

# Coin Counting Machine

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**Abstract:-** In the present time, different types of machines are available for counting notes, no such a machine is present to count coins. Lot of time will be taken to count large amount of coins in banks or any other financial centres. This paper is designed and implemented to overcome the burden of counting coins manually. The speciality of the proposed coin counting machine is that it counts and sorts the counted coins. It is believed that this machine will make a change in the problems related to counting of many coins and time taken for counting it.

## I.INTRODUCTION

In this modern world, humans are very busy. They have a little time to spend and a lot to work. So man majority depends on machines now-a-days for doing their works. There are many types of machines developed in favour of doing various works, thereby reducing human effort and time. This paper is a solution to the problem of counting a bulk of coins by human hand, and the solution is by developing an automatic coin counting machine. This machine is mainly focussed to be a aid in banking and financial applications for counting the coins. In this machine there is an input port where the coins can be inserted. In the output the coins are sorted and total amount of coins are displayed on LCD. This device detects, count and separates the coins without the help of a human hand. The device separates the coins one by one for counting. A web camera is used to capture the image of the coin, and a MATLAB program is used to count the coin. A DC motor is used to separate the coins. All the functions of this device are controlled by a PIC microcontroller. After the counting process, the amount will be displayed on LCD.

## II.BLOCK DIAGRAM AND ITS DESCRIPTION

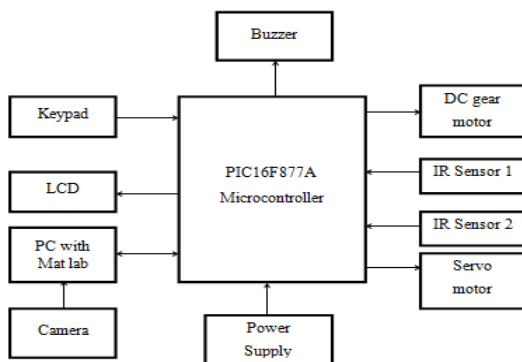


Fig 1.Block Diagram

The microcontroller used in the designed machine is PIC 16F877A. This is an 8bit controller with high performance RISC CPU. Here the VSS refer to ground for logic and input/output pins and VDD refer to positive supply to logic and input/output pins. An external clock source input is given to the OSC1 pin, whereas OSC2 is the oscillator crystal output pin, it connects to the crystal in a crystal oscillator mode. A crystal oscillator is an electronic oscillator circuit that uses the mechanical resonance of a vibrating crystal to create an electrical signal with a very precise frequency. Here we use crystal with frequency of operation equal to 16 MHz. Here all components are interfaced with PIC 16F877A.

A power supply is a reference to the source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of load is called a power supply unit. The term is most commonly applied to electrical energy supplies less often to mechanical ones and rarely to others. Here in our application, we need a 5V DC supply for all electronics involved in the project. This requires a step down transformer, rectifier, voltage regulator and a filter circuit for generation of 5V DC power.

Servo or RC Servo Motors are DC motors equipped with a servo mechanism for precise control of angular position. The RC servo motors usually have a rotation limit from 90° to 180°. Some servos also have rotation limit of 360° or more. But servos do not rotate continually. Their rotation is restricted in between the fixed angles. The Servo motors are used for precision positioning. These motors help to movement of coins.

Proximity Sensor is used to detect objects and obstacles in front of sensor. Sensor keeps transmitting modulated infrared light and when any object comes near, it is detected by the sensor by monitoring the reflected light from the object. Here sensors are identifying the presence of coin and giving information to microcontroller.

MPLAB IDE runs as a 32-bit application on MS Windows®. It is easy to use and includes a host of free software components for fast application development and super-charged debugging. MPLAB IDE also serves as a single, unified graphical user interface for additional Microchip and third party software and hardware development tools. In this project capturing the coin image with a camera and identification process is controlled by MATLAB program.

