

Design and Implementation of AN Entertainment Golf Robot

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ABSTRACT

Robot has been developed as something to help human beings, and robot will be very important field as an entertainment. This paper intends to contribute to developing golf robot as an entertainment using AVR ATmega Chips. It is believed that the entertaining robot giving a pleasure to human beings has good prospects for the rapid growth along with other robot industry. Golf robot developed in this paper has been developed for entertainment and has a similar sense in comparison with the real golf. This golf robot is represented in the way of putting the ball in the hole by hitting the ball just like the actual golf game and putting through making robot come close to the ball with the putting robot. This golf robot can play a game with several people like the actual golf if many putting robots can be used. It is, therefore, considered that the development of golf robots for entertainment using AVR has a high value of the golf robot as an entertainer on the ground that it can play a real golf.

Keywords: Robot, Entertainment, ATmega Chips

1. INTRODUCTION

It is prospected that robots will be developed as the most useful form to human beings, and entertainment robots and robots for the medical use will play a role as a driving force to make a rapid development in the robot industry. A professor who had attended at a forum of a program inviting overseas prominent scientists by the Ministry of Science and Technology anticipated that Korean robot industry could grow as fast as software technology and entertainment robot such as golf robot well would be pretty popular in the future[1]. Though many things for entertainment have been developed, golf robots are still on the first stage. Though there were, in particular, competition events related to robots in ROBOT World 2006[2] such as Grand Challenge, Robotpiad, Humanoid, Robotfest, U-SoC Robot, Module form intelligent robot, and Robot Soccer, there was not a golf robot yet, From this, it is presumed that making a golf robot and playing games do not seem to be easy.

There was a robot exhibition at Ichi World Expo held in Nagakute, Japan in 2005, and there a golf robot caddy-05 as a product related to golf robots showed playing golf[3]. It could be guessed from its appearance that making golf robot caddy had cost a lot, and it is considered that it will not be easy to make popular as an entertainment robot. 'Kibo' which is an educational robot developed by KIST (The Korea Institute of Science and Technology) is close to a human. It can imitate human's expression and move lips to a song. 'Jennibo' developed by Dasatech is similar to 'Ibo', a pet robot by Sony, but has an additional function to provide information through internet and deliver picture and voice memo[4]. Likewise, robots will help human beings by being developed in various areas such as not only entertainment but also education, cleaning, and combat. Now, this paper will develop a robot that can satisfy the above premise by laying emphasis on 1) Can a golf robot become entertainment?, 2) Can people generally like a golf robot?, and 3) Can we make a golf robot with a low cost in terms of price?

Golf robots developed so far had a lot difference with a real golf in that a robot took a ball and put it in the hole. To get rid of this difference, we have developed a golf robot by making a

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use of AVR (Alf Vergard Risc; ATMEL's RISC MCU) which is one of micro controllers that can be cheaply purchased in general. We have realized in the way to make the developed golf robot hit a ball like a real golf, get close to the ball, put it, and put it into the hole by making a use of a remote-controlled robot. The golf robot can play games with many like a real golf by using several separate putting robots. The development of a golf robot making a use of AVR, therefore, has a sufficient value as an entertainment golf robot because it can play real golf.

2. OVERALL CONFIGURATION OF GOLF ROBOT

Figure 1 is the overall configuration chart of golf robot system suggested in this paper. We can basically associate it with a golf course. A real golf course is composed of 9 holes or 18 holes, but the golf course field as an entertainment consists of 1 hole. The robot that hits a ball at first is a driver shooting robot. When the driver shooting robot hits a ball at first and the ball comes near a hole, a putting robot puts the ball and puts it into the hole,

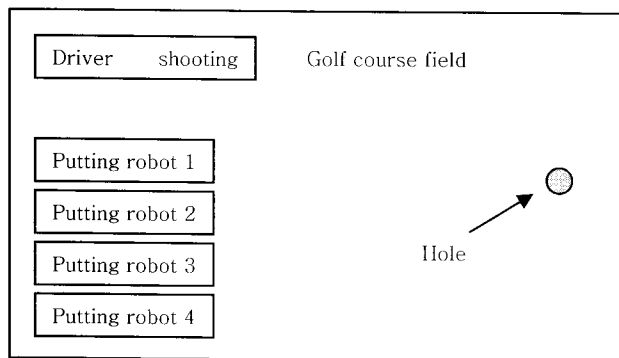


Fig. 1. Overall configuration of a golf robot.

