration on the pletokan game.*	*Black box*
Galasin calibration	*Conducting calibration on the galasin game.*	*Black box*
Boi-boian calibration	*Conducting calibration on the boi-boian game.*	*Black box*
Gatrik calibration	*Conducting calibration on the gatrik game.*	*Black box*
Directing a target	*Move the cursor toward a target on the pletokan game.*	*Black box*
Shooting	*Menembakan peluru sesuai arah kursor pada permainan pletokan.*	*Black box*
Matching the movement according to the instructions	*Calculating the match position of the hands on the galasin game.*	*Black box*
Avoid enemies throw	*Avoid enemies throw in boi-boian game.*	*Black box*
Develop a stone slab	*Develop a stone slab in boiboian game*	*Black box*
Hit the gatrik	*Hit the gatrik in gatrik game.*	*Black box*

Based on black box testing that has been tested, the results obtained in the form of a functional that exist in the game has been going well, so it can be concluded that the implementation of the Intel Perceptual Computing technology in game development compilation of traditional games have been successfully conducted.

2.3.2 *Beta Test*

This test through two phases, which a program demonstration, after the provision of the questionnaire.

1. Program Demonstration

Before giving questionnaires to users, users are welcome to try the game and try to run any existing functionality on the system until the user has a clear picture of the gameplay is presented, so that the user

has its own assessment of the game that is being demonstrated.

2. Questionnaire

After doing a demo program to users, each user is given a questionnaire containing seven questions related to the game that is being demonstrated. By using a Likert scale of the distribution of questionnaires to 30 users.

Based on the beta testing has been conducted, showed that P-Play Traditional Games managed to attract the interest of children to play traditional games.

2.3.3 *Acceptance Test*

Acceptance testing is done by conducting interviews with Zaini Alif, chairman of Hong Community. Interviews were conducted is by asking 10 the questions.

Based on the acceptance testing has been conducted, showed that P-Play Traditional Games can considerably increase the interest of children to traditional games, but the movement is in the original traditional game should be improved to get a real picture of the original traditional game.

3 KESIMPULAN

From the research that has been undertaken on the implementation of the Intel Perceptual Computing technology in game development compilation of traditional games, we can conclude that. Implementation Intel Perceptual computing on traditional game development game compilation has been successfully done. P-Play Games Traditional Games has been quite successful in increasing the interest of children to the original traditional game.

Adapun saran dari hasil penelitian implementasi adalah diibutuhkan eksplorasi lebih mendalam lagi mengenai gerakan-gerakan yang ada pada permainan tradisional yang asli untuk dapat membuat kendali gesture pada permainan lebih sesuai.

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