


Faculty of Information Technology									
<div>I declare that I am familiar with, and will abide to the Examination rules of CTU</div> <div></div> <div>_____</div> <div>Signature</div>	<div>SUBJECT NAME: Robotics Development</div> <div>SUBJECT CODE: RD412 FA3</div>								
	<div>Formative Assessment 1</div> <div>Duration:</div> <div>Date:</div> <div>Total Marks:</div> <div>Total pages:</div>					<div>Examiner:</div> <div>Moderator:</div>			
	Student number								
	2	0	2	3	1	0	7	3	
	<div>Surname:</div> <div>Coetzee</div>				<div>Initials: NA</div>				/

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### The team:

Luan Frey: Completed question 1.1.

Wiaan Willemse: Completed Question 1.2.

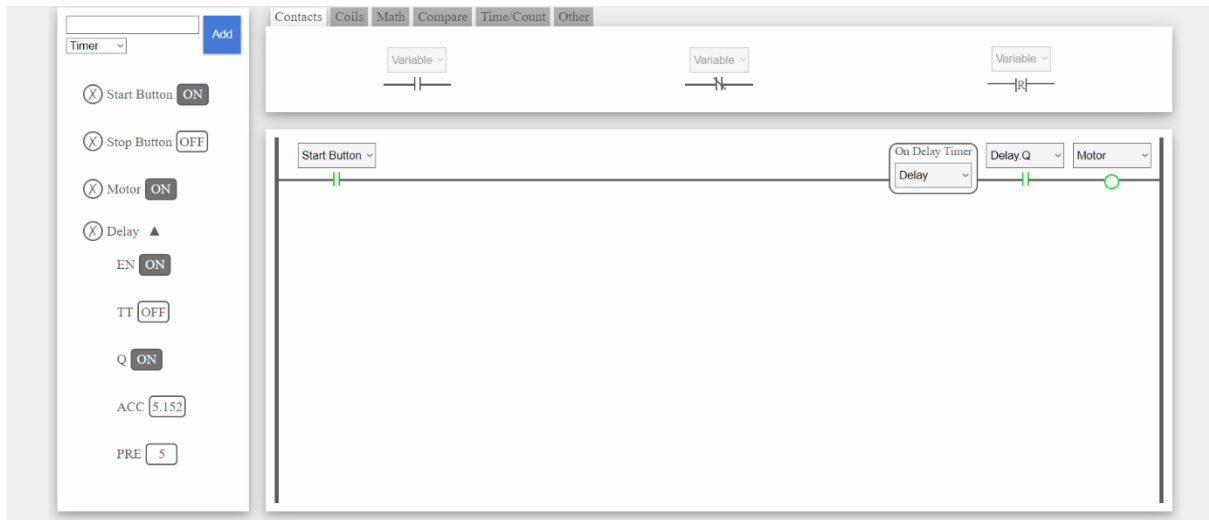
Dandre Oliver: Completed Question 1.3.

Christiaan Van Der Merwe: Completed question 1.4.

Juan van Nieuwenhuizen, Juan-Jacques Posthumus, Adriaan Coetzee: Worked together on the code for Section B.

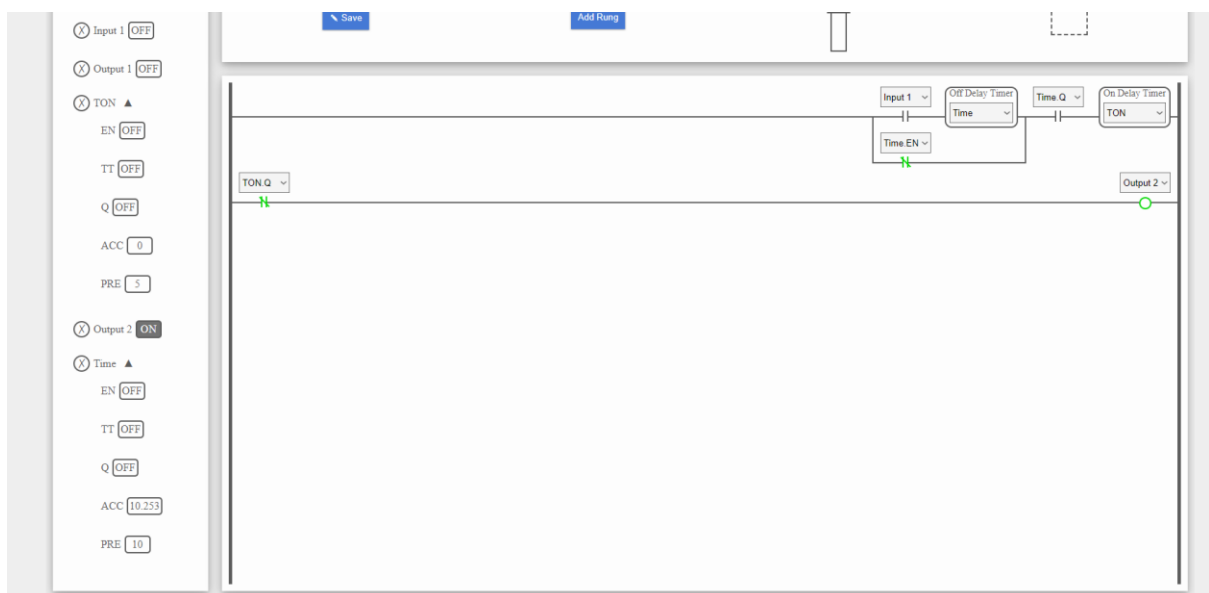
## Question 1:

1.1 Switch on an output 5 s after receiving an input and keep it on for the duration of that input, according to Allen Bradley.



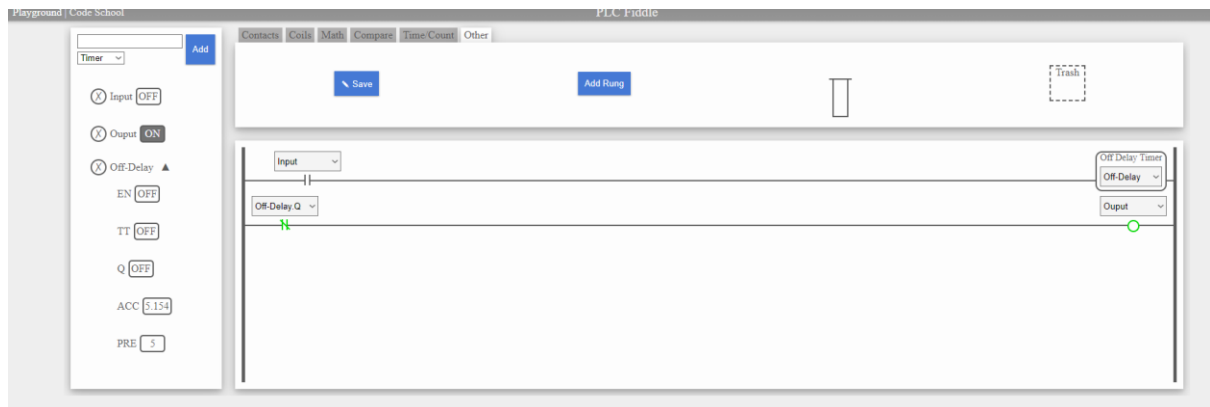
When the start button is pressed, a 5s delay occurs, and then Delay.Q is switched on once the ACC. reaches 5s.

1.2 Switch on an output for the duration of the input and then keep it on for a further 5 s, using TON.



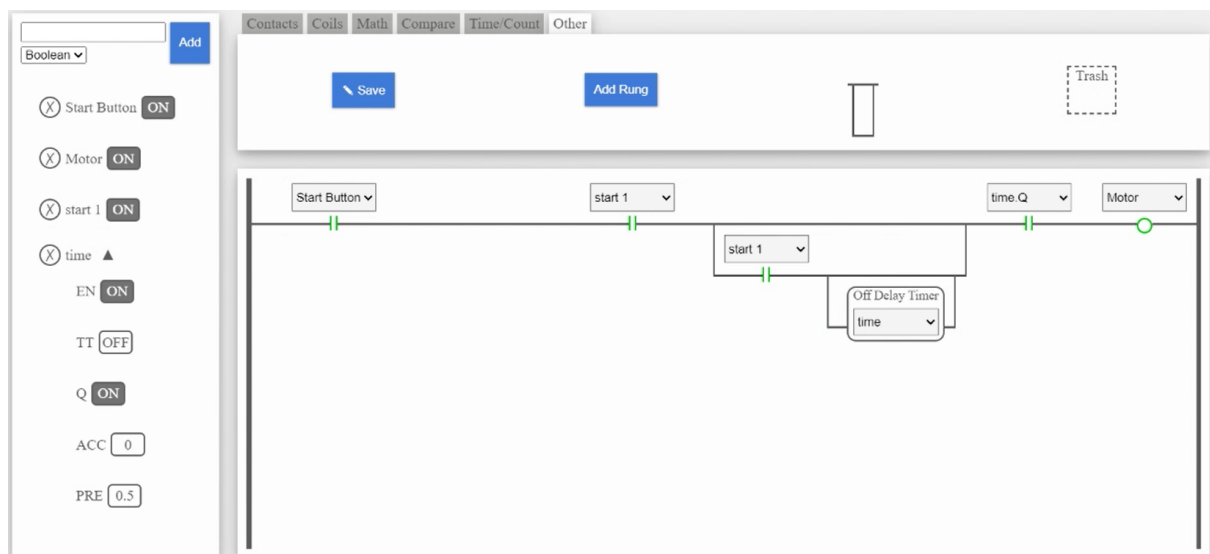
Output 2 is already on and TON.Q is already closed. When Input 1 is pressed and released, the Off Delay Timer triggers Time.Q, closing it and allowing power through with the help of Time.EN. This then triggers the On Delay Timer, and after 5s, turns off TON.Q, thus turning off output 2.

