ASSUMPTION UNIVERSITY OF THAILAND

FACULTY OF ENGINEERING

MCE 4103 : Mechatronics Engineering Laboratory II

Project Report

Automatic Coin Sorting Machine

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Section: 641

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I. Introduction

This project is about an automatic coin sorting machine. The automatic coin sorting machine will allow you to put any coin into the coin slot. When the coins are inserted into the coin slot, machine will sort them out by their size and will make them in group for each type. There will be a sensor for each type to count the number of coins. Machine will have a program to calculate the amount of money of each type and total. Finally, it will give you the coins sorted for each type and will show you the amount of money.

II. Project Description

In this program, you will be allowed to insert any coins (Thai Currency). First, it will show you the main page: you have to press “Start” Button to start the machine.

After that, it will show you second page which is to insert the coins. Since that is just simulation project, you will have to put each coin for each type by pressing the buttons (on HMI screen) or input switches (on PLC) for each type as sensor input; real machine will solve the coins by the coin slot (inside the machine, not the one we insert the coins) for each type by their size.

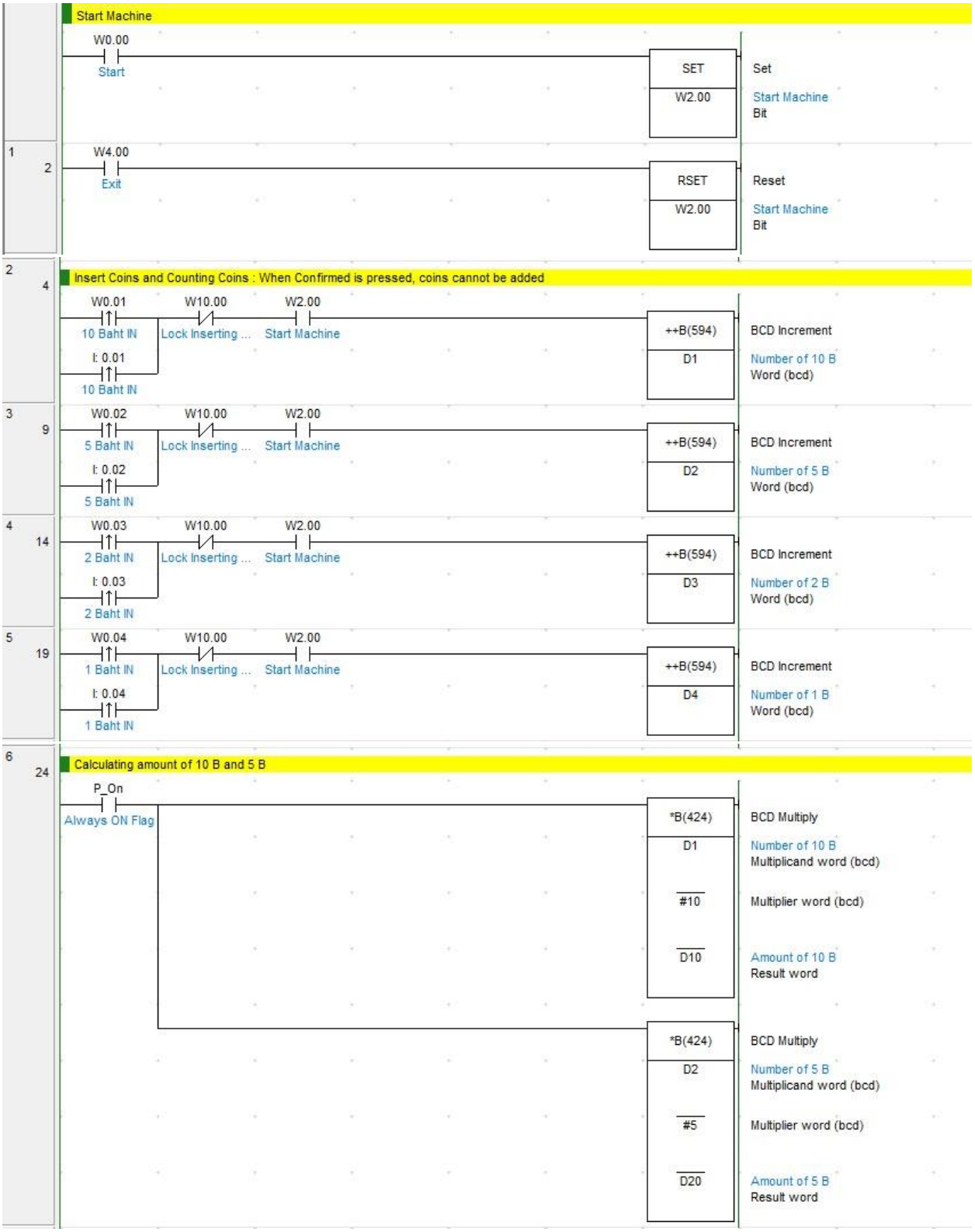
After you have inserted the coins, you have to press “Confirm” button. Then the machine will show you Operation Page which shows how many coins of each type is inserted and amount of each coin and total (in Baht). In Operation Page, you cannot add any more coin; coin slots will be locked. However, you can press “Add Coins” button in Operation page, if you have some more coins that need to be sorted; if you press “Add Coins”, Machine will go back to Adding Coin Page again.

