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Implementation Of Goods Lifter Robots With Android Based Voices Orders

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Abstract. After carrying out the manufacture of prototypes and desain from the robots that carry goods, it needs to be developed into the actual robot making so that dapat can be implemented with a real goods lifting robot so that it can be useful for the survival of the academic activities. The academic activity here is to lift goods in this case is a book or file from the third floor corner to the academic bureau room. With various tests have been carried out so that later the work of this tool is expected to operate properly in accordance with the wishes of the researcher. With the right analysis and calculation, this tool can lift items with a maximum weight of 5 kg and all items or items that are lifted can be placed in the designated place at the top of the robot. Control of the smartphone can move the robot so that it reaches the destination. The voice command is inputted to the smartpone that has been connected to the Arduino Uno system so that it can command the robot with a forward, backward movement, turn left and turn right. The control system is centered on the Arduino Uno microcontroller that has been loaded with a program to run this tool or robot. Research has succeeded in making robots designed according to the work and the desired system to help work in the lifting of goods.

1. Introduction

Current technological developments are increasingly advanced and have been utilized for the advancement and sophistication of equipment used to assist human work in daily activities in every aspect of life. Along with these developments which are increasingly advanced, also robotic technology is a tool that can be used as a human aid that has several advantages. One of the advantages is that it can lift things that humans cannot do periodically. From one place to another. The author wishes to make robots controlled by human commands through Android-based smartphone communication. With the commands we provide, the robot will move along with all the items on the body of the robot [1]. The body is made flat so that we can put materials or goods properly. With the control center is an Arduino Uno microcontroller that is connected to a smartphone with a bluetooth device. After the program is downloaded to the control IC, the motor will rotate to move the robot in accordance with the given voice command.

Arduino Uno is a microcontroller device using ATmega328, which is the successor to Arduino Duemilanove. The Arduino Uno has 14 digital input / output pins (where 6 pins can be used as PWM outputs), 6 analog inputs, 16 MHz crystal oscillator, USB connection, jack power, ICSP header, and reset button [2].





Figure 1. Microcontroller *Arduino Uno*

Android is an operating system for Linux-based mobile devices that includes the middleware operating system and applications. Android provides an open platform for developers to create their applications. Android is a new generation of mobile platforms, a platform that gives developers to develop as expected. The operating system that underlies Android is licensed under the GNU, General Public License Version 2 which is often called "copyleft" license where every third party repair must continue to fall under the terms [3]. Commercialization developers can choose to improve the platform without having to provide their improvements to the open source community. Instead developers can benefit from redistributing their work under whatever license they want. Their application developers are under any licensing scheme they want [4].



Figure 2. Android BT Voice Control For Android

Bluetooth is a wireless communication protocol that works on 2.4 GHz radio frequency to exchange data on mobile devices such as PDAs, laptops, cellphones, etc. One of the results of the example of the most widely used Bluetooth module is type HC-05 [5]. HC-05 bluetooth module is one Bluetooth module that can be found on the market at a relatively cheap price. The HC-05 bluetooth module consists of 6 connector pins, which each connector pin has different functions [6].



Figure 3. Bluetooth HC-05 Module

Bluetooth module HC-05 with a supply of 3.3 V to pin 12 bluetooth modules as VCC. Pin 1 on the Bluetooth module as a transmitter. Then pin 2 on bluetooth as a receiver [7].

2. Methodology

The method used for Goods Lifter Robots With Android Based Voices Orders, based on data that has been collected through the laboratory. Field method is also done, that research is done by way of directness to get good information about comparison between theory and practice in accordance with what expected, by determining the design of hardware and software that will be used in determining the classification of system. It is intended to test the concept before proceeding with the creation of the entire program as a final step is to create a user interface (User Interface).

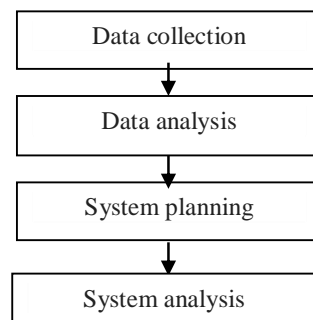


Figure 4. Framework

Based on the framework in Figure 4, the following steps can be described:

This study was conducted by collecting data relating to this theoretical research by reading books, magazines and writings that are closely related to research. This study also aims to strengthen the basics of this research work so that it cannot be separated from the applicable provisions.

