Development of Young Children Coding Drone using Block Game

Bong-Hyun Kim*

Industrial-Academic Convergence Research, 20 Wolpyeongsaetteum-ro, Seo-gu, Daejeon, 35226, Republic of Korea; snake93@nate.com

Abstract

Objectives: In this paper, we developed a coding system for a block games drones that children can feel the interest in software systems for leading educational material. **Methods/Statistical Analysis**: SW education is thinking of implementing a creative idea to SW. In addition, the students will easily SW educational, and fun to learn for yourself, this education should be intensified in the immersion process itself. Therefore, in this paper, we develop educational software coding system incorporating games and education. To this mixture was subjected to a software based on the coding block and the game design, develop a system to create, execute it as drones. **Findings**: To this end, training drones can easily touch the infant; it was easily configured as a possible assembly drones. Also developed a drone put the first priority on safety considering the age of the user. Finally, the sheathed touching by hand block intuitively control board-shaped product is available as to the training program, one was configured to be able to control by operating them. **Improvements/Applications**: Drone software coding for a block-based game developed in this paper is a smart education systems. Smart technology is utilized in the education system is implemented at the start of the study based on mathematical engineering robotics, computer science, programming. Digital interactive features of the Smart gives a higher education fun and interesting to students.

Keywords: Block Game, Drone, Smart Education System, SW Coding, Wireless Communication

1. Introduction

The world is changing in time; develop into the digital economy in the industrial economy of the manufacturing center. Developed countries of northern Europe and North America, and East Asia have already started the Digital Education Revolution to prepare the new digital economy. Since Smartphone emerged, the software is changing rapidly as a software-oriented society that determines the competitiveness of individuals, businesses and governments. The SW-oriented society industrial economy and other competencies are needed. World's major countries are improving the competencies required to SW oriented society through education. Mathematics, science in the late 19th century to the early 20th century, the Industrial Revolution and the industrial economy has a position as a universal education in schools, as education has become an essential educational SW courses in SW oriented society^{1,2}.

World-2000s, ICT (Information Communication Technology) education is the most utilized and to educate them about how to use the tools and commercial services using information and communication technologies. In recent years, the rapidly changing trends in User education as the Maker education. Through this, the children with the ability to raise the party coding and programming information and thinking (Computing Thinking) education which can be designed and fused with his own ideas and implement creative and problem-solving skills grow. Thus, it appears clearly that recent change in information science, coding education around the country to lead the digital economy in Europe, the Americas and Asia. It can be seen that early education for nurturing the competency contrast to the digital economy is being conducted.

Korea has introduced an ICT education at an early stage but contributes significantly to growth in the ICT powerhouse, reducing the ICT education in primary and secondary schools since the late 2000s. 2010 'Information' training courses in education reform such as algorithmic programming information science and information thinking education was expanded in content. However, depending on the number of schools shut down to select the 'Information' subjects and the reduction of' Operating instructions Educational Information and Communication Technology' is applied from August 2000 until December 2008. However, in recent years, education has been pushing for the title role in the SW talent for creating software-driven society, the government created the economic key performance according to contemporary flow³⁻⁵.

SW Education is thinking of implementing a creative idea to SW. Going to elementary and secondary education students SW is easy to learn and entertain ourselves, that education should be intensified in the commitment process itself. In particular, the educational software for children must be readily available, should be to promote creativity. It is a smart training system being developed for this purpose. Smart training system is a system that can go beyond the traditional concept of education systems creates new forms of gaming and education. Smart technology that is utilized in the implementation of the education system is derived from the study of robotics, computer science, programming, technology, engineering and mathematical theory, it can be incorporated into the educational field itself in Figure 1.



Figure 1. Information subject course rate.

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2. Education System Trend

The world is undergoing major development of educational software and systems for human resources development, with thinking computing by leveraging the awareness of the importance of education from elementary and secondary students SW infants, the regular curriculum. Typically, the UK has the required training courses to 16-year-old students 'computing' courses from September 2014 in 10 005 years. Japan has completed the required courses in high school to the 'information' course in 2012. India may establish computer science as a mandatory subject in primary and secondary schools since 2010. Israel has developed a computer science course in operating year 2011 Middle School. Estonia and is in conjunction with subjects such as math and science education attempts to programming code shows one motion or amendment in 2014 established courses. Finland is scheduled to begin in fall 2016 programming coding education in elementary school^{6.7}.

2013 US President Barack Obama has come forward to support educational programming, and Bill Gates, Mark Zuckerberg key personnel, including IT industry is scrambling to programming education campaign. It also focused non-profit organization called the US-led Code. org spread educational programming. Thus, it appears clearly that recent change in information science, coding education around the country to lead the digital economy in Europe, the Americas and Asia. This is evidence that the implementation of early education for nurturing the competency contrast to the digital economy⁸.

