

Implementation of Multiple Touch Gesture Using Depth Information

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ABSTRACT: In this paper, we propose a method of implementing a multiple touch gesture using the depth information. We obtain the depth information using depth camera and determine gesture type using it. Using this method, it is possible to provide an event according to this gesture and to implement the application supporting multiple touch gesture at low costs. In addition, user can control unit instinctively in shooting game by applying this method to the screen of large size.

Keywords: Touch, Gesture, Depth Information, Shooting game

I. INTRODUCTION

Recent, the interests in touch technology are increasing by advances in smart IT technology and the applications using touch gesture are also increasing [1, 2]. Accordingly, there are many developments of shooting game with touch events in smart phone. However, it is difficult to apply to touch function in medium and large-screen due to high cost of applying it. For this reason, it is difficult to develop a shooting game that supports touch gestures in large screen.

In this paper, we propose a method to recognize the gestures by a touch sensor using optical type and apply for shooting game using it. First, the proposed method recognizes whether touch by this touch information, then traces the touch point until touch is released and determines gesture type through tracked path. Through this method, it is possible to be applied to recognize touch gesture in screen using optical touch sensor. And we can develop a shooting game that supports gesture by applying the above method.

II. IMPLEMENTATION OF SHOOTING GAME USING MULTIPLE TOUCH GESTURE

The touch sensor is composed almost the resistive type, the capacitive type, and the optical type [3]. Recently the optical sensing methods have been used for the large size of the touch screen. The optical methods detect a pointer over the touch screen from the outside camera without using the physical touch sensor.

In this paper, we use direction gesture because this gesture can be used simply and intuitively so users can play this game easy. Using direction gesture, gesture type is determined by straight line determined by start and end points of touch, and events is prevented according to this gesture type.

There is method of determining the touch gesture type. First, it draws a straight line from the touch point to the end point of the trace pointer and measures the angle formed by the line. Then it determines to the nearest one of the gestures by comparison with the pre-registered direction. After that, the method provides an event that is assigned to a gesture. Fig. 1 shows a method of determining gesture type and Fig. 2 shows an event flowchart of this method.

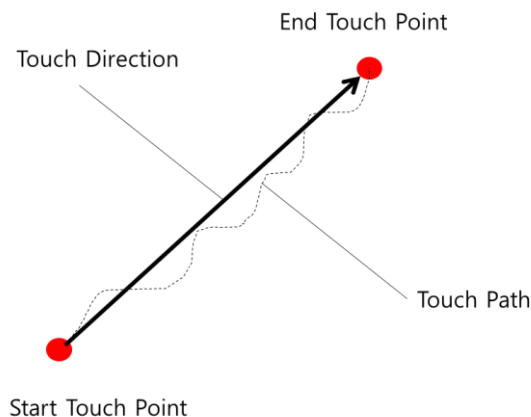


Fig. 1. Determining touch gesture type with start and end points

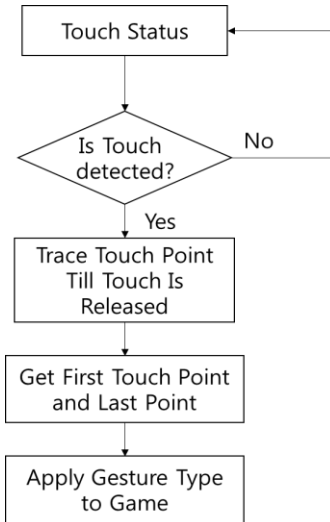


Fig. 2. Flowchart of determining the touch gesture type

In many shooting game, user controls a unit to move it or shots something like missile to enemy. Previously, user controls this unit through a joystick or a keyboard, mouse, etc. However, using these to control a unit in shooting game is uncomfortable because this controller is not intuitive. So user has to learn how to control this unit to play this shooting game. If the proposed method is applied to this shooting game, user can control this unit instinctively through touch gesture and play this shooting game in a wide screen at low cost.

Fig. 3 shows the class diagram of this shooting game using above touch gesture. Unit class is the role of storing unit information. GameController class is getting gesture information from TouchGesture class and controlling each unit to move it or to shot missile. TouchGesture class is the role of getting touch information from touch sensor and determines touch gesture type using this information through above method.

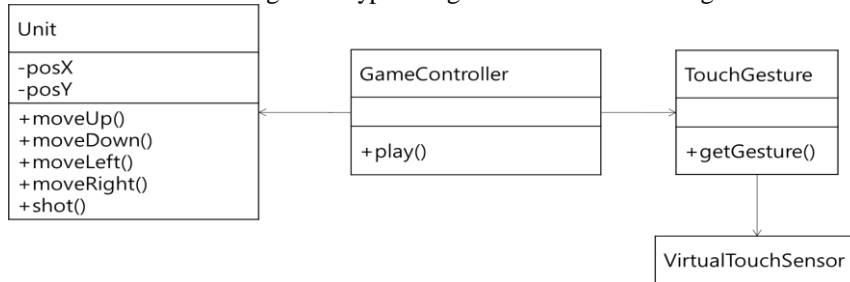


Fig. 3. Class diagram of the shooting game

Supporting direction gesture in this shooting game, it is important that intuitive and suitable events are provided. So if user drags to the left or right with touch, unit is moved in a direction of drag. Or if user drags to the top or bottom with touch, shooting angle is increased or decreased. If user wants to shot missile, user just touch and not drag to increase shooting power. And user keeps his touch until shooting power reaches the value user wants. Fig. 4 shows this direction gesture.