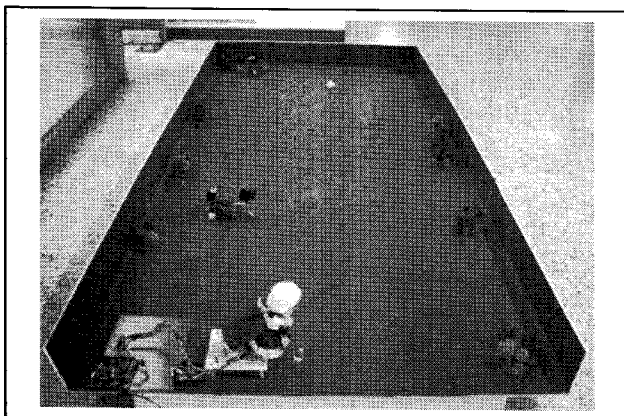


Fig. 2. Real feature of golf robot system

We make a game possible with 2 putting robots in this paper because more than 2 robots are supposed to play games if a golf robot tries to be an entertainment. We make 4 robots play games with 4 putting robots as occasion demands as well. 2 or 4 putting robots are just an example in this paper. In case of a real game, it will be ok if there are as many putting robots as

the number of players. Figure 2 is the overall photo of a golf robot developed according to system configuration of a golf robot.

3. DESIGN AND IMPLEMENTATION OF AN ENTERTAINMENT GOLF ROBOT

3.1 Driver shooting robot

ATmega 128 is used for a processor to control a driver shooting robot. ATmega 128 as a RISK chip has lots of functions and is used I/O port control, interrupt control, servo motor control, and stepping motor control [5]. The design configuration of a driver shooting robot is as Figure 3.

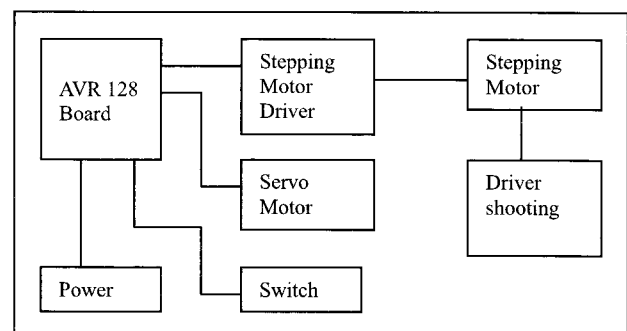


Fig. 3. Configuration of driver shooting robot



Fig. 4. Real feature of driver shooting robot.

The body of a driver shooting robot is made by making a use of servo motor, stepping motor, golf cody, and golf club. Its main body is composed of AVR 128 board, stepping motor driver, and power module. The real photo of a driver shooting robot is as Figure 4, and it is fixed and used to hit the ball.

3.2 Putting robot

ATmega 8 is used for a processor to control a putting robot. ATmega 8 is the same series as ATmega 128 and a chip to carry out almost similar function though its capacity of Flash, EEPROM and RAM is less than ATmega 128. Because a putting robot is supposed to approach a ball and put it into the

hole, we make it work by remote control with using an infrared port. The design configuration of a putting robot is as Figure 5.