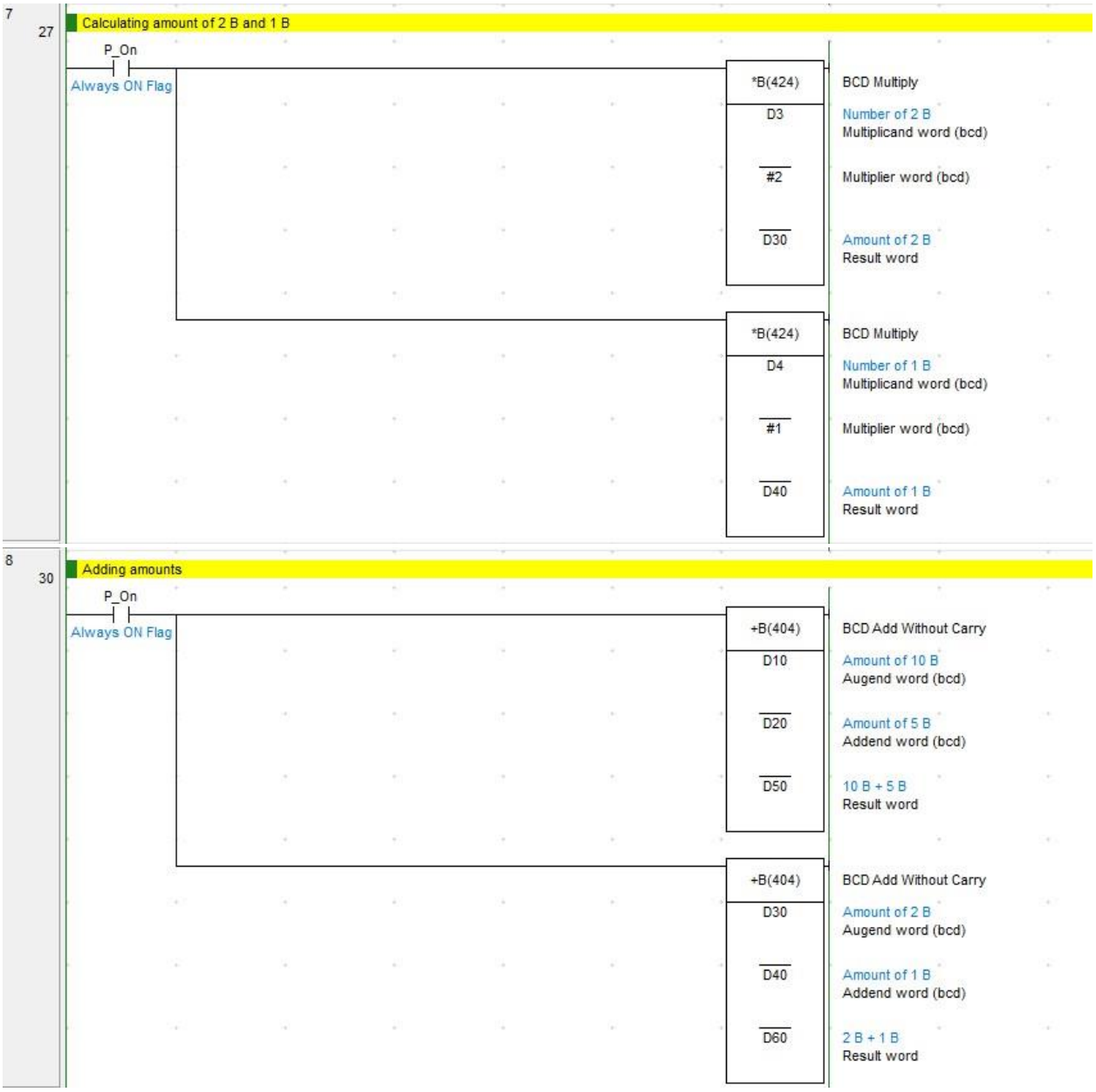
Moreover, you can also clear the data by pressing “Clear Data” button in Operation Page. When you press “EXIT” button, EXIT box will show up to confirm “Yes” or “No” because all the data will be clear when you exit the machine. If “Yes”, Main page will be shown again, and all data will be reset. If “No”, Operation Page will be shown again.