### III. CIRCUIT DIAGRAM AND ITS DESCRIPTION

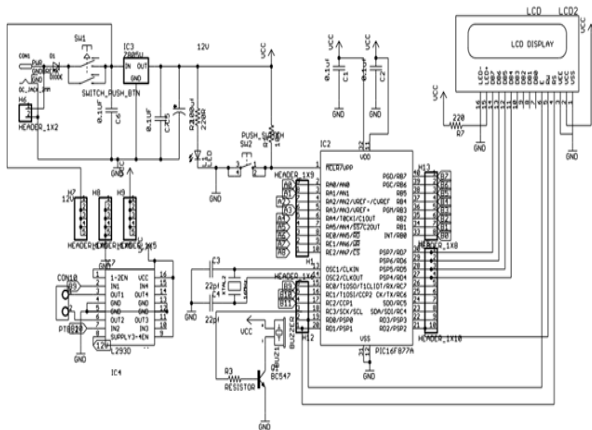


Fig 2. Circuit Diagram

A 12V adapter is used to power the entire circuit. Microcontroller, DC motor, motor IC, display power LED and the buzzer require only 5V to operate. 12V DC motors require 12V of power supply for proper operation. The positive voltage regulator IC LM7805 converts the 12V supply to 5V. Input from adapter is applied to first pin of IC and the second pin of IC is connected to ground potential. Output of 5V is taken from the third pin of regulator IC. Two capacitors are also provided at the input and output of regulator to provide improved stability and transient response. The output is then fed to RC filter. A LED indication is provided at the output of power supply section to indicate whether the power supply section work properly or not.

Here we use an input port where coins are inserted. The input port is designed so that the coins will be aligned horizontally one over each other. Using a DC motor, the coins are pushed into a camera section one after another. At the same time an IR sensor detects the coins and photographs are taken. These images will be stored in an external PC. At this time MATLAB identifies the coins by comparing the images with a database. The identification process is done by using the Gabor filter algorithm in MATLAB. After identification the PC will send a signal to the microcontroller and the microcontroller will open the appropriate drawer for the identified coins. Servo motors are operated by the microcontroller to pull the coins into particular drawers.

### IV. SOFTWARE SECTION

#### A. MPLAB IDE V8.86

MPLAB Integrated Development Environment (IDE) is a free, integrated toolset for the development of embedded applications employing Microchip's PIC® and dsPIC® microcontrollers. MPLAB IDE runs as a 32-bit application on MS Windows®, is easy to use and includes a host of free software components for fast application development and super-charged debugging. MPLAB IDE also serves as a single, unified graphical user interface for additional Microchip and third-party software and hardware development tools. Moving between tools is a snap, and

upgrading from the free software simulator to hardware debug and programming tools is done in a flash because MPLAB IDE has the same user interface for all tools. The current version of MPLAB IDE is version 8.90. MPLAB IDE v8.92 which is due to be released in June 2013 will be the last MPLAB 8 version that will contain new device support. It is a 32-bit application on Microsoft Windows and includes several free software components for application development, hardware emulation and debugging.

MPLAB IDE also serves as a single, unified graphical user interface for additional Microchip and third-party software and hardware development tools. Both Assembly and C programming languages can be used with MPLAB IDE v8. Others may be supported through the use of third-party programs.

#### B. COMPILERS

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. The name "compiler" is primarily used for programs that translate source code from a high-level programming language to a lower level language (e.g., assembly language or machine code). If the compiled program can run on a computer whose CPU or operating system is different from the one on which the compiler runs, the compiler is known as a cross-compiler. A program that translates from a low level language to a higher level one is a decompiler. A program that translates between high-level languages is usually called a language translator, source to source translator, or language converter. A language rewriter is usually a program that translates the form of expressions without a change of language.

A compiler is likely to perform many or all of the following operations: lexical analysis, preprocessing, parsing, semantic analysis (Syntax-directed translation), code generation, and code optimization. Program faults caused by incorrect compiler behavior can be very difficult to track down and work around; therefore, compiler implementers invest significant effort to ensure the correctness of their software.

#### C. CCS COMPILER

The CCS C Windows IDE is a software package that includes a source code editor, a C compiler, and an interface with a programming device (such as the ICD-U40). Together, these three components make up an Integrated Development Environment, or IDE. The general purpose of the IDE is to allow the user to create and edit a source code in C, then compile and program that code into a PIC microcontroller.

#### D. EAGLE

EAGLE (Easily Applicable Graphical Layout Editor), by CadSoft Computer is a flexible, expandable

EDA application with schematic capture editor, PCB layout editor, auto-router and CAM and BOM tools developed by CadSoft Computer GmbH, Germany, since 1988.