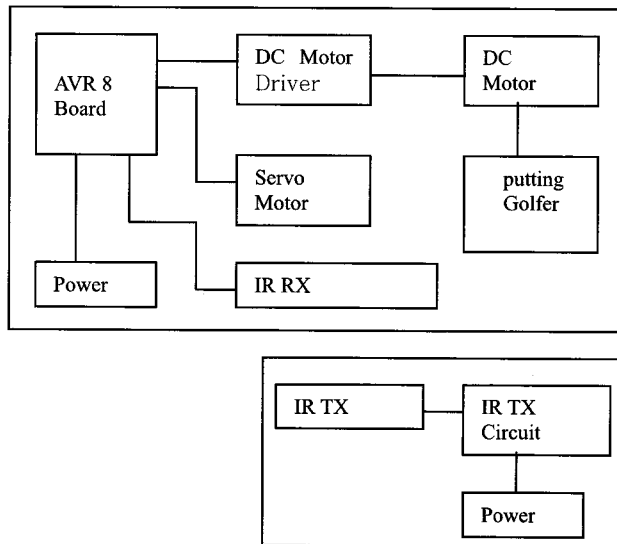


Fig. 5. Configuration chart of putting robot

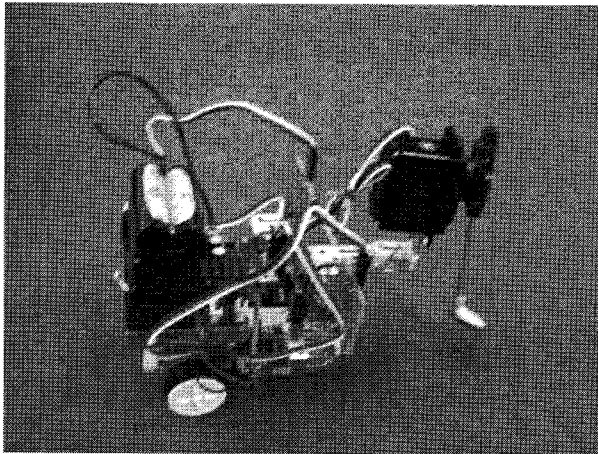


Fig. 6. Real feature of putting robot

The transmitting part of a putting robot through infrared rays gives a command a putting robot to approach the ball by going forward, going backward, turning right, and turning left. It is designed that a putting robot that approached the ball is supposed to put the ball and put it into the hole.

3.3 Ball Helper Robot

When a putting robot puts the ball in the hole, the ball falls into the hole. A player can pull it out, but if he/she uses a ball carrying robot, he/she is able to pull out the ball easily and carry it. A ball helper robot is made for this purpose. A ball helper robot is made by applying the principle of a line tracer used in general. It can relieve players' labor to pull out the ball by playing a role to wait for a ball to fall under the hole, to catch it, and to carry it outside again when players put it into the hole. Figure 7 is a real feature of a ball helper robot.

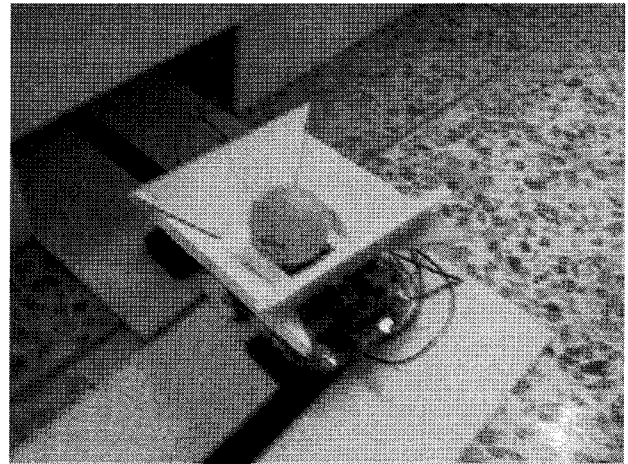


Fig. 7. Real feature of ball helper robot

3.4 Robot Control Program

3.4.1 Control program of a driver shooting robot

Control program of a driver shooting robot is made up with C-language by using ATmega 128. There is a program to drive 3 servo motors for the motion of the main body and a program to drive a stepping motor that makes a golf club drive.

3.4.2 Control program of a putting robot

Control program of a putting robot is made up with C-language by using ATmega 8. A putting robot is programmed to move back & forth and right & left by using DC motor because it has to move to any direction to find a ball; to hit the ball by using servo motor as well.

4. THE FEATURES OF A GOLF ROBOT AS AN ENTERTAINMENT

The feature of a golf robot is the same method as the real golf. The only difference from the real golf is that there is only one hole. First of all, decide the number of players. We make two players play games in this paper but several players can if putting robots are made more. Two players decide their order and play a game like playing a real golf. It is a method to make a driver shooting robot hit a ball first and then make a putting robot move and put the ball into the hole. Of course, it is not possible to put the ball into the hole at once. Just as the one who puts a ball into the hole first wins in a real golf, a golf robot that puts a ball into the hole first wins. The flow chart in a real play is as follows.

