

FINAL YEAR PROJECT SYNOPSIS

PLC CONTROLLED AUTOMATIC COLOURED PENCIL SORTING MECHANISM



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Project Background:

Sorting of various objects based on color is widely used in industries. For Example colored pencils, drinks of different colors and soaps of different colors etc. PLC based automatic sorting of different objects is now advancing the industry.

We intend to employ the technique for sorting of colored pencils. For the automation part we intend to use PLC.

Problem Statement:

- Identification of three colored pencils using MATLAB stimulation.
- Synchronization of Motor and camera will be done.
- Precise synchronization of ejectors so as to channelize different colored pencils in different slots.
- Conveyer system with controlling the axis of pencils with camera and actuators.

Applications:

PLC controlled sorting is widely used in industries like:

- Used in pencil industries to sort out different colored pencils
- In rice mills sorting different colored rice with corresponding quality.

- In process industries sorting different raw materials using different techniques.
- Improve quality, avoid wastage and maximize factory efficiency using machine vision. Color vision having the same mechanism.

Deliverable:

Upon completion of project we will be hopefully able to present sorting of the colored pencils and finish the following.

- Image processing via MATLAB software.
- Logical control of camera and ejector with pencil axis.
- PLC controlled automation.

Strategy & Approach:

- a. One of the most challenging parts of Design is to develop algorithm to detect the colors and control the cycle time using color detecting mechanism with MATLAB interfacing.
- b. How the pencils are loaded onto the conveyor is the first task of us.
- c. Interfacing of PC with PLC using best technique
- d. Making the mechanism of conveyer Belt in such a way that pencil's real axis and camera become same.
- e. Using PLC to control conveyor belt and ejectors.
- f. Synchronization of conveyor velocity with camera flashing.

Core Team members

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Undertaking

We certify that project work titled “PLC CONTROLLED COLOR PENCIL SORTING MECHANISM” is our own work but the idea was taken from Soliton Pencil sorting machine. (www.youtube.com/watch?v=mJNhQ_Vxc4g). No portion of the work presented in this project has been submitted in support of another award or qualification either at this institution or elsewhere. Where material has been used from other sources it has been properly acknowledged / referred.

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Dedications

First of all we are very thankful to ALLAH ALMIGHTY Who Has given us enough wisdom and courage to complete this project then dedicated to our loving Parents & our project advisor Khan Muhammad Nazir who enlightened our minds with Knowledge, tried to include the spirit of hard work and dedicational us so that we could have a bright future in terms of being good human and turn out to be competent Engineers with powers to take challenging engineering problems.

Acknowledgements

Bissmillahirrahmanirrahim

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This project is a culmination of a long period of work and without the support of many individuals, it would never have been existed. First and foremost, we thank our families, for their care and endless support, both moral and financial, to complete this project.

We have set a light and ever burning flame of gratitude and deep sense of obligation to our honorable advisor khan Muhammad Nazir for his generous assistance and inspiring attitude during the course of our project. Not only he helped us in our project but also did his best efforts in familiarizing us with basic concepts of components used which proved to be very helpful while doing our project.

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Our heartiest thank to all of them.

Regards:

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Abstract

The purpose of the project is to provide a mechanism for color pencil sorting. Different techniques are used to sort different items in our daily life. With the advent of liberalization and globalization, it is necessary that industries explore methods of enhancing automation and productivity to acquire greater competitiveness. In this regard Low Cost Automation (LCA) is a technology that promises to be very useful for any kind of manufacturing organization.

In this project, we have developed an automatic controlled system for sorting of pencils of different colors. Pencils that are moving on a conveyor mechanism have different colors. We have used image processing in MATLAB for taking image of pencil and finding color of pencil .After finding color of pencil special code of that color is sent to PIC microcontroller through serial communication .In PIC Microcontroller code is checked and signal is sent to PLC for timer controls. In PLC we have used timers, so that pencil whose color is checked comes in front of actuators, which are used for pushing pencil out from conveyor. It was also possible to complete this project without using PIC Microcontroller, but it was some extent costly because another module was required for PC to PLC serial communication.

