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Control Making for Elevator Simulation of Three Floor Building Based on Arduino Uno

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Abstract. Lift (elevator) is a tool used to raise and lower loads (good/people) between floors of a multi-storey building using a set of mechanical tools,either with automatic or manual tools. The research proposes to design acontrol system using the Arduino Uno IDE and create an elevator simulation using the CX-Programmer and CX-Designer. The purpose of the research on the manufacture is to determine the aspect to be achieved byadjusting the speed of the rotating motor, changing the motor rotation up and down, and programming the control system to make it work, and moving the lift using a 12 voltage motor power and the Dual H-Bridge L298NMotor driver. With a capacity of 5 voltages to power the Arduino Uno pin, and inside the Arduino Uno pin, several inputs are six pushbuttons for the first floor to the third floor, which on each floor there are two pushbuttons and a limit switch. A chain of elevator control systems can moveaccording to the designed program

INTRODUCTION

Lift (elevator) is a tool used specifically to transport loads, lifts are also often used in high-rise buildings that require load mobility between floors, this elevator uses an Arduino Uno microcontroller and a driving device using a 12 volt DC motor to be connected to the L298N motor driver. and to Arduino Uno to be programmed so that the control system design can rotate up and down, to find out up and down in the program, the condition of the lift when going up in3 (forward) is high and in4 (reverse) is low clockwise (CW), for the elevator when going down, in3 (forward) is low and in4 (reverse) is high it is counterclockwise (CCW) and makes a lift simulation using CX-programmer and cx-Designer so that it is easy to understand the working principle of the elevator.

METHOD

Process Schema

Figure 1 shows the schematic of the process carried out in the manufacture of a control system for a simulation of a three-story building elevator based on Arduino Uno. Starting from studying theories related to Arduino Uno and simulation software (CX-programmer and CX-designer), then determining what components are needed to design an elevator control system, then designing system tools that have been purchased such as Arduino, pushbuttons, dc motors, motor drivers, etc., the next process is programming the desired Arduino application, then making elevator simulations using CX-programmers and CX-designers to easily understand the working principle, then testing whether the program and system design are correct, if they function properly What is expected is that the documentation of the results of the design made is then concluded and becomes a parameter for further manufacture.

