

# Simple Smart Coin Counter and Detector through Arduino and Proteus

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## I. INTRODUCTION

In recent years, the convergence of innovative technology and financial management has led to the emergence of projects such as "Simple Smart Coin Counter and Detector through Arduino and Proteus". This project is driven by the aspiration to create a tangible and intelligent prototype capable of seamlessly detecting and adding coins to a digital coin bank, we endeavor to bridge the gap between conventional coin handling and modern financial technology.

The "Simple Smart Coin Counter and Detector through Arduino and Proteus" project capitalizes on the potential of Arduino and computer vision technology to bring about a transformative change in the way coins are detected and managed. In a world where financial transactions are increasingly digitized, there remains a need to streamline and enhance the physical interaction with currency. By integrating Arduino programming into an Arduino-based system, this project aims to provide a solution that can accurately detect, classify, and count Philippine peso coins, adding a layer of convenience and efficiency to everyday financial transactions.

Conventional coin management methods in the Philippines and elsewhere are often labor-intensive and error prone. The need for a reliable and efficient coin detection and storage system is evident. The "Simple Smart Coin Counter and Detector" project seeks to address this issue by introducing a physical prototype that combines sensor technology with Arduino, capable of autonomously detecting peso coins and adding them to a digital coin bank.

The main objective of this project is to develop prototype that can accurately detect, classify, and count Philippines Pesos coins. The specific objectives are the following: (1) create a prototype in Proteus and Arduino programming; (2) promote financial literacy among users by providing real-time updates on their coin savings and financial goals; and (3) ensure that the "Simple Smart Coin Detector" prototype is user-friendly and accessible to individuals of all ages, making coin management effortless and engaging.

The scope of the "Simple Smart Coin Counter and Detector through Arduino and Proteus" project encompasses the development of a prototype in Proteus and programmed in Arduino. This prototype aims to accurately detect and classify peso coins and add them to a digital coin bank. However, it is essential to recognize certain limitations:

- The project is initially focused on Philippine peso coins and may require adaptations to accommodate other currencies.
- The project is limited to the 1-, 5-, and 10-Philippine peso coins, specifically only one of the new variants of the coins.

## II. RELATED WORKS

### A. Coin Counter

The coin counter machine is used to store personal money in a money bank that is designed in a variety of styles. In this first part, where the personal money for coins were stored inside the Philippine peso coins were made of finest materials. The various sizes of Philippine peso coins were only fitted on 1-peso, 5-peso, and 10-peso coins that were only accepted on the appropriate vending machines elsewhere. The coin sorter features cylinders and divisions to separate and organize the precise quantity of Philippine peso coins, so they are not mixed up, as well as various compartments to deposit money inside the money bank [1].

### B. Coin Detection

When utilizing coin acceptors, the procedure of using the standard Philippine peso coin should identify the layout of whether the coin is exactly real, otherwise the coin would be sent back, if the coin wasn't part of the currency. When a Philippine peso coin is inserted precisely, magnetic, and appealing sensors can determine whether the quantity will be accepted by the coin acceptor and added to the money bank and stores another section for specific amounts [2] [3]. The real structure of the coin acceptor ought to have larger and have greater accepting amounts based on the dimensions and weight of the Philippine peso coin and the availability on the market that applies to their consumers.

### C. Arduino

The suggested coin detector will be created with the Arduino architecture, which is an open-source physical platform that allows electrical engineers and programmers to collaborate on projects to create physical prototypes. The

Arduino projects will aid in the development of simple concepts for making specific architectures a more simple and uncomplicated procedure. Arduino devices are many types of microcontrollers that are commonly accessible on compatible components as part of an easy-to-use to read inputs and outputs from the hardware and software that were combined [4].

#### D. Money Management

Many assumptions have been made about the article's suitable ages for financial education. Many parents might assist in educating younger generations to spend less money on unsure purchases and improve their financial stability [5]. The significance of liquid cash was associated in substantial ways with children, teenagers, and older age groups. The research study needs a plan and suitable instruction for parents to give extra cash to their kids of various ages, as well as donations that were pertinent to managing their future savings [6]. It is feasible to use money management to spend prudently and avoid turning frivolous purchases into investments that would be difficult to recoup later. Spend, Invest, Spare, and Endow were the four stages that were designed to correspond with the best savings [7]. The money management concepts could be used for clever coin insertion in savings banks to reach more target ages [8].

#### E. Coin Counting

The Arduino hardware with the custom sensors used for coin counting would verify how many coins had been entered into the money bank's various parts. The programmer would give instructions on the LED display and verify that the correct amount of money had been sent to the modules. These are techniques to utilize a similar architecture to check a user's coin inserted for holding funds as part of coin arranging techniques including intelligent machines [9].

