

COLOR SENSING PICKUP AND PICKOUT ARM ROBOT ENANCE WITH OPENCV TOOL

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ABSTRACT

In this paper, we will describe the hardware and system architecture of the sensing system. The advance of robotic technology will bring ease to human life not only in the industrial sector but also the education and entertainment sector. In this research, an idea of a robot that can classify objects according to their color is proposed. The implementation of arm robot using microcontroller is proposed in this paper. User can also able to control the robot from the PC unit by giving the instructions from the PC or from the keypad. Usually the ARM robot consists of the Shoulder, Shoulder, Elbow, Wrist and Gripper, which is controlled by using five DC motor. The instruction about direction control of robot and color to be chosen by robot can be given from the PC.

Keywords: ARM Robot, Gripper, Microcontroller.

1. INTRODUCTION

For the last few decades, unmanned robots-vehicles are becoming very popular and common in R&D, Industries, home and military organizations. There are many advantages of these robots as compared to human contributing to those application areas. One of the most important things about these robots is that they have the capability to perform their action remotely in the field, where human cannot enter and do the activity without any risks to human lives. The RS232 communication protocol is widely used for lots of applications. It is communicate the data between open CV and controller.

2. PROPOSED SYSTEM

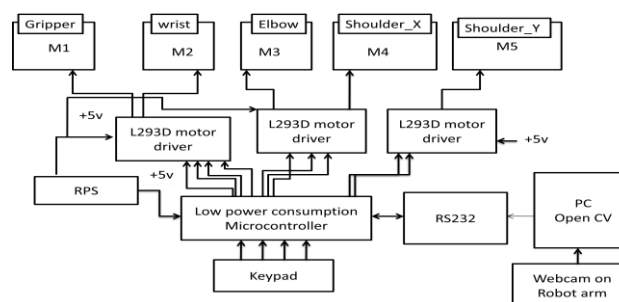


Fig.1.Block Diagram

In our proposed system color sensing by using in to be a color sensor ,and the robot can be working in to be a only one axis movement .the color sensor directly may be connected in to be a pic microcontroller. .The implementation of arm robot using microcontroller is proposed in this paper. User can also able to control the robot from the PC unit by giving the instructions from the PC or from the keypad. Usually the ARM robot consists of the Shoulder, Shoulder, Elbow, Wrist and Gripper, which is controlled by using five DC motor .The instruction about direction control of robot and color to be chosen by robot can be given from the PC

3. HARDWARE IMPLEMENTATION

A. PIC MICROCONTROLLER

Peripheral Interface Controller (PIC) was originally designed by General Instruments. In the late 1970s, GI introduced PIC 1650 and 1655 – RISC with 30 instructions .PIC was sold to Microchip Features: low-cost, self-contained, 8-bit, Harvard structure, pipelined, RISC, single accumulator, with fixed reset and interrupt vectors.

B. CIRCUIT DIAGRAM:

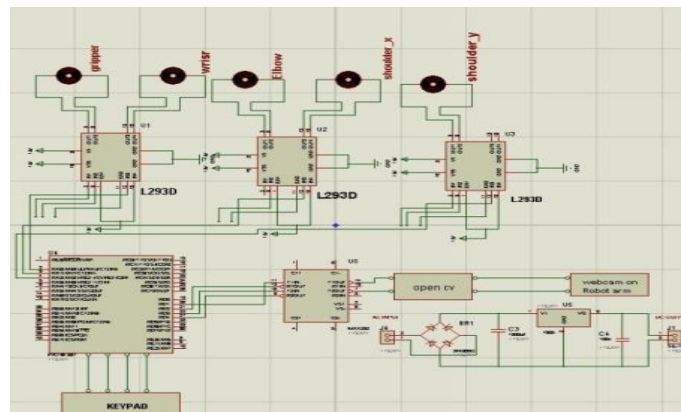


Fig.2. Circuit diagram

C. MICROCONTROLLERS

A single chip that contains

- Processor (the CPU)
- Non-volatile memory for the program (ROM or flash)
- Volatile memory for input and output (RAM)
- Clock
- An I/O control unit

Also called a “computer on a chip”

Billions of microcontroller units (MCUs) are embedded each year in a large number of products from toys to automobiles.