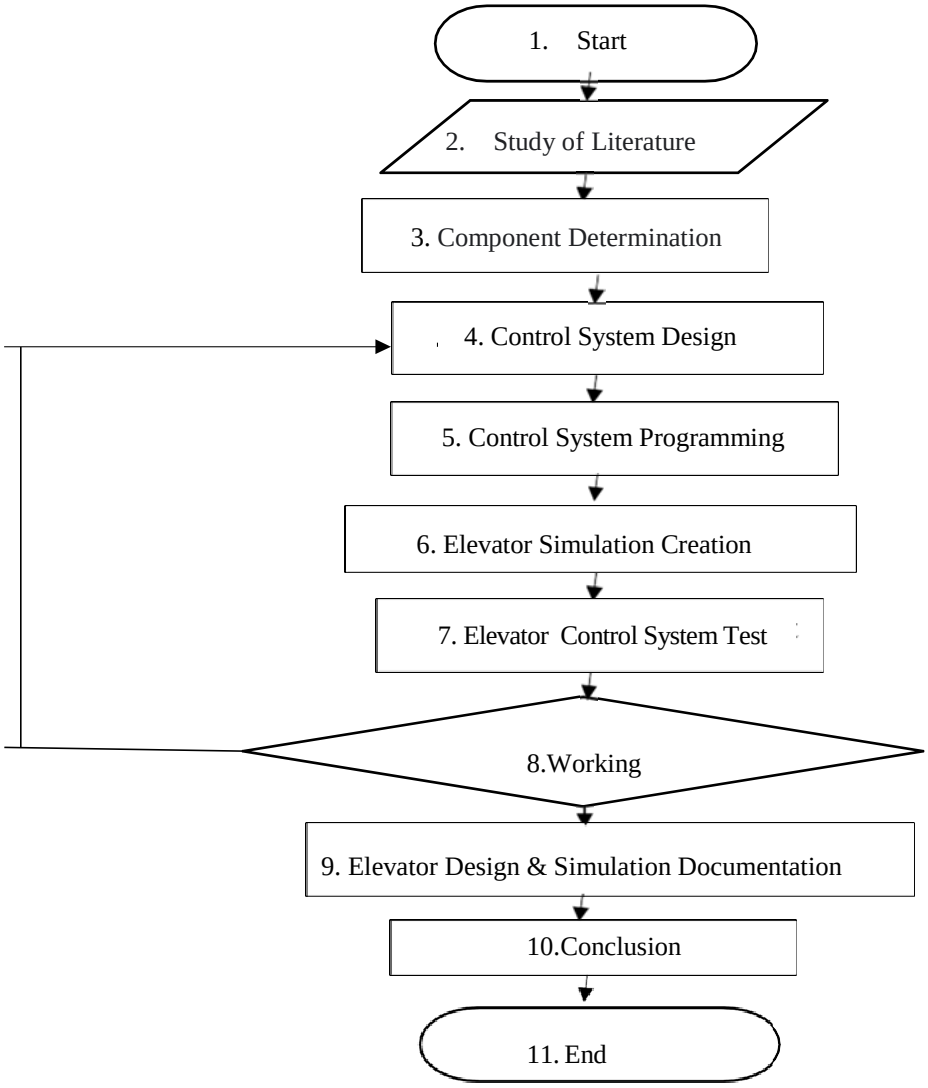

FIGURE 1. Process Schema

Control System Design

The design of the elevator control system of this three-story building functions as an elevator in general, only the difference is that the weight capacity is smaller, by making this elevator control system requires components to move the elevator up and down, and in this elevator design, the author uses the Arduino Uno microcontroller as the system. The control is where Arduino uses 6 volts to 20 volts and the input pins used in the three-story elevator control system are 9 pins (PB1, PB2, PB3, PB4, PB5, PB6, LS1, LS2, LS3) and the output pins use several three. pins (enb, in3, in4). Pushbuttons as elevator buttons to make it easy to go up and down and on each floor install two pushbuttons, on the first floor there are push buttons to go to the second and third floors, and on the second floor there are push buttons to go to the first and third floors, and on the second floor there are push buttons to go to the first and third floors. On the third floor, there is a push button to go to the second floor and the first floor. And there is a motor to drive the lift so that it can go up and down for up and down rotation. The author distinguishes the direction of rotation if the lift goes up the motor rotates in a clockwise direction (CW) if the lift goes down the motor rotates counterclockwise (CCW) The components in this design use The motor driver power supply uses an adapter cable according to the specifications of the motor used (12VDC) the pins used in the motor driver are enb, in3, and in4 which function to regulate the speed

of the PWM motor (Pulse Width Modulation) and in3, in4 to regulate the Forwatt Rivers Motor. To make it easier to understand the elevator control system of this three-story building, it can be seen in the system diagram that shows in Figure 2.

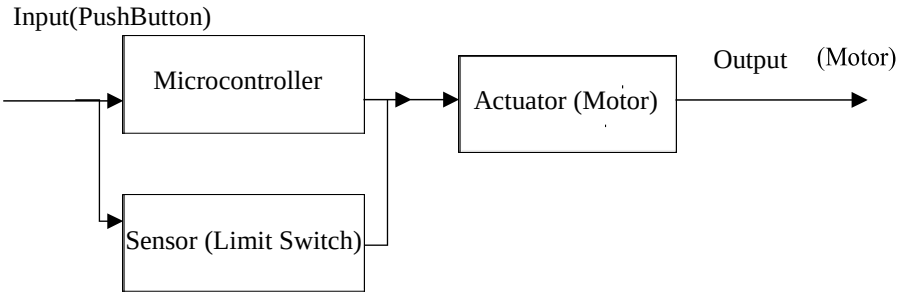

FIGURE 2. System Flowchart

ANALYSIS AND DISCUSSION

Documentation Results of Elevator Control System Design

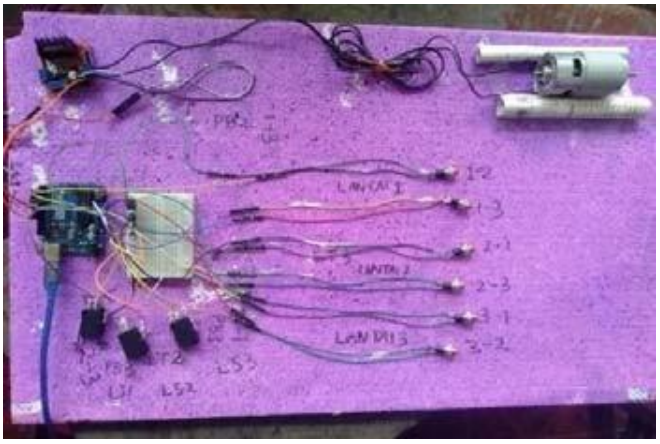

FIGURE 3. Three-Story Elevator Control System Design Installation

The pin flow for each component of Figure 3 are :

1. Motor Driver
   a. Enb: pin 11
   b. In3: pin 8
   c. In4: pin 6
   d. GND: Kabel adaptor 12VDC
   e. 12V: Kabel adaptor
   f. Out 1: Motor
   g. Out 2: Motor
2. Arduino Uno
   a. Push Button 1: pin 2
   b. Push Button 2: Pin 5
   c. Push Button 3: Pin 9
   d. Push Button 4: Pin10

e. Push Button 5: Pin A1
f. Push Button 6: Pin A2
g. Limit Switch 1: Pin 3
h. Limit Switch 2: Pin 4
i. Limit Switch 3: Pin A0

Based on the schematic above, the three-story elevator control system shows that Arduino is a very dominant component used for other components and the program is also very influential.

