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An Embedded Based Code Finder Using Robotic Arm Movement

B.Saranya, V.Ramanivetha, M.Vinodhini, R.Sujipriya, A.Shankar

Abstract— ***Robotics is the science of designing and building robots suitable for real-life applications in automated manufacturing and other non- manufacturing. Robots are meant to aid people, making a task easier or aiding a person who wants or needs help. The main use of robots has so far been in the automation of mass production industries, where the same, definable tasks must be performed repeatedly in exactly the same fashion. There are some places that still maintain manual records. This project is used for the concern that do not process with mass products instead to deal with ledgers and old records. The main aim of this system is to find a particular code present in a book. The code has been developed using embedded C. A barcode scanner is used to scan the barcode in the paper and it sends to the microcontroller to compare with the predefined barcode. If the code is matched then the microcontroller stops the process of the stepper motor, servo motor and electromagnet. Thus the particular person's record is found out using this system. The experimental results in software illuminate the reliability of this Code finder system as compared with the existing system is also much cheaper and 'smarter' than the traditional ones.***

Keywords—Degree Of Freedom (DOF), Printed Circuited Board (PCB), Microelectromechanical Systems (MEMS)

I. INTRODUCTION

The arm control in robots is very popular in the world of robotics. A robotic arm is usually programmable with similar functions to a human arm. Robotic arm can be used to perform a variety of tasks with great accuracy. The use of robots was increasing in the world. It is more helpful for the people in many ways by reducing the time and makes the work easier. Robots are capable of amazing feats of strength and speed. This project is based on robotics which is used to find the particular code in a book. This project aims to create a straightforward and repeatable process to minimize the human work to a greater extent. All processes are controlled by **8051 microcontroller.**

The ports of the microcontroller are used to control the operation of the stepper motor, scanner, electromagnets and servo motor. The program is done using embedded C. The PCB design required for implementing this project in hardware is done by ExpressPCB software.

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II. EXISTING SYSTEM

A high speed and fully automated pick and place operations of micro objects takes place. A new MEMS micro gripper that integrates both gripping and releasing. In this a three fingered 9-DOF assemble hand was used. This study focuses on a non-dominant hand of a surgeon. They developed a robotic hand that can carry out assistive task for surgery without changing tools and is capable of grasping large internal organs.

Nine active joins were used for three finger units (Left, Right, Center units). This is suitable for manipulation upto 17um. Three stepper motors are used for moving the objects. To hold or handle little materials three fingered arm robots were used.

III. FLOW CHART

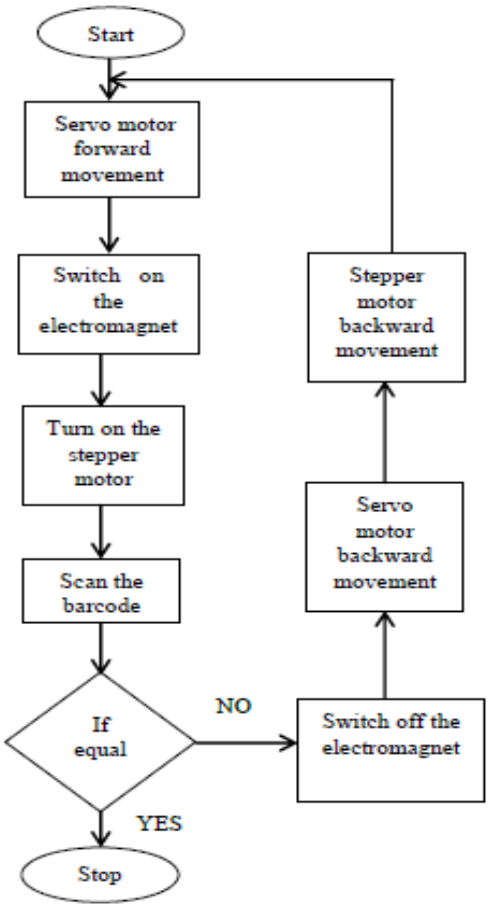

Fig. 1. Process flow of proposed methodology.