Design in a system is an activity or work to make a design or description of the system that will be implemented. The design phase is carried out by designing an equipment for lifting goods at the Royal Kisaran Bureau of Bureau of Office Space.

System analysis is a procedure performed to find out the results of the system design in the approved design document. By applying system analysis we can know that anything needs to be improved so that the system works properly.

3. Result and Discussion

This system is used to drive a dc motor that works based on control from a smartphone HP. Where on the smartphone storage has been carried out the sound that will be detected by the sound sensor that has been installed on the Android smartphone. The sensor is connected to the BT Voice Control For Arduino application which is also installed on the smartphone. To receive the signal sent by the sensor is bluetooth. This Bluetooth has been connected to the Arduino microcontroller. The received signal will activate Arduino according to the program that has been saved. Arduino will output voltage to the driver so the driver will connect the current to the dc motor will work or rotate.

The control device that will be built is to turn on two dc motors that move forward, backward, turn left, turn right and stop, so that this tool can make it easier for us to control the robot with the movements specified in the program. In controlling the dc motor is done using sound with words that have been stored in the Arduino microcontroller IC.

In the process of analyzing, it is necessary to define in advance the overall designed system so that the scope of the discussion must be clear by using the media in the form of context diagrams. In the picture below, the Context Diagram of a dc motor control system with Arduino will be described which is supported by the C language programming language.

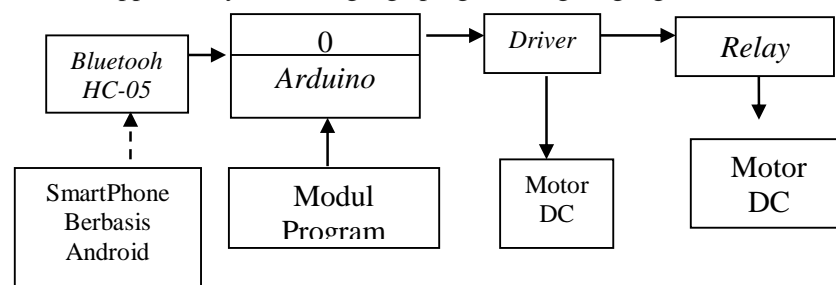


Figure 5. Context Diagram

In this discussion will be explained about level 0 data flow diagrams related to the tools designed. This sub-chapter will describe the data flow diagram which is a more detailed description of how these entities interact. In Figure 6. the following is a level 0 data flow diagram described based on the previous context diagram.

So that we produce the design of the tool to work in accordance with the expectations desired based on the program that has been made, then do the design of the tool. This hardware design starts from the design of the Arduino microcontroller circuit, the design of the smartphone connection to Bluetooth HC-05, the power supply design and the design of the driver and dc motor circuits.

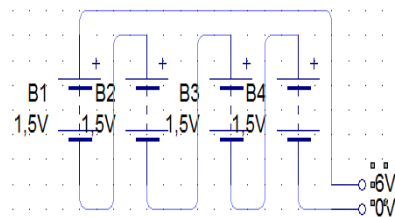


Figure 6. Power Supply Series

To control the on or off dc motor is used an Arduino microcontroller which is an Atmega 328 IC connected with other components so that it requires a minimum system in a circuit kit on a PCB board. Picture of the Microcontroller IC circuit with other components can be seen in the picture below:

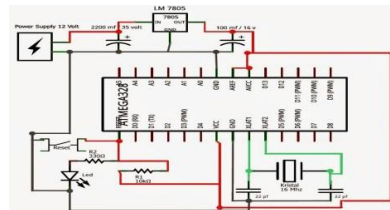


Figure 7. Arduino Uno Minimum System Series

For smartphone design that functions as a sensor to control a dc motor can be done by installing the BT voice Control for Arduino application through the Play Store. After we have installed the sound we record with the words that apply to turn on and turn off the dc motor. This voice recording is later recognized by the sensor application so that it can be a detectable signal.



Figure 8. Smartphone with BT Voice

To design Bluetooth HC-05 which will be connected to a smartphone using a wave or 2.4 GHz frequency used by Bluetooth. Also Bluetooth HC-05 is also connected to the Arduino Microcontroller using D11 pins connected to Rx (receiver) and D10 to Tx (transmitter) and also connected to the VCC and Ground of each device. Also Bluetooth Hc-05 is connected to the Arduino Microcontroller using D11 pins connected to Rx (receiver) and D10 to Tx (Transmitter) and also connected to the VCC and Ground of each device.