Elevator Simulation Making Documentation Results

Program for the elevator control system of a three-story building that has been created using Arduino Uno software and a program used to create an elevator simulation design (CX-designer) and a program to run a simulation design (CX-Programmer). CX-Programmer shows in Figure 4.

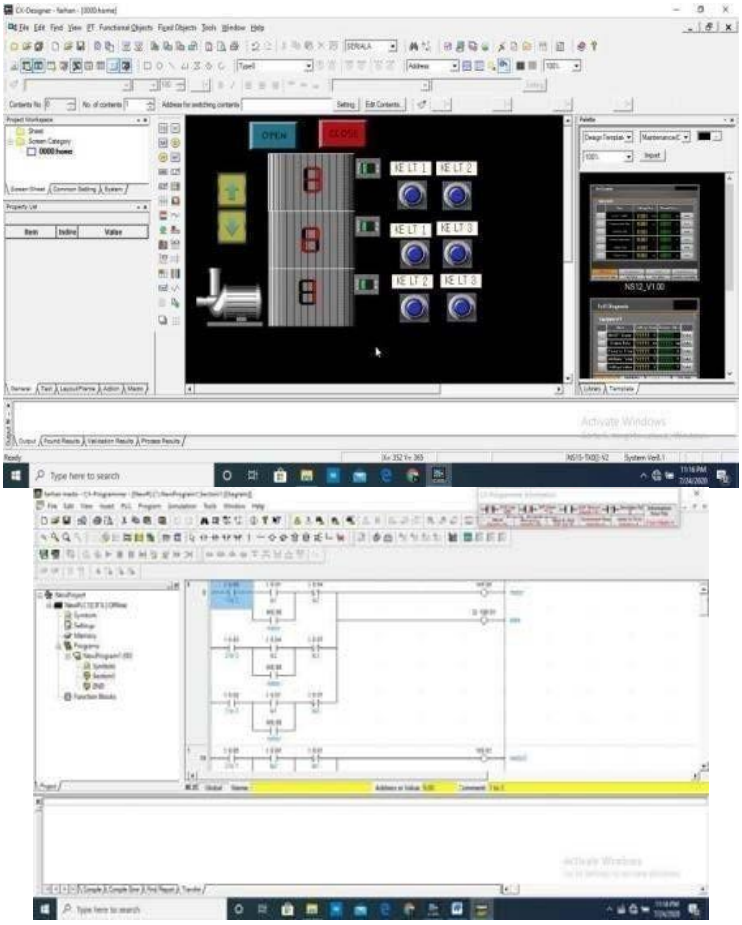

FIGURE 4. CX-Programmer

Analysis

Based on the results of the manufacture of a three-story building elevator control system, there are several analyzes obtained, namely as follows. First, in the elevator control system program to distinguish the direction of rotation of the motor when the lift goes up and down because the rotation of the motor when it goes up and down automatically is different, then in the Arduino Uno program for the lift the condition goes up in3 (forward) for clockwise rotation (CW) high and in4 (reverse) for anticlockwise rotation (CCW) is low, and when the lift condition is down, in3

(forward) is low and in4 (reverse) is high. Second, the enb pin on the motor driver is often detached which will result in excessive voltage, then the effect that occurs on the motor driver is easy to heat and can cause the motor driver to be easily damaged, so the solution is to solder the enb pin.

CONCLUSION

Based on the research that has been done, it can be concluded that the program has been made according to the design and when tested, the control system works well. Adapter cable according to the specifications used 12 volt DC after being tested the motor can move according to the used 12 volt DC.

For better results in further research for the elevator control system of this three-story building, there are several suggestions. First, the project board is used only temporarily and you should use a PCB (PrinterCircuit Board) so that it is not easy to remove the jumper cable. Second, it's best to solder the motor driver's enb pin so that it doesn't come off easily. Third, the cable connection on the DC motor should be soldered so as not to cause the motor driver to heat up and the cable to burn due to overvoltage4. Fourth, the elevator control system of this three-story building uses a 12V high torque DC motor (GW4058-31ZY) with the same specifications, where the current required is not more than 2A.

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