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IV. ALGORITHM

STEP1: Switch on the device
STEP2: Make a forward motion by using servo motor
STEP3: Energize the electromagnet to pick the page
STEP4: Turn on the stepper motor to turn the page
STEP5: Scan the particular area where the code is present
STEP6: Compare the code with the predefined code
STEP7: If both are equal stop the process
STEP8: Else de energize the electromagnet to leave the page and make a backward motion by using DC motor
STEP9: Turn on the stepper motor to come back to the original position
STEP10: Then repeat the process from step2.

V. BLOCK DIAGRAM

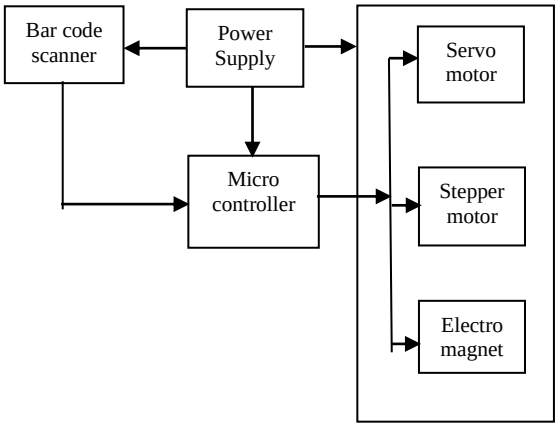

Fig. 2. Configuration of Embedded based code finder System.

VI. TIMING DIAGRAM

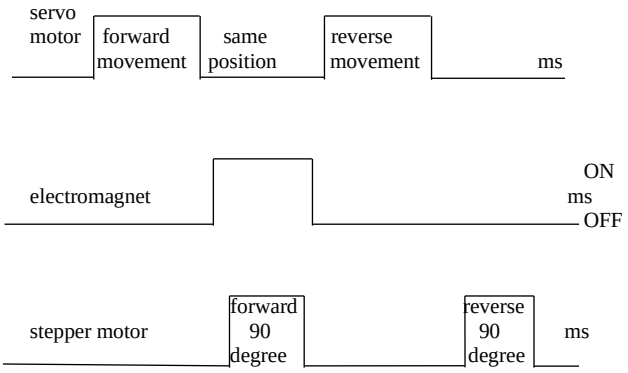

Fig. 3. Timing diagram to find a code

VII. HARDWARE SPECIFICATION

A. Microcontroller

The microcontroller we have implied here is 8051.8051 microcontroller is selected because it is a powerful and has low power consumption and provides a highly flexible and cost-effective solution to many embedded control applications.

It is an 8- bit microcontroller. The microcontroller had 128 bytes of RAM, 4k bytes of on-chip ROM, two timers, one serial port and four ports(each 8-bits wide) all on a single chip. The 8051 is an 8-bit processor, meaning that the CPU can work on only 8 bits of data at a time. It is a 40 pin IC.

B. Stepper Motor

A stepper motor is a widely used device that translates electrical pulses into mechanical movement. Stepper motor has constant speed and it can be locked at any position. It is available in various size and packages and easy to interface. Here it is used for the left and right movement of the arm.

C. Servo Motor

Any motor with feedback is a servo. It can be AC Servo and DC Servo. The shaft of the motor can be positioned or rotated through 180 degrees. They are commonly used in the hobby R/C market for controlling model cars, airplanes, boats, and helicopters. Servos are extremely useful in robotics. But servo motors are adapted DC motor and are extremely useful in robotics.

D. Electromagnet

Electromagnets have several uses and practical applications. They can be found in various everyday electronics and are also used for industrial purposes. Electromagnets are used to control the switches in relay. This is important especially when it comes to things like making a telephone call.

A generator uses the opposite principle and an outside force normally wind, moving water, or steam, rotates a shaft which rotates a set of magnets around a coiled wire to create an electric current. This is how we get electric power and electromagnets are also used to control the switches in relay.

VIII. SOFTWARE DESCRIPTION

A. Keil C

The use of C language to program microcontrollers is becoming too common. And most of the time it's not easy to build an application in assembly which instead you can make easily in C. The C language for microcontroller is commonly known as Embedded C or keil C.

Keil C compiler provides number of extensions for standard C function declarations. These extensions allow you to Specify a function as an interrupt procedure, choose the register bank used and select memory model.

Keil or C51 provides support for real-time operating system (RTOS) RTX51 Full and RTX51 Tiny. Real-time function task are declared using task and priority keywords. The task defines a function as real-time task. The priority keyword specifies the priority of task.

