

Study on a Smart Phone Application Controlling Harmful Animals Scaring System Applicable to Farm Plantation

Kyung Mog Lee

Abstract—A smart phone application of a harmful animal scaring system was constructed. The system could be controlled remotely by a smart phone to setup the peripheral devices such as a scarecrow balloon, an audio system and four light lamps. The scaring system consisted of three parts: a smart phone, a scaring control module and peripheral devices. The smart phone was programed to set the peripheral devices by touching the buttons on its screen. The scaring control module was built on an electric circuit board with an ATMEGA's Arduino 328P-PU microcontroller. And the response time between the phone and the control module was measured to be about 200 milliseconds. It was much more convenient to use a smart phone than manually controlling switches.

Index Terms— android program application, Bluetooth communication, farm keeper, harmful animal scaring device, remote smart phone

I. INTRODUCTION

RECENTLY, the population of farm damaging animals such as water elks and boars has increased rapidly in Korea due to the law of protecting those animals[1]. Sometimes water elks tear the mesh net standing around a farm, and ruin all the sprouts of planted seeds. Boars also ruin all the crops by devouring vegetables, and birds peck at the fruits of farming trees.

And, the explosive spread of the smart phone and the rapid development of the Information Technology have caused the smart phone's applications widely developed in variety fields, such as smart farming systems[2][3][4][5], games[6][7], and industry applications. The information technology is also applied in some applications of the farm protecting system from wild animals [8].

And, the Bluetooth communication was used in some researches on the connection of the phone and some environment device[9][10][11][12].

In this paper a smart phone's application was developed for the harmful animals scaring system, which could be controlled remotely by a smart phone. This research consisted of three parts, a smart phone, a scaring control module and peripheral devices. On the screen of the smart phone, the peripheral devices setting buttons were displayed touchable and the statuses of the peripheral devices shown.

II. BODY OF PAPER

In this paper, a harmful animal scaring system was developed to be managed by a smart phone. The system consists of a smart phone, a device control module, and peripheral physical devices such as a scarecrow balloon, an audio system, and four light lamps. An Arduino microcontroller was used in building the scaring controlling module.

Fig. 1 shows a harmful animal scaring system using a smart phone as a remote setting controller. The device control module was equipped with a Bluetooth communication module, a Micro-processor, a fan motor, power switches controlling the power of four light lamps. The communication specification between the Smart phone and the device control module was in 9600 bps Bluetooth communication. The distance between the phone and the device control circuit board was within 10 m so that the phone and the control board could keep the connected state. The device control module could power up a fan motor, an audio amp, and for lamps. The fan motor made the scarecrow balloon expanded into sky in order to scare harmful birds, such as sparrows.

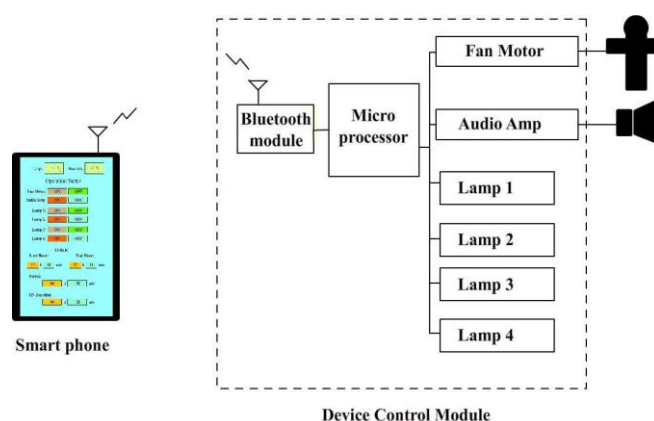


Fig. 1. A harmful animal scaring system using a smart phone as a remote setting controller.

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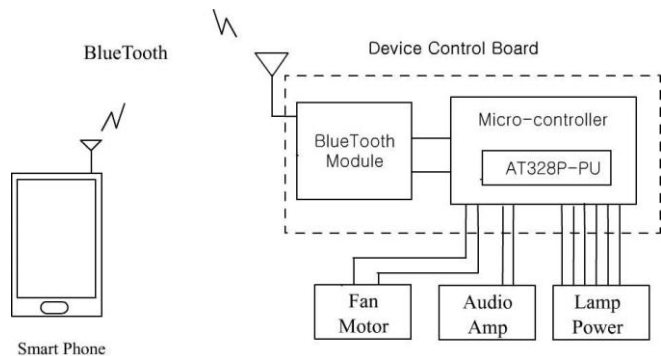


Fig. 2. Detailed system connection of a device control module and a smart phone remote controller.

The screen of the phone showed the information of the setting conditions of the peripheral device.

Fig. 2 shows the detailed system connection of a device control module and a smart phone remote controller. The device control module consisted of a Bluetooth module and a Micro-controller. This controller was built on an electric circuit board with ATMEGA's 328P-PU Arduino microcontroller.