For example: a single vehicle can use 70 or more microcontrollers. Microcontrollers are designed for embedded applications, in contrast to the microprocessor used in personal computers or other general purpose applications. PIC microcontroller chips from Microchip are the world's smallest microcontrollers.

D. MICROCONTROLLER FEATURES

- High-Performance RISC CPU.
- Only 35 instructions to learn.
- Operating speed.
- Interrupt capability.
- 8-level deep hardware stack.
- Direct, Indirect and Relative Addressing modes.
- Special Microcontroller Features.
- Precision Internal Oscillator.
- Power-Saving Sleep mode.
- Wide operating voltage range (2.0V-5.5V).
- Industrial and Extended Temperature range.
- Power-on Reset (POR).

E. ANALOG TO DIGITAL CONVERTER MODULE

- When configuring and using the ADC the following functions must be considered. Port configuration
 - Channel selection
 - ADC voltage reference selection
 - ADC conversion clock source
- Port configuration: The ADC can be used to convert both analog and digital signals. When converting analog signals, the I/O pin should be configured for analog by setting the associated TRIS and ANSEL bits. See the corresponding Port section for more information.

F. MEMORY ORGANIZATION

Program Memory Organization:

The PIC16F882/883/884/886/887 has a 13-bit program counter capable of addressing a 2K x 14 (0000h-07FFh) for the PIC16F882, 4K x 14 (0000h-0FFFh) for the PIC16F883/PIC16F884, and 8K x 14 (0000h-1FFFh) for the PIC16F886/PIC16F887 program memory space. Accessing a location above these boundaries will cause a wraparound within the first 8K x 14 space.

4. SIMULATION RESULT

G. CCS SOFTWARE

A compiler is a computer program (or set of programs) that transforms source code written in a programming language (the source language) into another computer language (the target language, often having a binary

form known as object code). The most common reason for wanting to transform source code is to create an executable program.

This integrated C development environment gives developers the capability to quickly produce very efficient code from an easily maintainable high level language. The compiler includes built-in functions to access the PIC microcontroller hardware such as READ_ADC to read a value from the A/D converter. Discrete I/O is handled by describing the port characteristics in a PROGRAM. Functions such as INPUT and OUTPUT_HIGH will properly maintain the tri-state registers. Variables including structures may be directly mapped to memory such as I/O ports to best represent the hardware structure in C.

H. CCS COMPILER FEATURES

1. Built in libraries that work with all chips for RS232 serial I/O, I2C, discrete I/O and precision delays.
2. Integrates with MPLAB IDE and other simulators and editors for source level debugging. Standard HEX file and debug files ensure compatibility with all programmers.
3. Formatted print allows easy formatting and display in HEX or decimal.
4. Efficient function implementation allows call trees deeper than the hardware stack.
5. Source code drivers included for LCD modules, keypads, 24xx and 94xx serial EEPROM's, X10, DS1302 and NJU6355 real time clocks, Dallas touch memory devices, DS2223 and PCF8570 serial SRAM, LTC1298 and PCF8591 A/D converters, temperature sensors, digital pots, I/O expander and much more.
6. Access to hardware features from easy to use C functions, timers, A/D, EEPROM, SSP, PSP, USB, I2C and more.
7. 1, 8, 16 and 32 bit integer types and 32 bit floating point.
8. Assembly code may be inserted anywhere in the source and may reference C variables.
9. Automatic linking handles multiple code `pages.