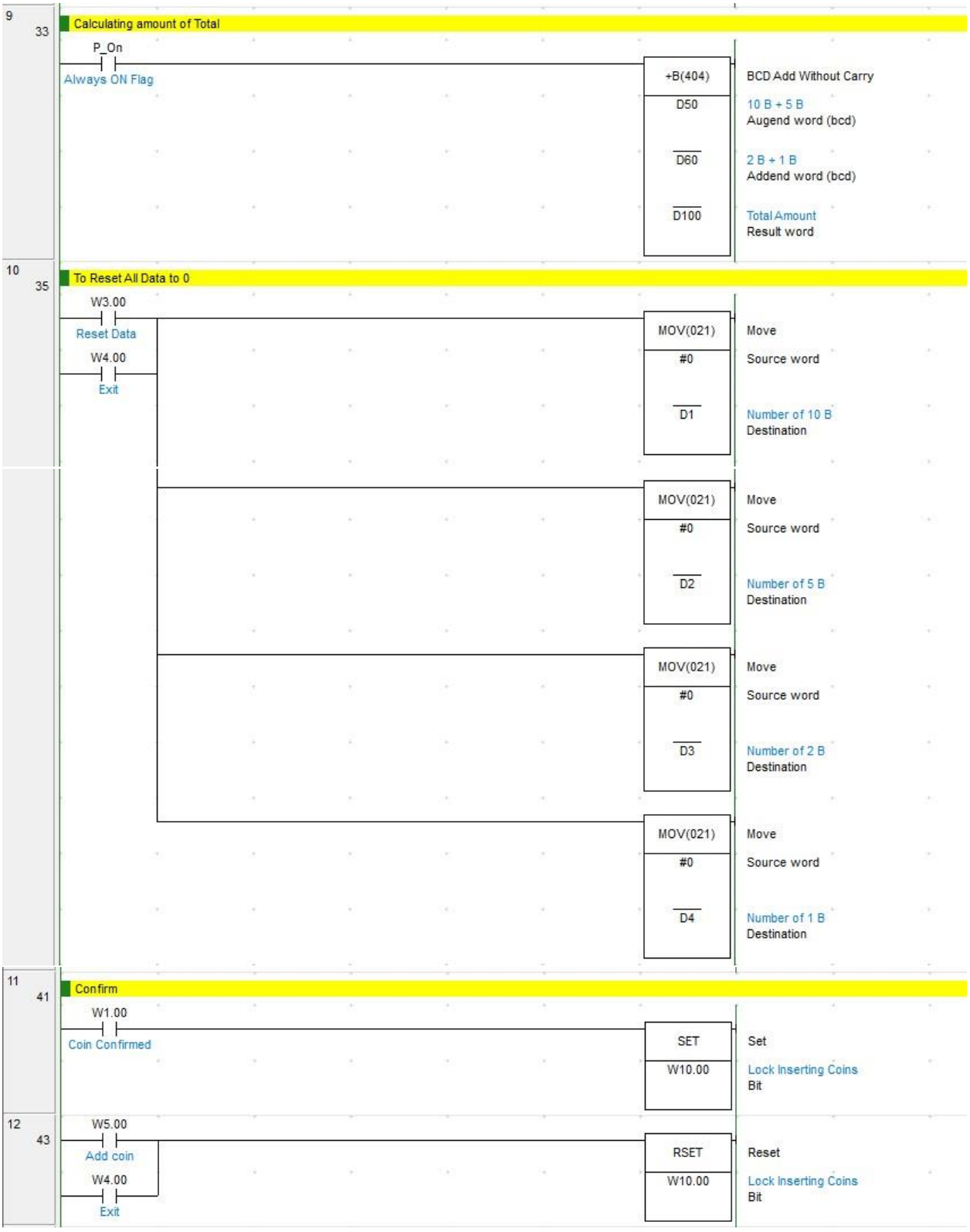
INPUT From PLC to insert the coins (To read the coins as sensor)