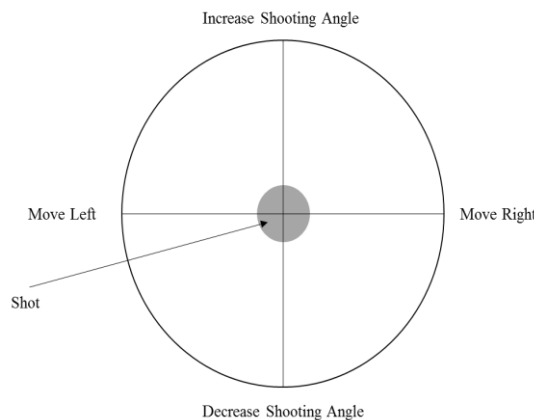


Fig. 4. Direction gesture in this shooting game

Fig. 4 is a prototype of the implemented game directly, using the class diagram of Fig. 3. A unit and another enemy are presented in Fig. 5(a). Fig. 5(b) and Fig. 5(c) shows that this unit is moved by touch gesture and its angle is increased. Fig. 5(d) indicates that this unit shoots to enemy unit through keeping and releasing touch.

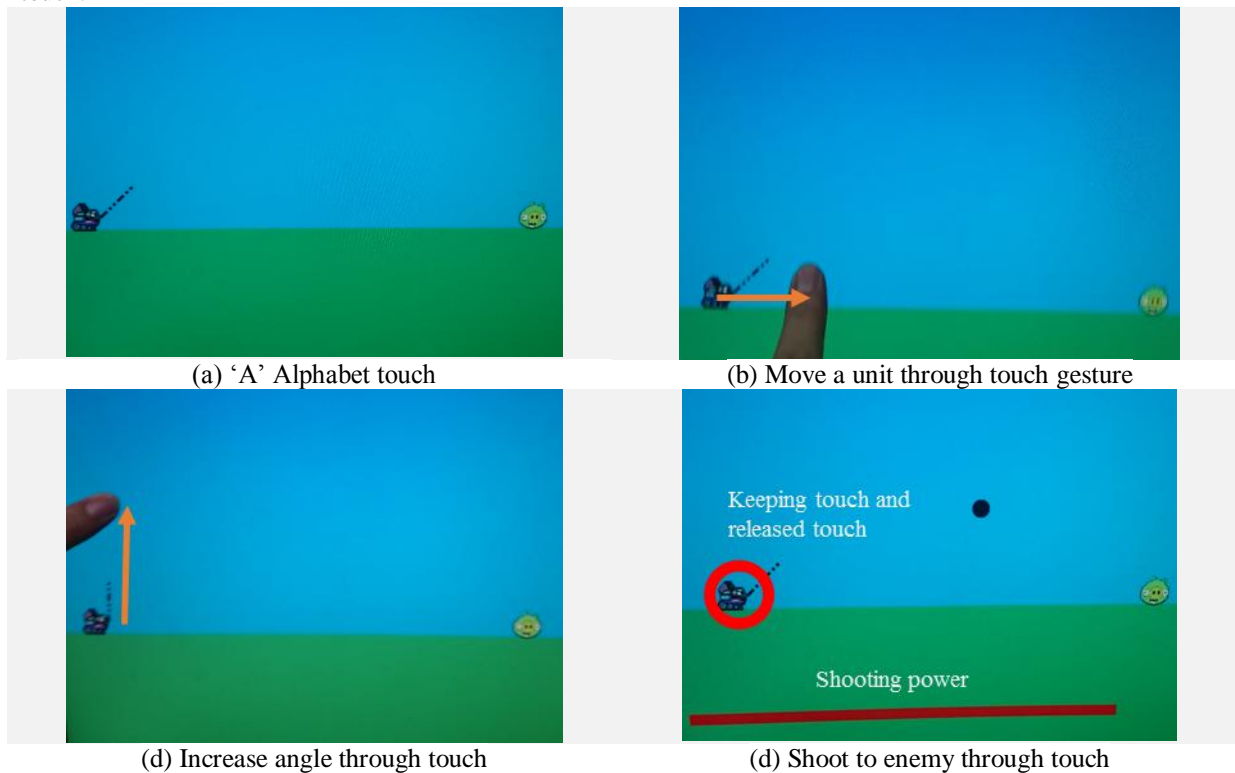


Fig. 5. Implementation of shooting game using touch gesture

III. CONCLUSION

In this paper, we propose method of touch recognition using optical touch information and method of determining to gesture type in touching using the direction. By using this method, it is cheaper than the existing methods and makes it easy to build a touch gesture environment. By providing suitable event for gesture with the proposed method, it is expected to be applied to touch gesture on shooting game that is used with big screen at low costs. And it is also expected that many gamers will have fun playing this.

IV. ACKNOWLEDGEMENTS

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REFERENCES

- [1] R. Munoz-Salinas, R. Medina-Carnicer, F.J. Madrid-Cuevas, and A. Carmona-Poyato, "Depth silhouettes for gesture recognition", *Pattern Recognition Letters*, vol.29, no.3, pp.319-329, 2008.
- [2] P. Suryanarayan, A. Subramanian, and D. Mandalapu, "Dynamic hand pose recognition using depth data", In *International Conference on Pattern Recognition*, 2010.
- [3] S.K. Kwon, "Puzzle game in touch pad", *IOSR Journal of Engineering*, Vol. 4, No. 11, pp.14-17, 2014.