In Korea, the parish assembled robot is activated. Recently, the development of ICT educational robot technology and smart devices that combine form has been activated. KT's kibot, Albert smart devices and training, new forms of communication products combine the development of educational robot carrier SKT has been progress. It occupies the largest share of current educational robot is assembled programmable robot system as shown in Table 1. Development of a programmable system-built robot industry development direction is possible it is necessary to develop differentiated through improved systems for personal robot created through the combination of 3D printing, graphic-based developmentbased links such as authoring tools and technologies. Existing teacher assistant robot has been a lack of price competitiveness due to exhaustion, lack of technical perfection, A/S issues, content, lack of progress is technology developed compensate. In addition, the PC operation is clumsy younger target robot differentiated content development and training of SW e-Learning content is available offline form is being performed. After all, the business model of foreign companies is changing in content development and distribution of products in the sale of a single robot. Thus, the coding system developed for education for infants and younger are required to equip the education system in the domestic market competitiveness field^{9,10}.

Table 1. Development plan of education	system
technology	

Parameter	As is	To be
Form	Assembly possible forms	The assembly is simple and not linked content package
Equipment	Take advantage of the PC keyboard operation display	Diversification of the devices used in smart devices
Education Materials	Utilize pre-built ready-made	Utilizing directly produced as a DIY utilize ICT skills
System Robot Function	Programmable system robot of stand alone-type	Community works to connect to the cloud server through the network interlock

3. Development of SW Education Drone

In this paper, we developed a preschool and elementary school-based educational software SW coding system drone drones that children can feel the interest to the system as a material for the prior training.

- **Step 1:** Educational drones can easily touch the infant, easy assembly was composed of two available systems. Further, we developed a system based on the first safety considering the age of the user.
- **Step 2:** Put the block touched by hand intuitively board type control system is available as to the training program, one was configured to be able to manipulate the control. Board-type system can be converted to a

variety of formats, designed and developed using the block additionally to enable the various training programs.

In this paper, we developed a game based on blocks of software coding systems for drones. To this end, in one step, to prepare a built-up that can lead to interesting drones. Drones assembled educational system has been developed as a detachable so that you can assemble your own system. Drones are basically controller, four batteries, body, motor part required to operate, and consists of an ultrasonic distance sensor. Battery was developed as a possible assembly of motor part outside the system. We implemented a system of block-like Lego type can be assembled easily to children. The motor mounting arm was configured to be easily fastened to the main frame. Finally, the main controller, a battery, ultrasonic sensor has a groove shape of the Lego-type blocks, which were designed to be connected to the main frame in Figure 2.



Figure 2. Development of Drone system using Lego block.

Drone system based lego block have implemented a system with safeguards to minimize the breakage and damage to the human body since the operation for children. To this end, we developed as a system considering the safety in consideration of the product characteristics for the software coding training indoors. Due to the propeller drone added a protective net for protecting the propeller part to minimize vandalism and damage to human body. Cage has been configured so that children can assemble yourself drones were designed to lead to assembling interesting. In addition, the above configuration prevents day 2M, when the ultrasonic waves through the sensor mounted on the bottom and increased safety in Figure 3.

For controlling the base of Lego blocks drone it was applied to a wireless communication method. Program board and the 1:1 correspondence with, and through the control system and configured to be implemented in accordance with the infants configured sequentially function is generated by the program implemented a control board on-board wireless communication ability to collect the control signals sent over the air. In addition, the latest BLE communication methods through the introduction of smart phones and were designed to be interoperable with the Smart Pad in Figure 4.



Figure 3. External protection of Lego Drone.



Figure 4. Control system using BLE communication.

Finally, by developing a program body for coding the block-type game system it was linked to the drone. Block-type board game program was designed equipped with a built-in command data blocks can be assembled on a square board with a block on one board and to work by clicking on the Start button. After the picture is focused carved puzzle separated, and click the Start button to developing a program specific functions to be implemented. Flatbed program board that plugs into the block was developed in order to work in order to recognize the identity of the block. Block is connected to the electrical connector and the board, VCC, IN, OUT, GND was configured to the main microcomputer and the data communication. Specific data embedded in the block is changed into a microcomputer in the main program was developed to be transferred to the drone via wireless communication. The main program of the microcomputer board is to recognize certain data blocks in order to convert them to command data implemented by passing through the wireless communication. Finally, the program

board is implemented as a computer is connected via a wire to enable conversion and sent to the data drones. In addition, it was developed to easily transfer through the wireless^{11,12} in Figure 5.



Figure 5. Program coding board of block-type.

4. Conclusion

Since the emergence Smartphone, the software is changing rapidly as software-driven society that determines the competitiveness of individuals, businesses and governments. In the SW industry-oriented society and economy are the other skills demands. World's major countries are improving the competencies required to SW oriented society through education. However, a simple coding based software training is often difficult to create future value. Thus, there is a need for a software-oriented training of interest through the game.

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