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Wireless Android-Based Control of Plastic Crane Roll Control Prototype

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Abstract - Overhead crane is a lifting tool used by almost all industries, ports, warehouses, workshops, and others. In general, the overhead crane control system is less effective and efficient because the operator still follows the direction of the crane's speed. In this case, problems often occur because the pendant switch which functions as a controller still uses a cable as a connector to the overhead crane panel. Various problems that often occur include cables breaking frequently due to being hit by a load lifted by the hoist, operators having difficulty setting a safe distance because they are limited by the length of the pendant switch cable. Based on the background of the problem, a control system is made which is expected to be able to control the overhead crane effectively and efficiently without using a cable as a connector but using an android smartphone. Control with an android smartphone using an android application with a wifi connection and an arduino uno R3 microcontroller. Based on the test results on this control system, device control can be controlled at a maximum distance of ± 100 meters as long as the device is still within wifi range. The control system can function optimally and the application can be installed on Android OS 4.0 (Jelly Bean) smartphones. Therefore, the use of a cable can be replaced with a wifi connection system to reduce friction with the cable and so that the operator can maintain a safe distance from the load to be moved because it is no longer limited by the length of the cable.

Keywords: Android, Overhead Crane, Wifi

I. INTRODUCTION

Overhead crane is a lifting tool that is used by almost all industries, ports, warehouses, workshops, and others. In general, the overhead crane control system is less effective and efficient because the operator still follows the direction of the crane's speed. In this case, problems often occur because the pendant switch which functions as a controller still uses a cable as a connector to the overhead crane panel. Various problems that often occur include cables breaking frequently due to being hit by a load lifted by the hoist, operators having difficulty setting a safe distance because they are limited by the length of the pendant switch cable. Based on the background of the problem, a control system is made which is expected to be able to control the overhead crane effectively and efficiently without using a cable as a connector but using an android smartphone. Control with an android smartphone using an android application with a wifi connection and an arduino uno R3 microcontroller. Based on the test results on this control system, device control can be controlled as long as the device is still within wifi range. The control system can function optimally and the application can be installed on Android OS 4.0 (Jelly Bean) smartphones. Therefore, the use of a cable can be replaced with a wifi connection system to reduce friction with the cable and so that the operator can maintain a safe distance from the load to be moved because it is no longer limited by the length of the cable.

II. METHODS

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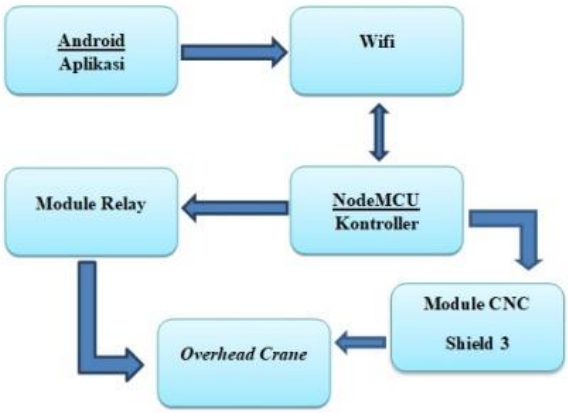

Figure 1. block diagram

From the block diagram above, it can be seen a little about the description of the object of this research and the following is an explanation of the function of each block diagram:

a. Android (Application)
   Android (Application) is used to send commands to the control system to drive the Overhead Crane.
b. Wifi
   Wifi is used as a connection for sending commands from Android to the control system (NodeMCU).
c. NodeMCU modules
   The NodeMCU module is used to process commands sent via wifi from the android application.
d. Relay Module
   The Relay Module is used to regulate the movement of the Overhead Crane according to the command received.

2.1 Data Collection Method

In the data collection method this time using the experimental observation method, namely the method carried out by:

1. Test the Overhead Crane with a control system that is in accordance with the standard crane pendant switch.
2. Testing control and response capabilities on android applications.
3. Testing the movement of the Overhead Crane when in operation to determine the responsibility

2.2 Data Analysis Method

The data analysis used is experimental data analysis to analyze the accuracy of the tool through the right components after the trial:

1. Observing the performance comparison between the Overhead Crane that still uses a pendant switch and the Overhead Crane that uses the Android control system.
2. Observing the differences and responsiveness of Overhead Cranes that still use pendant switches with a control system regulated by Android.
3. Observing the level of system security by paying attention to the movement of the Overhead Crane when it is operated until it is felt that this system can be used properly or meets standards.

III. RESULT AND DISCUSSION

At the time of designing and manufacturing "Design of Android Based Plastic Roll Crane Control Prototype". This tool can be used to control overhead cranes effectively and efficiently without using a cable as a connector but using an android smartphone. By using a Wifi connection, it is felt that it will be more practical, efficient and accurate.

Based on the test results on this control system, device control can be controlled as long as the device is still within wifi range. The control system can function optimally and the application can be installed on Android OS 4.0 (Jelly Bean) smartphones. Therefore, the use of a cable can be replaced with a wifi connection system to reduce friction with the cable and so that the operator can maintain a safe distance from the load to be moved because it is no longer limited by the length of the cable.

Table 1. Data Measurement

Crane	Data
Vertical	1 cm/s = 60 cm/minute

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	(Wifi) 20 cm/s = 1,2 m/ minute (Pendant)
Horizontal	2 cm/s = 1,2 m/ minute (Wifi) 20 cm/s = 1,2 m/ minute (Manual)
Up-Down	5 cm/s = 3 m/ minute (Wifi) 20 cm/s = 1,2 m/ minute (Manual)

a) Data Analysis

Based on the data obtained in this study, the data analysis was carried out in stages and carefully and thoroughly. With the analysis of the data obtained, it produces several things as follows:

1. Comparing the motion response of the Crane that is controlled with a Pendant Switch and Control via Wifi (Smartphone Application).
   From the results of observations of the motion response of cranes controlled with a Pendant Switch or application, the response tends to be the same.

Figure 2. Crane

2. Observing the movement of the Crane Roll
   From the results of observations of Crane motion controlled by Pendant Switch and Application, it tends to be the same.
3. Testing the effectiveness and accuracy of using Control Crane using a Wifi-based Smartphone Application.

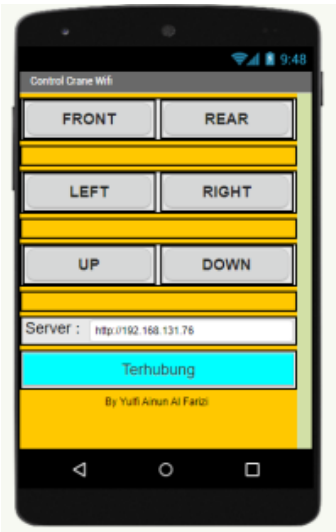

Figure 3. Smartphone Application

b) Discussion

In the Design and Build of the Android-Based Plastic Roll Crane Control Prototype, it has the following work system:

1. Smartphone application sends data/command to Crane via Wifi network.
2. Then the data is received and processed by the Wifi Microcontroller Module.
3. Then the processed data is used as an order to move the Crane Roll according to the command sent.

IV. CONCLUSION

From a series of research, testing and analysis of the Android-Based Plastic Roll Crane Control Prototype, it can be concluded as follows:

1. The Wifi module has its own IP address, and each module is different.
2. To operate, an internet/Wifi network is required.
3. Because it uses the internet network, crane control can be carried out in various places as long as it is connected to a Wifi network.

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