EAGLE was originally developed to run as a 16-bit application under DOS, with support for OS/2 and Windows added later on. Starting with version 4.0, EAGLE was converted to 32-bit. EAGLE version 4.0 also dropped support for DOS and OS/2, but was among the first professional electronic CAD tools available for Linux. A 32-bit DPMI version of EAGLE 4.0 running under DOS was available on special request in order to help support existing customers, but was not released commercially. Starting with version 4.13, EAGLE became available for Mac OS X, with versions before 5.0.0 still requiring X11. Version 5.0.0 officially dropped support for Windows 9x and Windows NT 3.x/4.x. EAGLE 6.0.0 no longer supports Mac OS X on the Power PC platform (only on Intel Macs), and the minimum requirements have been changed to Mac OS X 10.6, Linux 2.6 and Windows XP.

On 24 September 2009 Premier Farnell announced the acquisition of CadSoft Computer GmbH, developer of EAGLE.

EAGLE is popular among smaller design houses and in academia for its favorable licensing terms and rich availability of component libraries on the web. Hobbyists are attracted by the availability of freeware licenses.

#### *E.MATLAB*

MATLAB® is a high-level technical computing language and interactive environment for algorithm development, data visualization, data analysis, and numerical computation. Using Matlab, you can solve technical computing problems faster than with traditional programming languages, such as C, C++, and FORTRAN.

Matlab is a data analysis and visualization tool which has been designed with powerful support for matrices and matrix operations. As well as this, Matlab has excellent graphics capabilities, and its own powerful programming language. One of the reasons that Matlab has become such an important tool is through the use of sets of Matlab programs designed to support a particular task. These sets of programs are called toolboxes, and the particular toolbox of interest to us is the image processing toolbox. Rather than give a description of all of Matlab's capabilities, we shall restrict ourselves to just those aspects concerned with handling of images. We shall introduce functions, commands and techniques as required.

A Matlab function is a keyword which accepts various parameters, and produces some sort of output: for example a matrix, a string, a graph. Examples of such functions are `sin`, `imread`, `imshow`. There are many functions in Matlab, and as we shall see, it is very easy (and sometimes necessary) to write our own. Matlab's standard data type is the matrix; all data are considered to be matrices of some sort. Images, of course, are matrices whose elements are the grey values (or possibly the RGB values) of its pixels. Single values are considered by Matlab to be matrices, while a string is merely a matrix of characters; being the string's length.

When you start up Matlab, you have a blank window called the `_Command Window_` in which you enter commands. Given the vast number of Matlab's functions, and the different parameters they can take, a command line style interface is in fact much more efficient than a complex sequence of pull-down menus. You can use MATLAB in a wide range of applications, including signal and image processing, communications, control design, test and measurement financial modelling and analysis. Add-on toolboxes (collections of special-purpose MATLAB functions) extend the MATLAB environment to solve particular classes of problems in these application areas. MATLAB provides a number of features for documenting and sharing your work. You can integrate your MATLAB code with other languages and applications, and distribute your MATLAB algorithms and applications.

#### V.ADVANTAGES

- Economic
- Fast
- Fully autonomous
- User friendly
- Eco friendly
- Easy to maintain

#### VI.RESULTS AND DISCUSSION

Our project "Coin Counting Machine" counted a bulk amount of coins without much delay. This machine mainly works on Digital Image Processing using MATLAB. This device can detect, count and separate the coins easily. It reduces the human effort. The device can separate the coins one by one for counting. After the counting process the amount will be displayed on LCD. Now our product is designed in a low cost model, so it has a little time delay in counting coins. If this machine can be designed with advanced technologies and high quality equipment we can reduce the time delay for counting coins.

#### VII.CONCLUSION

Although in the present time different types of machines are available for counting notes, no such machine is present to count coins. It's really a problem that the waste of valuable time in counting coins by human power. Lot of time will take to count large amount of coins in banks or any other financial centers. Today machines have replaced humans in almost field of jobs. It's due to the speed and accuracy of machines. But it's very shame that in such a world no machines are present to count coins. We studied about this problem and to overcome this problem, we have designed a machine which counts coins. The specialty of our machine is it counts and sorts the coins after counting. So preferred coins can be collected from the machine easily. Since Digital Image Processing technology is used in our product, the speed of our machine will be high compared to others. We believe that our machine will make a change in the problems related to counting of many coins and time taken for counting it.

### VIII. REFERENCES

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