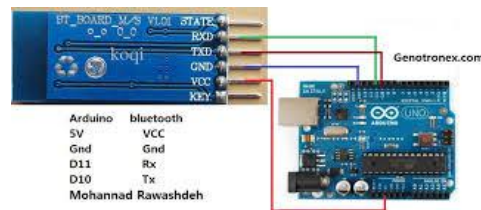


Figure 9. Bluetooth HC-05 Connected to Arduino

The load circuit consists of drivers that are directly connected to a dc motor. The output of the microcontroller will activate the driver so that there is input of logic to the sensor to provide current to the dc motor so that it can work. In order for the load of either the tool or component used to work then data is needed to the input part of a driver. This driver circuit uses the L293D IC which functions as a switch to connect the current to the dc motor.

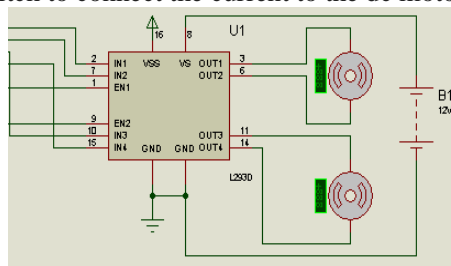


Figure 10. Driver circuit and DC motor

The L293D IC circuit integrates with the input and output of each foot or pin on the IC. With the principle of the driver that works as a switch (the working principle is the same as what the transistor has discussed as a switch). After all the components are provided, make the PCB as the place for the components and cables connected to the power supply.

Distance Design in Robot Control To determine the distance between the smartphone and the robot to control the robot, it can be done by measuring away from the two devices that act as transmitters and receivers. 3.3.6 Robot Mechanics Design To make the robot can be formed like a tool that is needed, it is necessary to design the design of each mechanical part of the robot, namely the body or frame of the robot, the linkage of the gear wheel of the robot and the electrical system that supports the work of the robot.

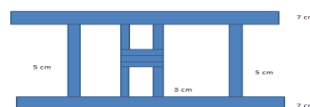


Figure 11. Design Body

In running the wheels of the robot, it is necessary to plan the speed of the wheels so that it needs to be analyzed by the gear assembly with the gears attached to the wheels of the robot. Gear diameter is 15 m and wheel diameter = 25 cm.

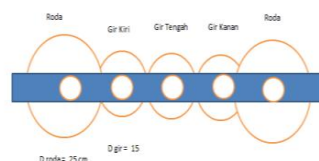


Figure 12. Sistem Whole Gear

To run a robot, it takes an electrical system that connects one component to another component so that the robot can run with the android control properly.

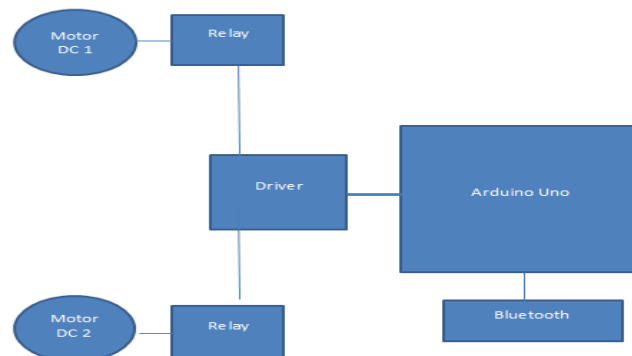


Figure 13. Robot Electrical System

In the design of DC robot control devices using this Android Control smartphone as a whole consists of a combined design ranging from bluetooth HC-05 design, microcontroller design, DC motor driver design that is connected thoroughly so that it becomes a controller that can make it easier to control the lifting robot for every movement.

Mechanical and electrical design is well designed so that it can later lift heavy loads. This electrical system will provide current on each DC motor that moves in each direction by giving commands in the form of sound on the smartphone to which DC motor movement is to be started by saying the desired words.

4. Conclusions

From the discussion in the previous chapters, conclusions can be drawn, namely:

- DC motor control can be done remotely as long as the frequency used as a Bluetooth frequency is: 2.4 KHz at this frequency in controlling DC motor can be done as well as a maximum of 10 m,
- In this system for power or capability in controlling the DC motor is determined by the power must be on the driver that is connected directly to the DC motor,
- Compared to other controllers such as using a remote control, this Android-based robot controller is better because it can be controlled over a longer distance,
- To make this tool for larger power scales it takes a 24 Volt DC relay so that the DC motor driver whose output part is connected to a DC box or relay.

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