Dedication

We have great pleasure in dedicating this thesis to:

Our beloved families for their support,

Our respected teaching and technical staff in the university,

The professions of electronics engineering,

All who believed in promoting electronics engineering.

Acknowledgement

In the name of Allah, the most merciful, the most compassionate all praise is to Allah, the lord of the world; and prayers and peace be upon Mohammed his servant and messenger.

We would like to express our gratitude and respect to our beloved Sudan University oF Science and Technology, to which we proudly belong wishing it a continuous success and advancement.

Our thanks to DR. Ala Aldeen Awouda our supervisor, who with his knowledge, experience and patience supervised and directed us all the way through.

We must not forget to express our thanks and gratefulness to Eng.Hashim Batran and to all who contributed in one way or another to make this project a reality.

Abstract

Color sorting robot is a useful, fast and costless system in industrial application that reduces manual working time and provides less human mistakes when manual systems are undertaken.

The objective of this project is to design an efficient microcontroller based system that picks up objects and puts them down in the right place according to their colors to optimize productivity.

The controller used is Arduino Uno that communicates with color sensor TCS3414CS and various motor modules real time to detect the right color and control the robot movement.

TCS3414CS is an RGB color sensor, it sends RGB component's values to Arduino uno which determines weather the color is in it's predefined ranges or not, if it is, it sends signals to motors to catch and release object in it's container.

The robot's arm consists of servo motors to insure good catching and releasing, and the robot's wheels are DC motor to drive it to the desired container.

المستخلص

روبوت فرز الألوان هو نظام مفيد وسريع وغير مكلف في التطبيق الصناعي الذي يقلل من وقت العمل اليدوي ويقلل الأخطاء التي تحدث عندما يتم تنفيذ الأنظمة اليدوية.

الهدف من هذا المشروع هو تصميم نظام تحكم ذو كفاءة عالية على أساس التقاط الأشياء و وضعها في المكان المناسب وفقا للونها.

وحدة التحكم المستخدمة هي الاردوينو المتصل مع جهاز استشعار اللون ومجموعة من المحركات للكشف عن اللون المناسب والسيطرة على حركة الروبوت.

جهاز استشعار اللون يرسل القيم المكونة للون للاردوينو الذي يحدد هل اللون موجود في النطاقات المحددة مسبقا أم لا، وإذا كان الأمر كذلك، فإنه يرسل إشارات إلى المحركات لالتقاط ووضع الهدف في الحاوية المناسبة.

يتكون ذراع الروبوت من محركات عالية العزم لضمان حسن التقاط و وضع الهدف في المكان المناسب بالطريقة المطلوبة.

Contents

Chapter Two
Literature Review

Chapter Three
System Design

Chapter Four
Simulation and Result

Chapter Five
Conclusion and Recommendations

List of tables

List of figures

List of Abbreviations

AVR	Alf and Vergil RISC processor.
ADC	Analog to Digital Convertor.
AC	Alternating Current.
bps	Bit Per Second.
CMOS	Complementary Metal Oxide Semiconductor.
DC	Direct Current.
EEPROM	Electrically Erasable Programmable Read Only Memory.
FTDI	Future Technology Devices International.
GND	Ground.
H	Hexadecimal.
HSI	Hue, saturation and intensity.
HSL	Hue, Saturation and Lightness.
HSV	Hue, Saturation and Value.
IC	Integrated Circuit.
ICSP	In Circuit Serial Programming.
IR	Infra-Red.
I2C	Inter-Integrated Circuit.
IED	Integrated Development Environment.
KB	Kilo Byte.
LED	Light Emitting Diode.
LDR	Light Dependent Resistor.
MATLAB	Matrix Laboratory.
ms	Millisecond.
mA	Milliampere.
PC	Personal Computer.
Proteus	Processor for Text Easy to Use.
PWM	Pulse Width Modulation.
RGB	Red, Green and Blue.
SRAM	Static Random Access Memory.
USB	Universal Serial Bus.
V	Volt.
Vin	Input Voltage.
VCC	Voltage at a Common Connector.

List of Appendices