Fig. 3 shows the screen shot of the remote control smart phone. The screen showed all the setting buttons and all the devices' setting conditions, and the timer's setting times. The operating schedule of peripheral devices can be programmed into the smart phone. Some devices should work during night only. So, the start and the end of operation time could be set at some specific hours. And, some devices should work for some time period. So, the operation duration could be set, too.

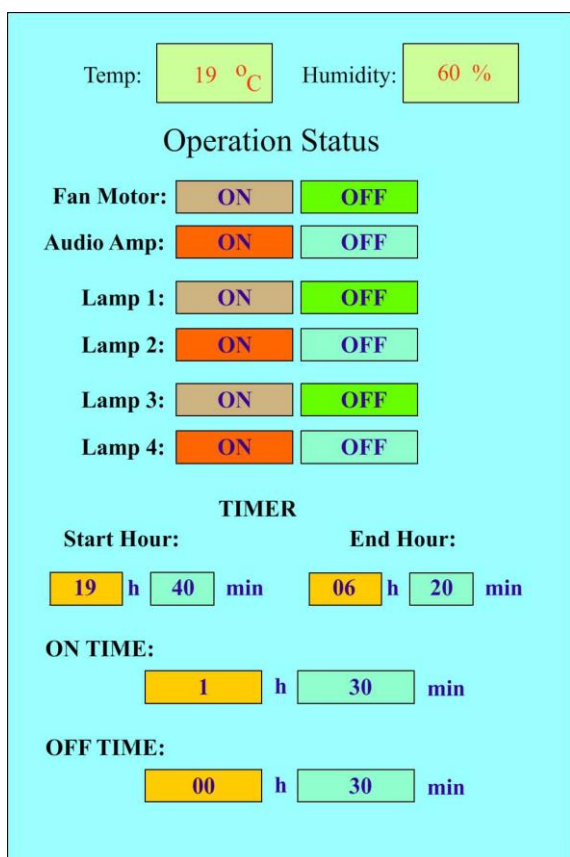


Fig. 3. The screen shot of the remote control smart phone.

In this figure, the device control module was set for the start time of all the devices to be at 19:40, and for the end time to be at 6:20 in the morning. The On time duration was set to be 1 hour 30 minutes, the Off time duration to be 30 minutes. So, all the devices activated from 19:40 until 6:20 in the morning. But, the operating time of all the activated devices was only for 1 hour 30 minutes. And for 30 minutes, they were deactivated. Then, they were turn on, again for an hour and 30 minutes. This operation was repeated until 6:20 in the morning.

Fig. 4 shows the diagram of the program blocks of the constructed system. The remote controller smart phone was a Samsung's Galaxy of which model Number was SHV-E210K. The android build number was KitKat, and Firmware version 4.4.4.

The response time of the loopback test, which is between the smart phone and the scaring control module, was about 200 milliseconds.

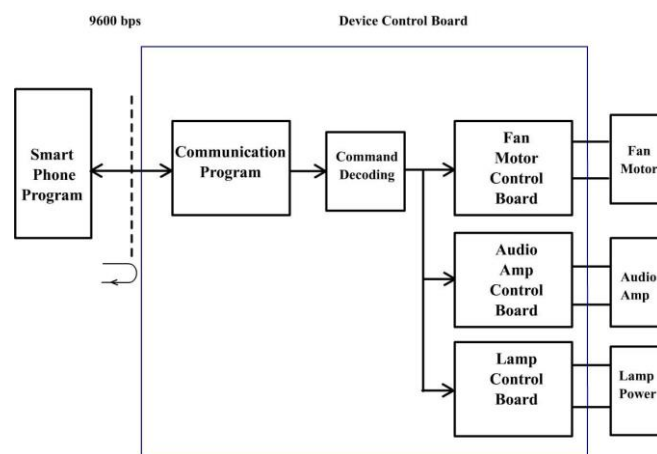


Fig. 4. Diagram of the program blocks of the constructed system.

III. CONCLUSION

In this paper, a harmful animal scaring system was constructed to be controlled remotely by an android smart phone. The system consisted of a smart phone, a scaring control module, and peripheral devices. The smart phone was programmed in Android to recognize control button commands, and to send the proper signal to the scaring control module in Bluetooth communication of 9600 bps data rate. The scaring control module was built on an electrical circuit board with ATMEGA 328P-PU microprocessor. The smart phone was programmed to show on the screen all the setting statuses of the peripheral devices. As a remote control smart phone, Samsung Galaxy SHV-E210K model was used. And an android program was developed on the KitKat version for the phone to be able to be used as a remote setting and controlling device. And, system test was conducted by measuring the response time of all over the system. The time was measured to be about 200 milliseconds in 9600 bps Bluetooth communication between the phone and the scaring control module. Sometimes, it was much more convenient to control the peripheral devices by the remote control smart phone than by the manually controlling switches.

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