**Abstract**— Along with the development of advanced gaming technology, we can play the game with so many tools or platforms such as console games, PC games, mobile games and handheld games. The disadvantage of those games is the difficulty to connect additional sensors to the PC computer. Large power requirements will also be a constraint. Besides, the size of the PC could be a weakness that makes it difficult to carry and play anytime. Raspberry is a small computer that can be added with motion detection sensors. By using the raspberry, the researchers managed to create a game "Crows Adventure" that uses motion detection sensor as the controller. Some of the sensors used in the game are UDS Sensor (Ultrasonic Sensor distance) and touch sensors which are applied to smartphone to control the game. This allows the use of sensors in making more varied games by using raspberry devices.

**Keywords**— Console, Raspberry, game, sensor ultrasonic.

I. INTRODUCTION

Along with the development of the game technology game, we can play the game with a tool or platform that assortment, such as console game, PC games, mobile games and handheld game. Console game is a separate device that is usually associated with a monitor or television to display. As mentioned in [1] occurrence P S4 a nd X box O ne s tarted the 8th generation of t he console g a me. Moreover, t here is a development of o ther game consoles, such as N intendo, Sega. PC games require a personal computer or laptop to play. Mobile games are games that we play on mobile phones such as Android and I-phone. Handheld game or commonly called portable g ame console i s a t ype of game that is smaller in size that has a screen and can be played anytime.

There are also games that require additional sensors to play. Such as games that we have encountered in Gamefantasia or Timezone. There is a game that uses sensors shaped like a gun, and there are games like DDR (Dance Dance Revolution) as the sensors are stepped on. The weakness of the game above is difficult to connect the additional sensor to the PC computer. PC computer also has a problem because it requires large power. In addition, the size of the PC becomes a weakness that makes it difficult to use in a game that can be carried and played at anytime.

Raspberry is a small computer has advantage which is able to be added by motion detection sensors. According to [2] even though small sized Raspberry is often used for projects that require the ability PC as a robot. Games created by using python programming language and scratch can be run on Raspberry and played using LCD monitors or televisions.

II. LITERATUR REVIEW

There are a few games that use sensors to play., such as "Ultrasonic Sensor Game" [3], the game that uses two sensors UDS to play. After bot h play er ha nds get close to the sensor, the distance will be measured and the shortest distance to the sensor will win the game. Unlike "Ultrasonic Sensor Game", researchers use these sensors into a game, which the sensor will be used to control the game. Researchers are eager to examine the advantages and disadvantages of sensors compared with IR sensors that applied...
in a game and what factors are likely to influence the feedback results obtained from each sensor, so that the use of a sensor in a game can be used optimally in accordance with needs.

**III. RESEARCH METHODOLOGY**

3.1 Design of Prototype

In this phase, the game and game consoles will be designed and manufactured using the Raspberry as the main board. In the process of designing the game, game engine is needed as well as image processing applications in order to get programming and graphics that can support the creation of a game.

![Fig 3.1 Circuit of Work](image)

Figure 3.1 is a circuit of work that creates a mini console. After the buttons on existing applications on the device is pressed, the value will be sent via Bluetooth and accepted by Arduino. In Arduino, values will be processed and be used as a controller connected via USB that is plugged in the Raspberry.

3.2 Prototype Design of Mini Console Raspberry Pi

This prototype uses Raspberry Pi 2 as the main board. Raspberry Pi is used because of its ability in the process of computing like a computer but only need a small resource and have a small-sized board.

![Fig 3.4 Circuit of Raspberry](image)

![Fig 3.5 Circuit of Arduino](image)

3.3 Gameplay game “Crows Adventure”

This game uses 2-dimensional images with pixel art theme. At the beginning of the game there will be only the title game and a moving background. After a player presses the "Shoot" button, the game begins.

The game uses auto runner as the gameplay, where the character will fly non-stop and must avoid several obstacles, such as other birds.
3.4 Control Game “Crows Adventure”

The game uses the android as the media controller that will be connected via Bluetooth by using Arduino which will be processed and then will be sent to Raspberry.

The movement would use the UDS to set the height of the character, and to move right and left using the application on Android. Figure 3.7 is a sketch of the controller.

![Fig 3.7 Sketch of the Controller](image)

IV. RESULTS AND DISCUSSION

4.1 Android-Based Controller

Controller of the game is very important, because the player should be able to control the character easily. This application to control the game is created by using web-based engine called AppInventor.