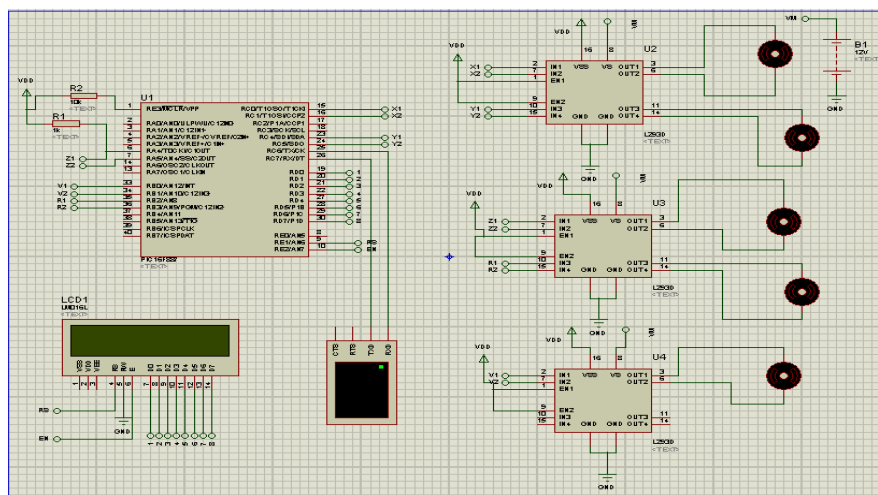


Fig.3. simulation diagram

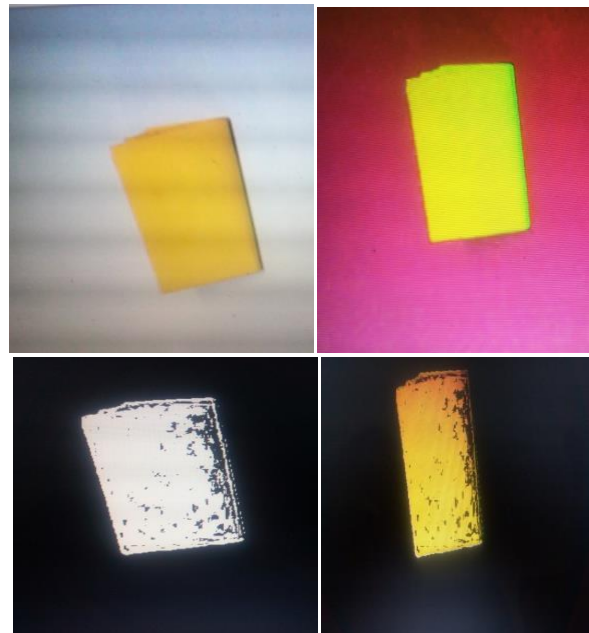


Fig.4. simulation output

5. HARDWARE RESULT

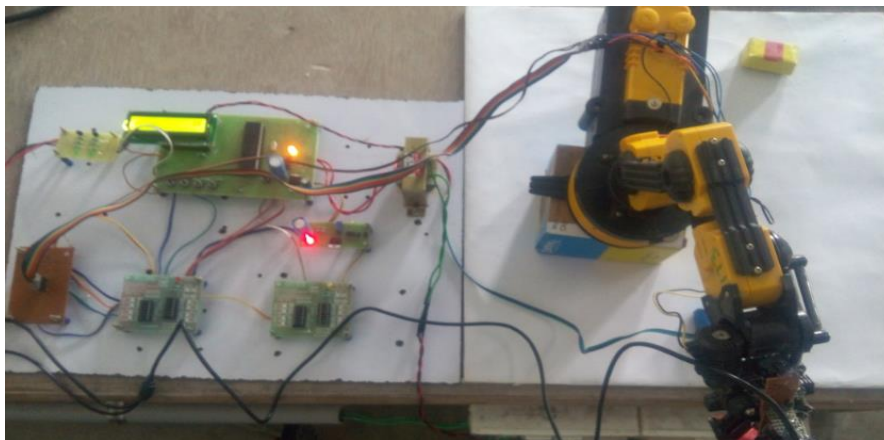


Fig.5.Hard ware kit

CONCLUSION

This designed arm robot is cost effective robot with an excellent intelligence can be used to do multifunction in home, industry, medical, R&D and defense etc. The system uses commercially available module for RS232 protocol. This system has also upgraded the basic intelligence of arm robot by using color sensors and it is also possible to further increase its intelligence by implementing system. Thus, the designed arm robot is focusing on the possible application area to a greater extent. Color sensing section performed two main tasks; object's detection and color recognition. System is fully remote controlled and can pick the required objects. The cost effective system was designed to perform the continuous and reliable tasks without human errors using the simplest concepts. Since this system is mainly controlled by the PIC Microcontroller,

the results obtained are more reliable and faster. Finally, the aim of the project was to have a fully functional robotic arm which sorts different colours and the target is achieved successfully. The system responses are a little bit slower than expected. It can be improved by using a more advanced colour sensor and microcontroller.

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