B. Expresspcb

There are different tools available in market for making circuit schematic, simulation, circuit layout etc. Electronic design automation (EDA) is the category of tools for designing and producing electronic systems ranging from printed circuit boards (PCBs) to integrated circuits. This is sometimes referred to as ECAD (Electronic Computer-Aided Design) or just CAD. Some of the PCB layout softwares are ExpressPCB, OrCAD PCB Design, Free PCB, Eagle Layout Editor and many others. Fedora Electronics Laboratory supports some of the CAD tools.

ExpressPCB is very easy to use Windows application for laying out printed circuit boards. The engineers at Express PCB have assembled a few general rules of thumb that can help the beginner design their first printed circuit board.

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These tips are not specific to using CAD software, but instead provide an overview to help and explain how to position the components on the board and how to wire them together with traces.

IX. DELAY CALCULATION

A .Stepper Motor

- 5v stepper motor with 3.5 watts power
- The speed of the motor = 0 to 84 rpm
- The maximum speed = 84 rpm
- Time period for single rotation = 1/84 min = 0.0119 min
- For a full rotation time period = 0.71428 sec =714.28 ms
- For 360 degree rotation = 714.28 ms
- For 90 degree rotation= 0.17857 sec = 178.57 ms
- For 100 degree rotation = 198.4 ms
- Frequency of the oscillator for 90 degree rotation =1/time =5.6 Hz
- Frequency of the oscillator for 100 degree rotation =5 Hz

B. Servo Motor

- Diameter of the wheel =5cm
- Circumference of the wheel =2*3.14*radius of the wheel=15.7cm
- Speed of the Servomotor =100rpm
- Time taken for one rotation=1/100 =0.01min =0.01*60(in sec) =600ms
- The distance travelled for 600ms =15.7cm
- Time required for 5cm movement =191.08ms