1.3 Switch on an output for 5 s after the start of an input signal, using an off-delay timer.



Once the input is pushed and released, the Off Delay Timer triggers, and after 5s, opens Off-Delay.Q, and so turns off the Output.

1.4 Start a machine if switch B is closed within 0.5 s of switch A being closed; otherwise the machine is not switched on.



After the Start Button (A) is pressed, the Off Delay switch does not have power. When switch 1 turns on, and the Queue is not finished, the Off Delay switch will get power and stop its count, and the motor will turn on. If the Queue timer runs out, then Switch 1 will not turn on the motor, and the Queue timer variable will automatically open and the motor will not switch on.

## Question 2 code:

### Variables:

H\_POS: Current horizontal position

V\_POS: Current vertical position

DEST: Destination point

GRIP\_STATUS: Whether gripper is holding an ingredient (1 for holding, 0 for empty)

### Initial State:

H\_POS := 0 (Initialize horizontal position)

V\_POS := 0 (Initialize vertical position)

GRIP\_STATUS := 0 (Initialize gripper status)

### Instructions:

START: (Start of Instruction List)

MOVE\_TO\_A: (Move to point A horizontally)

DEST := A

WHILE H\_POS > DEST

H\_POS-- (Decrement horizontal position)

END\_WHILE

GRIP\_ON: (Activate gripper)

ACTIVATE\_GRIPPER

MOVE\_UP: (Move up vertically to pour mint leaves)

DEST := A

WHILE V\_POS > DEST

V\_POS-- (Decrement vertical position)

END\_WHILE

MOVE\_DOWN: (Move down vertically to mix)

DEST := N (Neutral position)

WHILE V\_POS < DEST

V\_POS++ (Increment vertical position)

END\_WHILE

MOVE\_TO\_B: (Move to point B horizontally)

DEST := B

WHILE H\_POS < DEST

H\_POS++ (Increment horizontal position)

END\_WHILE

POUR\_LIME\_JUICE: (Pour lime juice)

GRIP\_OFF: (Deactivate gripper)

DEACTIVATE\_GRIPPER

MOVE\_TO\_C: (Move to point C horizontally)

DEST := C

WHILE H\_POS < DEST

H\_POS++ (Increment horizontal position)

END\_WHILE

GRIP\_ON: (Activate gripper)  
ACTIVATE\_GRIPPER

MOVE\_UP: (Move up vertically to pour rum)  
DEST := C  
WHILE V\_POS > DEST  
V\_POS-- (Decrement vertical position)  
END\_WHILE

MOVE\_DOWN: (Move down vertically to mix)  
DEST := N (Neutral position)  
WHILE V\_POS < DEST  
V\_POS++ (Increment vertical position)  
END\_WHILE

MOVE\_TO\_D: (Move to point D horizontally)  
DEST := D  
WHILE H\_POS < DEST  
H\_POS++ (Increment horizontal position)  
END\_WHILE

POUR\_SODA\_WATER: (Pour soda water)  
GRIP\_OFF: (Deactivate gripper)  
DEACTIVATE\_GRIPPER

RETURN\_TO\_START:  
H\_POS := 0  
V\_POS := 0  
GOTO START

## Bibliography

Anon., n.d. [Online]

Available at: <https://www.youtube.com/watch?v=w043mOdIgao>

Anon., n.d. [Online]

Available at: <https://learning.oreilly.com/library/view/programmable-logic-controllers/9780128029299/B9780128029299000091.xhtml#s0060>



## Completed Declaration of Authenticity

**I Nico Adriaan Coetzee** hereby

declare that the contents of this assignment is entirely my own work except for the following documents: (List the documents and page numbers of work in this portfolio that were generated in a group)

Activity	Date



Signature:

Date: 02/10/2023