Money (Coins)	PLC INPUT
1 Baht	I 0.04
2 Baht	I 0.03
5 Baht	I 0.02
10 Baht	I 0.01

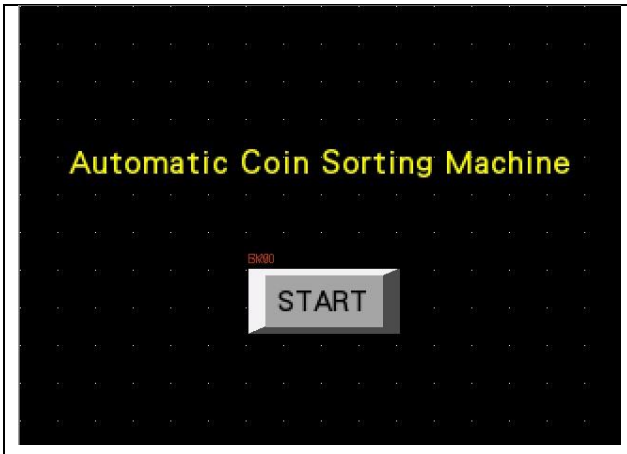
III. Ladder Program



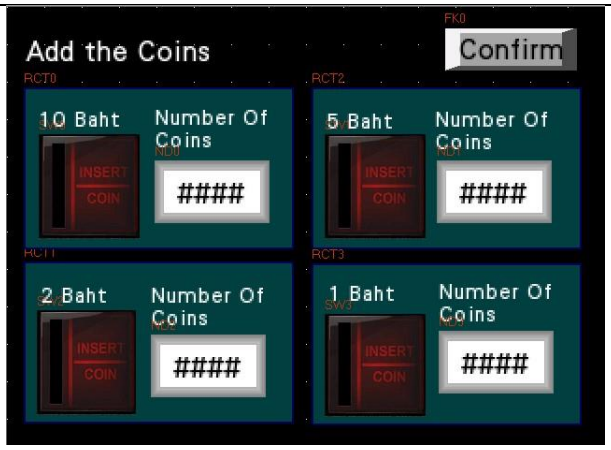

7
27
Calculating amount of 2 B and 1 B
P_On
Always ON Flag
*B(424)
D3
#2
D30
BCD Multiply
Number of 2 B
Multiplicand word (bcd)
Multiplier word (bcd)
Amount of 2 B
Result word
*B(424)
D4
#1
D40
BCD Multiply
Number of 1 B
Multiplicand word (bcd)
Multiplier word (bcd)
Amount of 1 B
Result word
8
30
Adding amounts
P_On
Always ON Flag
+B(404)
D10
D20
D50
BCD Add Without Carry
Amount of 10 B
Augend word (bcd)
Amount of 5 B
Addend word (bcd)
10 B + 5 B
Result word
+B(404)
D30
D40
D60
BCD Add Without Carry
Amount of 2 B
Augend word (bcd)
Amount of 1 B
Addend word (bcd)
2 B + 1 B
Result word