### III. MATERIALS AND METHODS

#### 3.1 MATERIALS

The Simple Smart Coin Counter and Detector was integrated using Arduino and the following components:

Table 3.1 – List of Project Materials

Items Used	Quantity
Arduino Mega 2560 Rev3	1
Buttons or Switches Module	5
LM016L – LCD 16x2	1
Infrared LED pair Tx and Rx	1

#### Arduino Mega 2560 Rev3

The Arduino Mega 2560 Rev3 is a microcontroller based on the ATmega2560. It has 54 digital input/output

pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), and a 16mhz crystal oscillator. The device is used when connecting it to a computer with a USB cable or powering it with an AC-to-DC power jack and reset button for restarting the device [10].

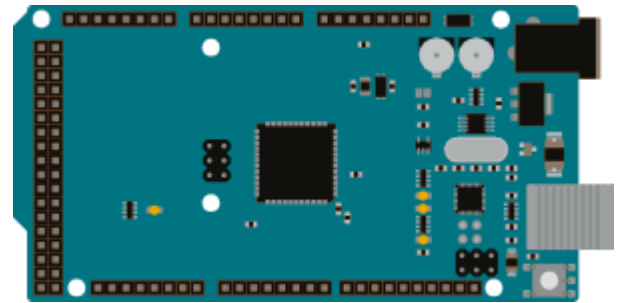


Figure 3.1 Arduino Mega 2560 Rev 3

#### LM016L – LCD 16 x 2

The LM016L 16x12 is an LCD display based on Hitachi's HD44780 controller to use any compatible with any similar on HD44780 controllers to display their number of coins inserted into a coin acceptor using integrated components. The LM016L 16x12 LCD display contains 14 pins on the 1 controller, and 16 pins for the 2 controllers to display 80 characters which will be based on the diagram. [11].

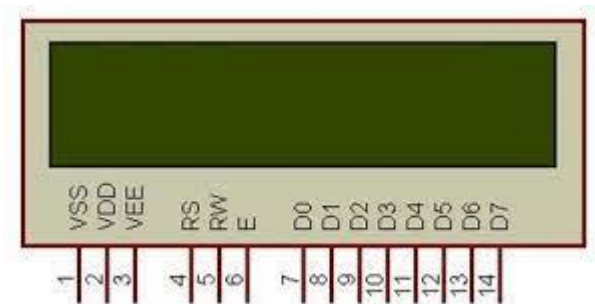


Figure 3.1 LM016L – LCD 16x2

#### Buttons or Switches Module

The Arduino device that is compatible with microcontrollers can update its number of coins inserted and will display on the LCD by using the buttons and switches module to activate functions. It has features with different buttons or switch modules of various types that are readily available on the market and guaranteed to work with most Arduino microcontrollers.

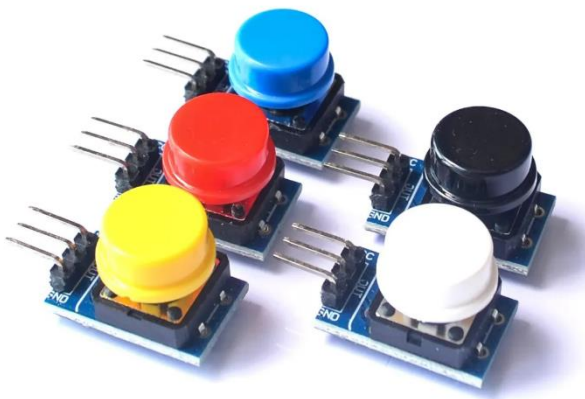


Figure 3.3 Buttons or Switches Modules

### Infrared LED pair – TX and RX

The infrared led pair TX and RX is a piece of technology in which buttons or switches give signals to the microcontroller, which updates the command module based on the coins inserted. Where the user hits the buttons, the infrared sensors perform the command based on the number of coins that were input and check the amount on each coin in the entire system.



Figure 3.4 Infrared LED Pair – TX and RX

### 3.2 Methods

The simple smart coin counter and detector prototype was simulated in Proteus with Arduino code. The prototype uses the Arduino Mega 2560 as the microcontroller board, an LM016L 16x2 LCD display for displaying to the user the number of 1-, 5-, and 10-peso coins inserted, the amount for each coin, and the total amount of all the coins. The code [12] was modified to fit this prototype's coin variant. Some changes to the functions were also made to improve the output of the prototype.