![Fig 4.1 Visual Programming Kontroler](image)

Figure 4.1 is a visual programming of the application. At this stage, the program serves as the sender, and when the buttons that have been made are pressed as an example of "1", that shot is pressed, then the application will send the value "s" to be captured by Arduino and will be processed in the Arduino.

4.3 Programming on the Arduino

Code 4.1 is a program of Arduino, where the value obtained will be read and processed. Once the value has been processed, program will execute the command which will be connected to the device Raspberry as control of the game.

```c
char val;
#include <Keyboard.h>
int x = 0;
char ir = 'n';
void setup() {
  Serial.begin(9600);
  Serial1.begin(9600);
  Keyboard.begin();
}

if ( Serial1.available() ) {
  Val = Serial1.read();
  if ( val == 'y' ) {
    ir = val;
  }
  else if ( val == 'n' ) {
    ir = val;
  }
  Keyboard.press(val);
}
else {
  Keyboard.releaseAll();
}
```

![Code 4.1 Code on the Arduino](image)

4.4 Programming on the Raspberry

A. Main Menu

Figure 4.2 is a view of the game "Adventure Crows". The crow is a character that can be played by a player, where the player must avoid eagle attack in order to continue the game and get the corn to increase the score.

![Fig 4.2 Game Interface](image)
B. Programming of the “Crows Adventure”

Figure 4.3 is a program in Scratch to control the game “Crows Adventure”. The values received by Raspberry will be used by the crow to move vertically.

Figure 4.3 Programming on the Scratch

4.5 Measurements of the UDS and IR Sensor

Because prototypes using multiple sensors such as ultrasonic and infrared, the researchers want to take measurements to see how well each of the sensors can be used in the manufacture of a game.

By using the Arduino to measure, researchers calculate the distance from each sensor by seeing and observe the results that be read on serial monitor of sensors plugged into the pins on the Arduino.

Table 4.1 is the result of the measurements obtained from testing the UDS and IR sensors. UDS sensors used in testing is UDS series HSR-04, while the IR sensor used is a series SHARP 2Y0A02.

<table>
<thead>
<tr>
<th>Distance Sensor to Device</th>
<th>Results that be read on UDS</th>
<th>Results that be read on IR</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 cm</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>14 cm</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>13 cm</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>12 cm</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>11 cm</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>10 cm</td>
<td>11</td>
<td>10</td>
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<tr>
<td>9 cm</td>
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<td>9</td>
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<td>7 cm</td>
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<td>3 cm</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>2 cm</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>1 cm</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

Table 4.2 Result of testing

<table>
<thead>
<tr>
<th>The things that are tested</th>
<th>UDS</th>
<th>IR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity in measuring distance</td>
<td>v</td>
<td>X</td>
</tr>
<tr>
<td>Distance of the device is less than 1cm</td>
<td>x</td>
<td>X</td>
</tr>
<tr>
<td>Device is tilted and not aligned with the sensor</td>
<td>Not Accurate</td>
<td>Not Accurate</td>
</tr>
<tr>
<td>The field device is in solid black</td>
<td>v</td>
<td>X</td>
</tr>
<tr>
<td>Response time</td>
<td>Slower when IR</td>
<td>Faster</td>
</tr>
<tr>
<td>Interference light sensor on the location of the game</td>
<td>x</td>
<td>V</td>
</tr>
</tbody>
</table>

V. CONCLUSIONS

The conclusion of this research as follows:
1. Game "Crows A dventure" uses sensors in the device as a controller Raspberry. Some of the sensors used in the game are U DS sensors, IR sensors and touch sensors. The sensors can be added to the device by plugging pins Raspberry existing on the sensor into the GPIO pi n contained in the raspberry.

2. Game "Crows A dventure" is designed using Scratch. To play the game, it requires application on Android devices made by software AppInventor to move left, right and shoot. While the distance detection sensor is used to set up and down on the characters in the game.

3. The sensors tested are U DS sensor and I R sensor. UDS sensors use sound as a medium, while the IR sensor uses infrared light as a medium. After researchers conduct a study to determine the factors that influence these sensors in a game, researchers get the results that each sensor has its advantages and disadvantages. UDS sensor is more sensitive to distance than the IR sensor, but the response time of IR sensors is faster. It is because the IR sensor uses light as a medium. Other factors affecting these sensors in a game are the color of the back side of the used device. If the back side of the device has a solid black color, IR sensor has difficulty in measuring the distance, especially with the light around will also affect the distance measurements performed by IR sensor.

REFERENCES

