A NEW MODEL OF SMARTPHONE USE FOR GRAIN DRYER WITH ARDUINO UNO-BASED HEAT TEMPERATURE CONTROL

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ABSTRACT

Android is an operating system for Linux-based mobile phones. Android provides an open platform for developers to create their own applications for use by various devices, the purpose of this research is to produce real results in providing comfort or convenience to the controllers of grain dryers (rice) everyday without touching the trigger button of the controller, especially for physically disabled or elderly people who find it difficult to stand. In making this research, turn on the heater ignition button with Arduino Uno-based voice commands using a smartphone. The results achieved are improving aspects of comfort and convenience for people with physical disabilities or the elderly, who have difficulty standing or reaching tool switches, where this tool can work after a Bluetooth device is available on an Android smartphone. Basically, the principle of using this tool is that the user must be able to operate a smartphone based on the Android operating system.
Keywords: Android, Arduino, device controller, Bluetooth.

I. Introduction

Current technological developments encourage people to continue to think creatively, not only to explore new inventions, but also to maximize the performance of existing technology to ease human work in everyday life, such as controlling grain dryers. Therefore, if the grain dryer in a place is controlled without having to turn on the switch on the grain dryer, the role of the microcontroller, android smartphone, and Bluetooth facility is very important to provide comfort and convenience, especially for people with physical disabilities or people who have old. The use of Android smartphones as a means of communication and smart phones has experienced many developments at this time. such as a starting tool for grain dryers combined with microcontroller components and utilizing the existing Bluetooth facilities on Android smartphones. From the convenience and the proliferation of Android smartphones among the public.

II. Literature review

2.1. Microcontroller

Microcontroller is a microprocessor that is devoted to instrumentation and control. A microprocessor is a digital electronic device that has inputs and outputs as well as controls with programs that can be written and erased in a special way. Microcontroller is a computer on a chip that is used to control electronic equipment, which emphasizes efficiency and cost-effectiveness. Literally called "small controller" where an electronic system that previously required many supports such as TTL and CMOS ICs can be reduced/minimized and finally centralized and controlled by this microcontroller.

2.2. Arduino Uno

Arduino is an electronic kit or open source electronic circuit board in which there are main components, namely a microcontroller chip of the AVR type from the Atmel company. The microcontroller itself is a chip or IC (Integrated Circuit) that can be programmed using a computer. The purpose of embedding a program in a microcontroller is so that the electronic circuit can read the input, process the input and then produce the desired output. In general, Arduino consists of two parts, namely:

a. The hardware is an open source input/output (I/O) board.
b. Arduino software, which is also open source, includes the Arduino IDE software
to write programs and drivers for connection with computers.

The Arduino programming language is C language. This language has been made easy using simple functions so that beginners can learn it quite easily. Arduino also simplifies the process of working with microcontrollers. There are several reasons why the C language is widely used, including the following:

a. C language is available in almost all types of computers.
b. The C language code is portable.
c. C language only provides a few key words.
d. C language program executable process is faster.
e. Multiple library support.
f. C is a structured language
g. Apart from being a high-level language, C is also considered a medium-level language

C language is a compiler.

2.3. Bluetooth Module HC-05

Bluetooth Module HC-05 is a wireless communication module on the 2.4GHz frequency with a choice of connection either as a slave or as a master. Very easy to use with a microcontroller to

create wireless applications. The interface used is serial RXD, TXD, VCC and GND. Built in LED as a bluetooth connection indicator.

Input voltage between 3.6~6V, don't connect with more than 7V power source. The current unpaired is about 30mA, and when paired (connected) is 10mA. The 4 pin 3.3V interface can be directly connected to various microcontrollers (Arduino, 8051, 8535, AVR, PIC, ARM, MSP430, etc.). The effective range is 10 meters, although it can reach more than 10 meters, the quality of the connection is decreasing.

III. Research Methods

A research plan or design in a narrow sense is interpreted as a process of collecting and analyzing research data. In a broad sense as a research design includes the process of planning and conducting research.