### A. Block Diagram

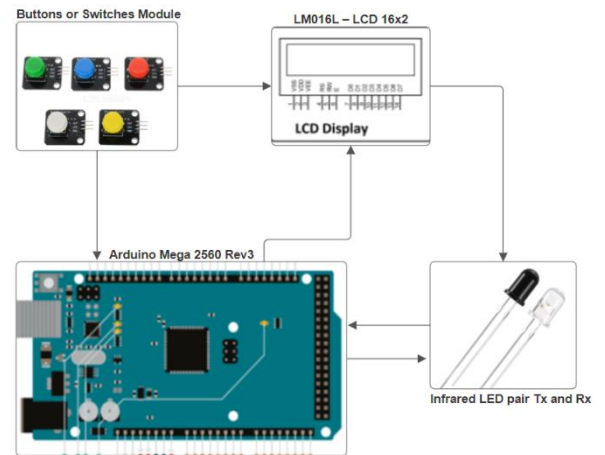


Figure 3.5 Smart Coin Counter and Detector Block Diagram

### B. System Flowchart

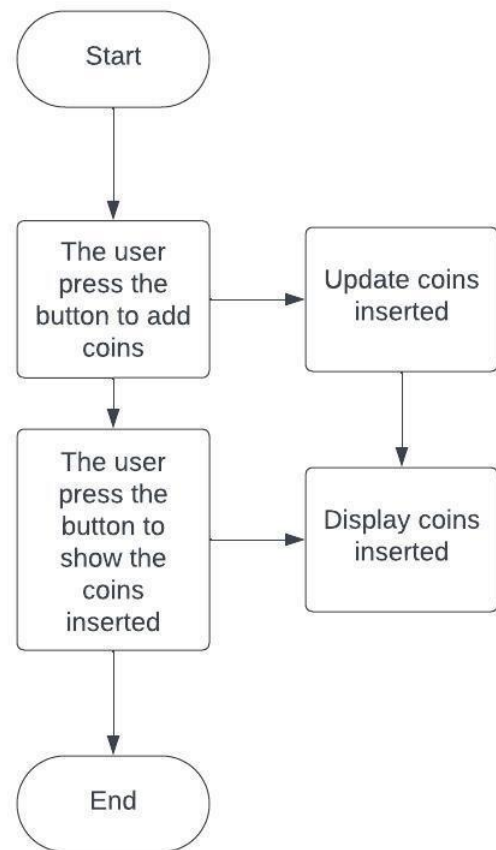


Figure 3.6 Smart Coin Counter and Detector Flowchart

Figure 3.6 illustrates the flowchart of the simple smart coin counter and detector. It starts when the user clicks on the specified coin denominations available on the Arduino command. For example, if the user inserts a 1-peso, 5-peso, or 10-peso coin once or several times, the number of coins inserted in the simulation is updated on the LCD display. While displaying and presenting details on coin amount

entered on the display for each coin denominations that have already been inserted.

### C. Schematic Diagram

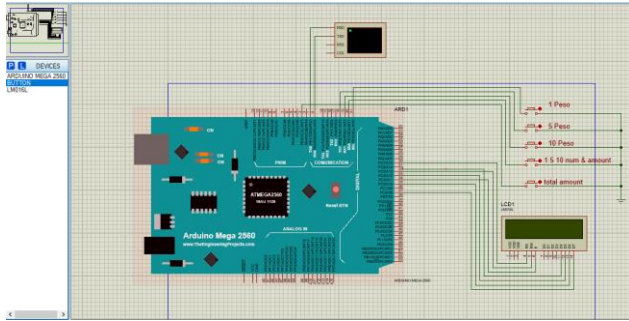


Figure 3.7 Smart Coin Counter and Detector Schematic Diagram

## IV. CONCLUSION AND RECOMMENDATIONS

The desired project for "Simple Smart Coin Counter and Detector" had no complications during simulation. Many of the customers who wanted to save money were following the objectives on the necessary duties. The coin detector had an amount counter that showed how much the entered coins were worth on the virtual terminal. The Arduino microcontroller and other components were installed, including the LCD display, the infrared TX and RX pairs, and buttons to make physical connections all working.

To improve this simple smart coin counter and detector, the group recommended the following:

1. Since there is a new 20-peso coin and many variants of the 1-, 5-, 10- peso coins, the group recommended to configure the code and schematics to accept all Philippine Peso coins and all its variants.
2. Due to time and economic feasibility, the prototype was only simulated through Proteus, with Arduino programming. The group recommended building a physical prototype so that it could be used and tested and be available to the public.

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