9
33
Calculating amount of Total
P_On
Always ON Flag
+B(404)
BCD Add Without Carry
D50
10 B + 5 B
Augend word (bcd)
D60
2 B + 1 B
Addend word (bcd)
D100
Total Amount
Result word
10
35
To Reset All Data to 0
W3.00
Reset Data
W4.00
Exit
MOV(021)
Move
#0
Source word
D1
Number of 10 B
Destination
MOV(021)
Move
#0
Source word
D2
Number of 5 B
Destination
MOV(021)
Move
#0
Source word
D3
Number of 2 B
Destination
MOV(021)
Move
#0
Source word
D4
Number of 1 B
Destination
11
41
Confirm
W1.00
Coin Confirmed
SET
Set
W10.00
Lock Inserting Coins
Bit
12
43
W5.00
Add coin
W4.00
Exit
RSET
Reset
W10.00
Lock Inserting Coins
Bit

IV. HMI Design



Page 1 : Main Page



Page 2 : Add Coins Page

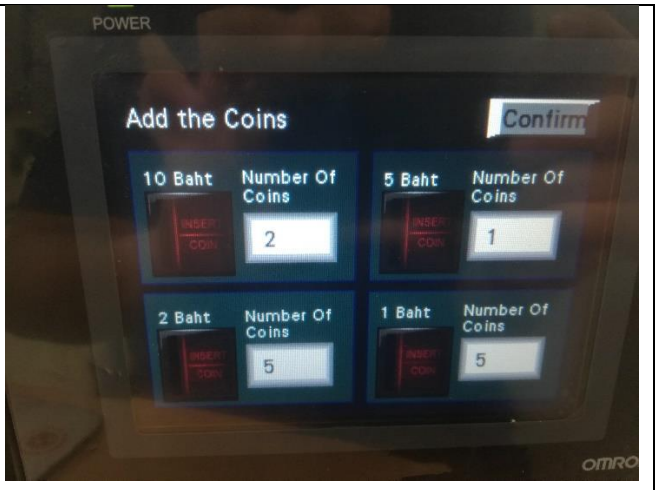
Page 3 : Operation Page

Page 4: EXIT Page

V. Result

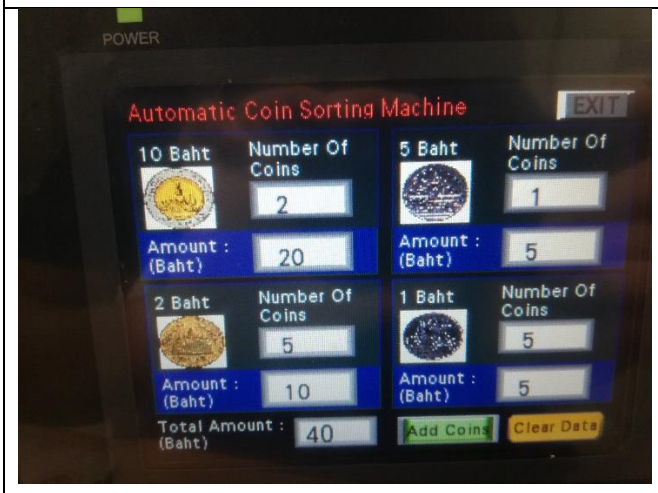
First Page: Main page

When "START" button is pressed, second page will be shown up.



Second Page: Add Coins Page

In this page, we can add the coins. When I pressed "Confirm" button, third page showed up.

