Universitatea Tehnică a Moldovei

Programul de masterat **Inginerie Electrică**

ELABORAREA SISTEMULUI DE CONTROL AL BRAȚULUI ROBOTIC

Teză de master

Masterand: Bădărău Mircea

Conducător: lect. univ. Cazac Vadim

Chişinău – 2020

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CUPRINS

REZUMAT

Teza conține: 82 pagini, 28 ilustrații, 3 tabele, 82 surse bibliografice.

Cuvinte cheie: braț robotic, arduino, servo motor, I2C, Adafruit, senzor Hall, automatizare, controlul mișcării, MATLAB Simulink.

Obiectul de studiu: Elaborarea sistemului de control al brațului robotic.

Scopul tezei: Proiectarea brațului robotic și elaborarea sistemului de control al alcestuia care are ca funcție principală copierea/repetarea mișcărilor brațului uman.

Actualitatea temei: Lucrarea este cauzată de necesitatea elaborării și proiectării în industrie a sistemelor autonome de control, care ar simplifica și ar îmbunătăți condițiile de muncă pentru factorul uman în mediile agresive.

În această lucrare a fost propus elaborarea sistemului de control al brațului robotic care are ca funcție principală copierea/repetarea mișcărilor brațului uman, ca mediu de programare fiind aleasă platforma Arduino. Pentru verificarea sistemului de control a fost necesar de realizat însăși brațul robotic pe care a fost ulterior testat codul elaborat.

În lucrare am prezentat o scurtă descriere a roboților și posibilitățile acestora de implicare în industrie. Acest lucru influențiază pozitiv calitatea muncii efectuate și îmbunătățește calitatea vieții oamenilor ce activează în domenii nocive.

În capitolul 1 sunt prezentate noțiuni teoretice în domeniul brațelor robotice fiind accentuată documentarea asupra sistemului de control al mișcărilor.

Capitolul 2 demonstrează geometria și explică cinematica roboților pentru controlul mișcării, respectiv familiarizează cu elementele componente a părții de control și acționare a brațului robotic.

În al 3-lea capitol se explică elaborarea sistemului de control al brațului robotic ce are ca funcție principală repetarea mișcărilor brațului uman, simulările căruia au fost efectuate în mediul MATLAB Simulink.

Principalele rezultate obținute:

- Dimensionarea brațului robotic;
- Elaborarea listingul programului în mediul Arduino;
- Transformarea codului pentru realizarea schemei bloc în MATLAB Simulink;
- Efectuarea unor simulări de verificare în mediul MATLAB Simulink.

ABSTRACT

Explanatory memorandum: 82 pages, 28 illustrations, 3 tables, 82 bibliographic sources.

Keywords: robotic arm, arduino, servo motor, I2C, Adafruit, Hall sensor, automation, motion control, MATLAB Simulink.

Object of study: Development of the robotic arm control system.

Purpose: The design of the robotic arm and the elaboration of its control system whose main function is to copy / repeat the movements of the human arm.

Topicality of the topic: The work is caused by the need to develop and design in industry autonomous control systems, which would simplify and improve working conditions for the human factor in aggressive environments.

In this paper it was proposed to develop the control system of the robotic arm whose main function is to copy / repeat the movements of the human arm, as a programming medium being chosen the Arduino platform. In order to verify the control system, it was necessary to make the robotic arm itself, on which the elaborated code was subsequently tested.

In the paper we presented a short description of the robots and their possibilities of involvement in the industry. This positively influences the quality of work done and improves the quality of life of people working in harmful fields.

Chapter 1 presents theoretical notions in the field of robotic arms, emphasizing the documentation on the movement control system.

Chapter 2 demonstrates the geometry and explains the kinematics of robots for motion control, respectively familiarizes with the components of the control and actuation part of the robotic arm.

The third chapter explains the development of the control system of the robotic arm whose main function is to repeat the movements of the human arm, whose simulations were performed in the MATLAB Simulink environment.

The main results obtained:

- Sizing of the robotic arm;
- Elaboration of the program listing in the Arduino environment;
- Transformation of the code for the realization of the block scheme in MATLAB Simulink;
- Performing verification simulations in the MATLAB Simulink environment.

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