- 1) Put the ball near a golf robot.
- 2) Press the switch. A golf robot adjusts itself and hits a ball toward the target place.
- 3) Make a putting robot move back & forth and left & right and get close to the ball with a remote controller to control a putting robot.
- 4) Press the switch of the remote controller to make a putting robot put the ball and put it into the hole.

- 5) Repeat 4) till the putting robot puts the ball into the hole.
- 6) The one who puts the given ball into the hole first wins like a real golf.

As mentioned above, a golf robot has been researched and developed as an entertainment by laying emphasis on

- 1) Can a golf robot become entertainment?
- 2) Can people generally like a golf robot?
- 3) Can we make a golf robot with a low cost in terms of price?

As lots of people generally like golf, a golf robot can become entertainment by setting up a golf robot if a space is available. We will be able to make it without giving an impression that it costs a lot in comparison to other game machines if it is produced in large quantities. Figure 8 shows a driver shooting robot and a putting one are playing golf.

5. CONCLUSION & FUTURE REARCH TASK

Though there have been a soccer robot, a dog robot, and a golf robot for entertainment, it seems that the existing golf robot falls behind the sense of the real. Thus, we have made a research and developed a golf robot to have the feeling of the real golf and the sense of the real in this paper. Just as many people like golf, those who are interested in golf will have a great interest in a golf robot.

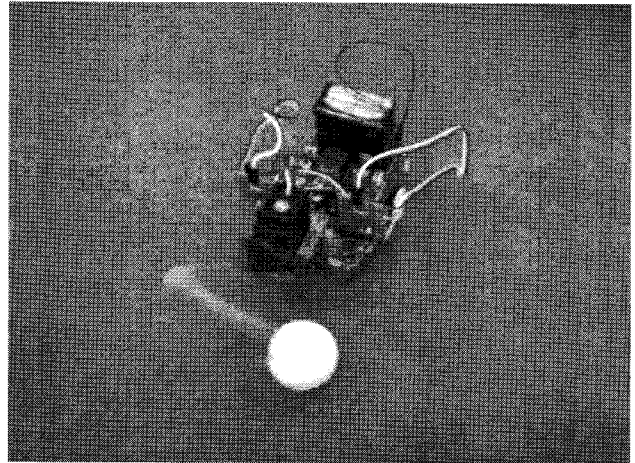
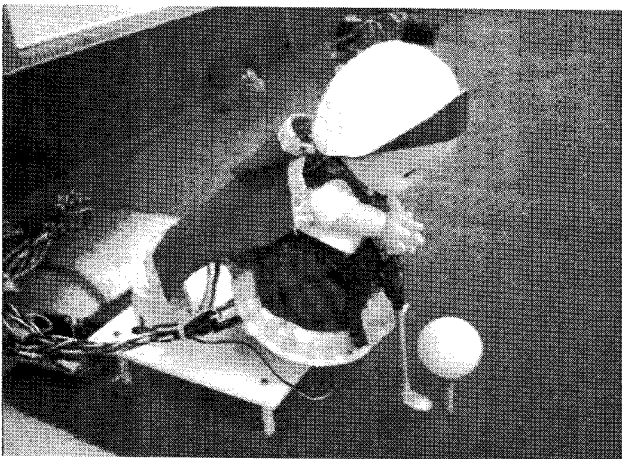


Fig. 8. The actual motion of a golf robot

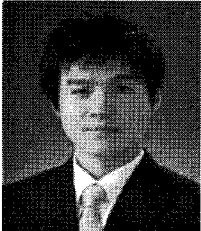
There remains future task that we should adjust the intensity like playing a real golf by making a driver shooting robot and a putting robot adjust the intensity when they hit the ball; we should give the feeling to round the actual holes by changing the position of the hole in a golf robot like a real golf with 9 holes or 18 holes. There are, also, possibilities that the method to make the most use of the charm as a game could be applied by referring to the present situation of robot form mechanic game[6]; the function of intelligent form for a golf robot could be added if necessary just as a home robot has been developed as an intelligent form and has formed a wireless home network[7]. We should, moreover, make a golf robot for entertainment that more people would be satisfied with and interested in by adding convenient functions if necessary for more practical golf robots as an entertainment.

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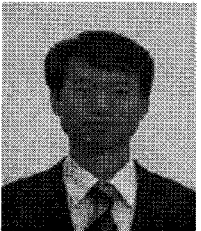
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