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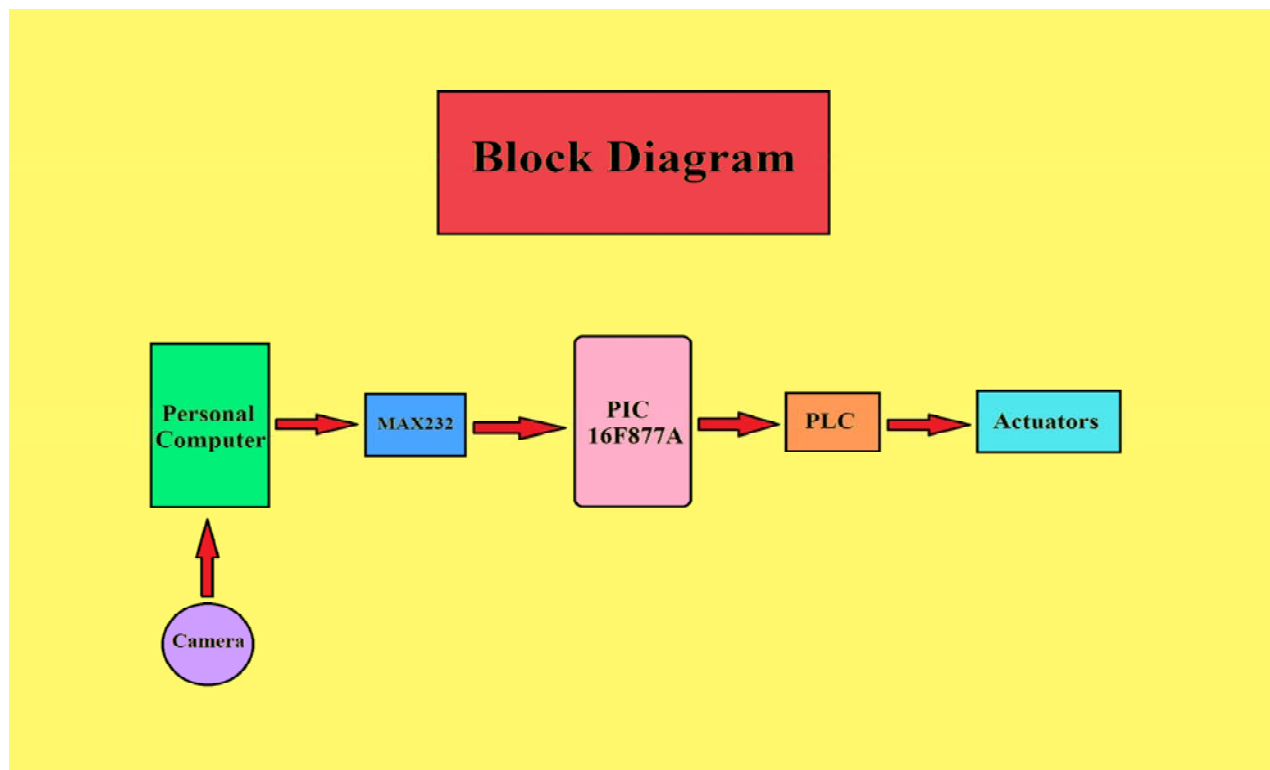
Chapter 1

Introduction to Project

Sorting of various objects based on color is widely used in industries. For Example colored pencils, drinks of different colors and soaps of different colors etc. PLC based automatic sorting of different objects is now advancing the industry.

We have employed the technique for sorting of colored pencils. For the automation part we have used PLC and for image processing we have used MATLAB.

A webcam is used to capture image of pencils placed at conveyor belt. After capturing, this image is processed in MATLAB to find color. For this purpose we use a tool in MATLAB (IMTOOL).



After finding color of pencil corresponding code of that color is sent to PIC microcontroller through serial communication. In this step serial communication is done to send signal from PC

to PIC. As we know PC works at CMOS logic and PIC work at TTL logic. Conversion of CMOS signal of PC to TTL signal is done by using MAX232 level convertor

It is helpful to understand what occurs to the voltage levels. When a MAX232 IC receives a TTL level to convert, it changes a TTL Logic 0 to between +3 and +15 V, and changes TTL Logic 1 to between -3 to -15 V, and vice versa for converting from RS232 to TTL. This can be confusing when you realize that the RS232 Data Transmission voltages at a certain logic state are opposite from the RS232 Control Line voltages at the same logic state. To clarify the matter, see the table below.

RS232 Line Type & Logic Level	RS232 Voltage	TTL Voltage to/from MAX232
Data Transmission (Rx/Tx) Logic 0	+3 V to +15 V	0 V
Data Transmission (Rx/Tx) Logic 1	-3 V to -15 V	5 V
Control Signals (RTS/CTS/DTR/DSR) Logic 0	-3 V to -15 V	5 V
Control Signals (RTS/CTS/DTR/DSR) Logic 1	+3 V to +15 V	0 V

The PIC16F877A has **one USART** module which is used for serial communication. The PIC16F877A is working at 0 and 5 Volt logic level whereas the serial port on PC communicates at logic level +/-15 Volts. So we need a logic level converter and that is MAX232 here. In serial comm. the frequency is most and 1st important factor so, it necessary to having same baud rate in both (PC and PIC). We have done this with 9600 bit/s. When a byte is received by UART module it is stored in RXREG register, a RXIF flag rises which gives interrupt and interrupt subroutine “**void interrupt receive (void)**” is automatically called up on this interrupt. The transmission begins when the TXREG register is loaded. TRMT bit is the status bit of transmission. if it is '0' the transmission is in process and if it is '1' then it indicates that transmission is completed and it is ready to transmit new byte.

PIC Microcontroller (PIC16f877A) is used for receiving the signal that is coming through serial communication from Max232. Code is checked and signal is sent to PLC for timer controls. In PLC we have used timers, so that pencil whose color is checked comes in front of actuators, which are used for pushing pencil out from conveyor. It was also possible to complete this project without using PIC Microcontroller, but it was some extent costly because another module was required for PC to PLC serial communication.