The steps for making a grain dryer using voice commands are as follows:

1. Study of literature
   The author examines the references obtained from several scientific works such as national and international journals
2. Literature review
   Library method, namely collecting data and information by reading references, websites, documents which include research that has been raised, articles and journals related to the object of research.
3. Consultation
   Done in consultation with scientific colleagues in the same discipline to get inspiration in solving problems encountered when making software and making hardware.
4. Tool Testing
   This is done by conducting experiments, testing modules and integrating these modules with programs to control the system so that it becomes a unified whole and obtains the maximum possible results.

The old system used manual control, namely by means of direct physical contact between the user and the switch button to turn on the grain dryer as a connector or circuit breaker to turn on the grain dryer. This manual method is less effective for physically disabled or elderly people who find it difficult to reach the grain dryer switch. So the authors designed a system that can control the start of a grain dryer using an Android smartphone as a control medium for on/off grain dryers.

Before going to the next stage, a flowchart for the process of uploading the program code or sketch to the Arduino board is first made, with the flowchart as follows:
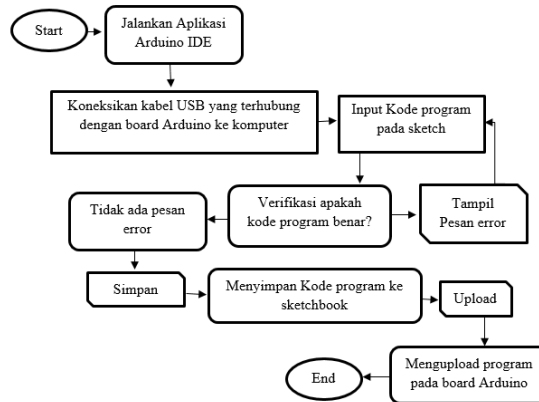
Figure 1.. Flowchart of the process of uploading the program code to the Arduino board

The first step that must be taken is to determine the logic that will be applied to the lights to be controlled, then create the algorithm which is then implemented using the Arduino IDE. From this logic, a command input flowchart is made from the software that will be embedded in the Arduino Uno microcontroller, which is as follows:
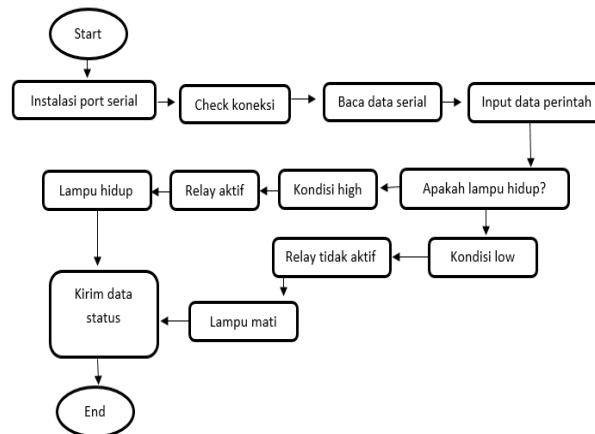
Figure 2. Voice command input flowchart on Arduino

IV. Results

4.1.SystemTesting

System testing is intended to test all software elements that are made whether they are as expected. A system will run optimally if the system is run with minimum hardware and software. This is because each designed system requires different hardware and software specifications in order to function optimally. The hardware and software requirements to be able to run "Turn on the lights using voice commands" are as follows.

4.2. Implementation

After all required systems that have been prepared have been fulfilled, the next step is to implement and build the system that will be created.

Figure 3. Results of Grain Dryer with Voice Commands

V. Conclusion

1. To turn on the grain dryer, use voice commands by connecting Bluetooth to an Android smartphone and you don't need to reach for the switch.
2. The grain dryer used uses electricity from a hydropower plant and does not depend on existing PLN electricity.
3. Control of the grain dryer will not work if the Android smartphone is outside the range of the Bluetooth wireless transmission from the Bluetooth module because the Bluetooth connection will be automatically disconnected.
4. To turn on the grain dryer, we only need to say the programmed keyword.
5. The speech recognition feature on an Android smartphone can be used to control grain dryers using voice commands. This is done by initializing the voice command spectrum in the form of a string into a character code that has been recognized by the microcontroller.

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