X. RESULTS

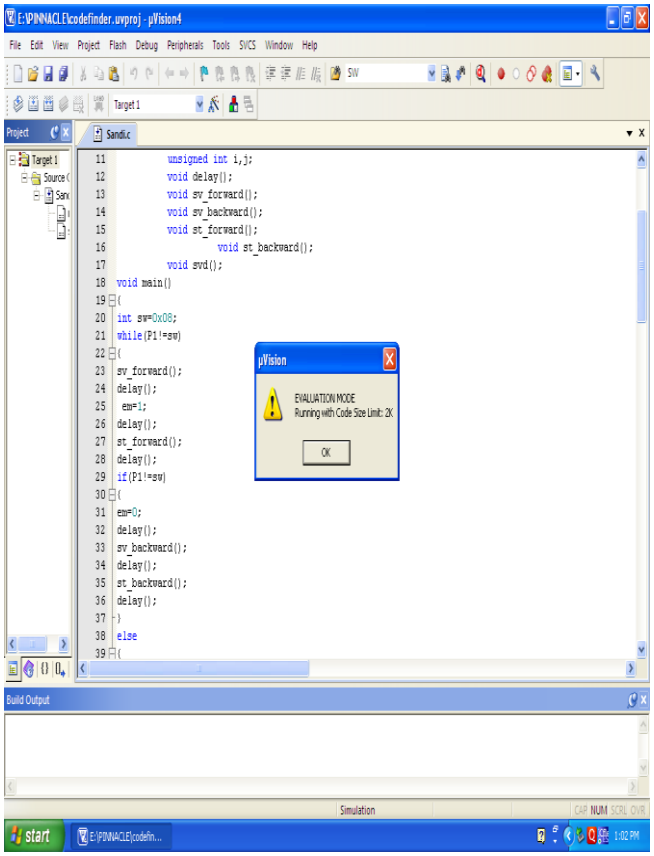

Fig. 4. The debugged coding has been shown

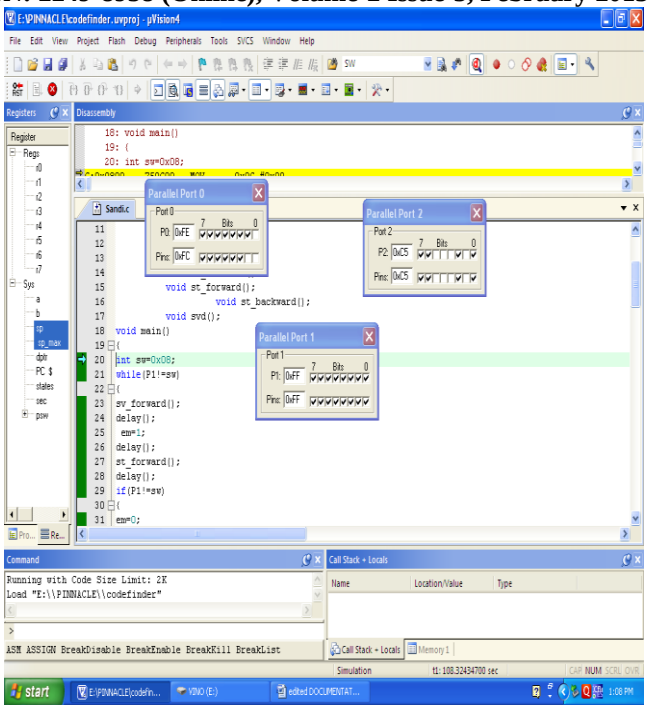

Fig. 5. Input considered as FFH

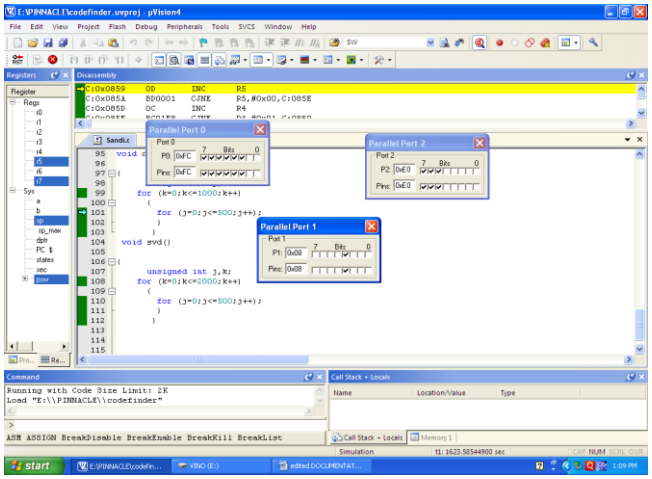

Fig. 6. 8 bit code is matched

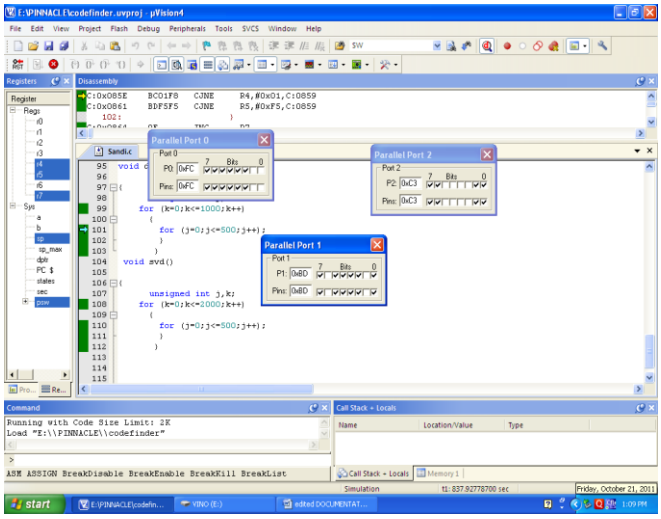

Fig. 7. Unmatched code

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XI. CONCLUSION

This project represents the design and implementation of a robotic arm by using a stepper motor and a servo motor. The arm is designed to make a move upto 90 degree. The 90 degree and the front and back movements are made possible by means of a stepper motor and a servo motor. The program is developed using the KEIL C software. The above project can be implemented in hardware by fusing the software program into a hardware module.

This project can be implemented in hardware by using 8051 microcontroller with the use of Flash Magic software. This project can be implemented in real time using a scanner, stepper motor and servo motor. This helps the concern that maintain manual records for an individual person. It can be further enhanced for selecting more than one code at the same time by some modifications in the program.

XII. HELPFUL HINTS

A. Abbreviations and Acronyms

PCB(Printed Circuited Board),
MEMS(Microelectromechanial System)
DOF(Degree Of Freedom)
RTOS(Real Time Operating System)

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