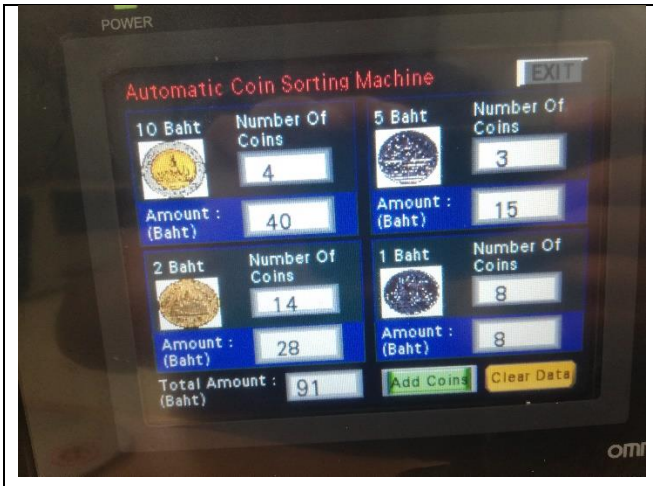


Third Page: Operation Page

In this page, number of coins and amount of money for each type of coins, and total amount of money will be shown.

Second Page : Add Coins Page

When I pressed "Add Coins" on Operation Page, second page will be shown up again. So, I can add more coins. After coins are added, I pressed "Confirm" button.

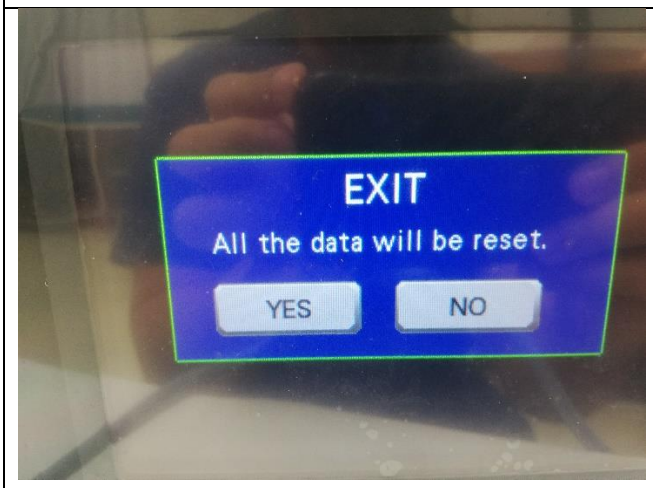


Third Page: Operation Page

Now, Machine will show you number of coins and amount of money for each type of coins, and total amount of money again.

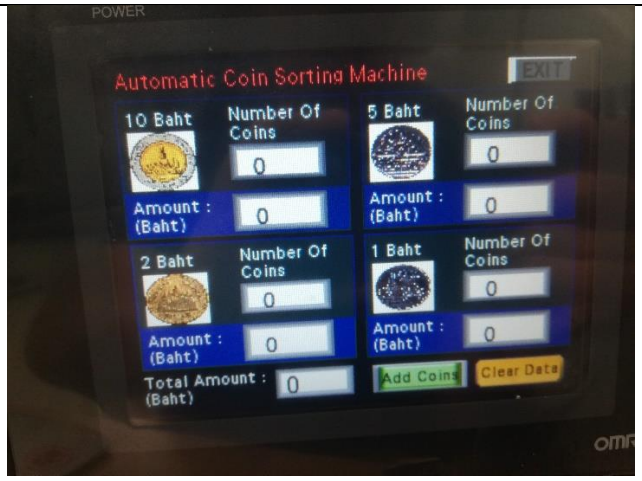
Third Page: Operation Page

When I pressed “Clear Data” button, all the data were reset.



Fourth Page: EXIT Page

In this page, if we choose “No”, it will go back to Operation Page.
If we choose “YES”, it will go to Main Page and all data will be reset.



Third Page: Operation Page

If “No” is pressed on EXIT page, Operation Page will be shown again, Data are showing “0” because I clear all data first before I pressed “EXIT”.

First Page: Main page

If “YES” is pressed on EXIT page, Main Page will be shown, and all data will be reset.

VI. Conclusion

By doing this project, I could apply my understanding and knowledge about PLC and HMI that I have learnt in Mechatronic Lab 1 and 2, and I gained more confident in using PLC and HMI. I could also understand about how Automatic coin sorting machine operate. Doing this project helps me about how to write a program to make convenient use of customer or user because I wrote this program and designed HMI from customer point of view.