OPTIMIZING FOOD AND BEVERAGE WAREHOUSE MANAGEMENT WITH PLC CONTROLLED AUTOMATED INVENTORY SYSTEM

Documentation of Open Automation Challenge - 2023

Submitted by

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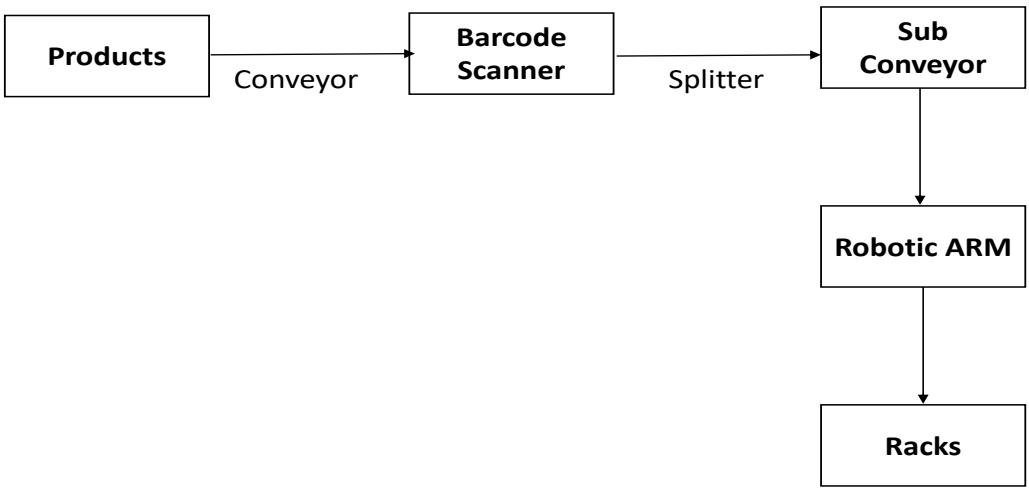
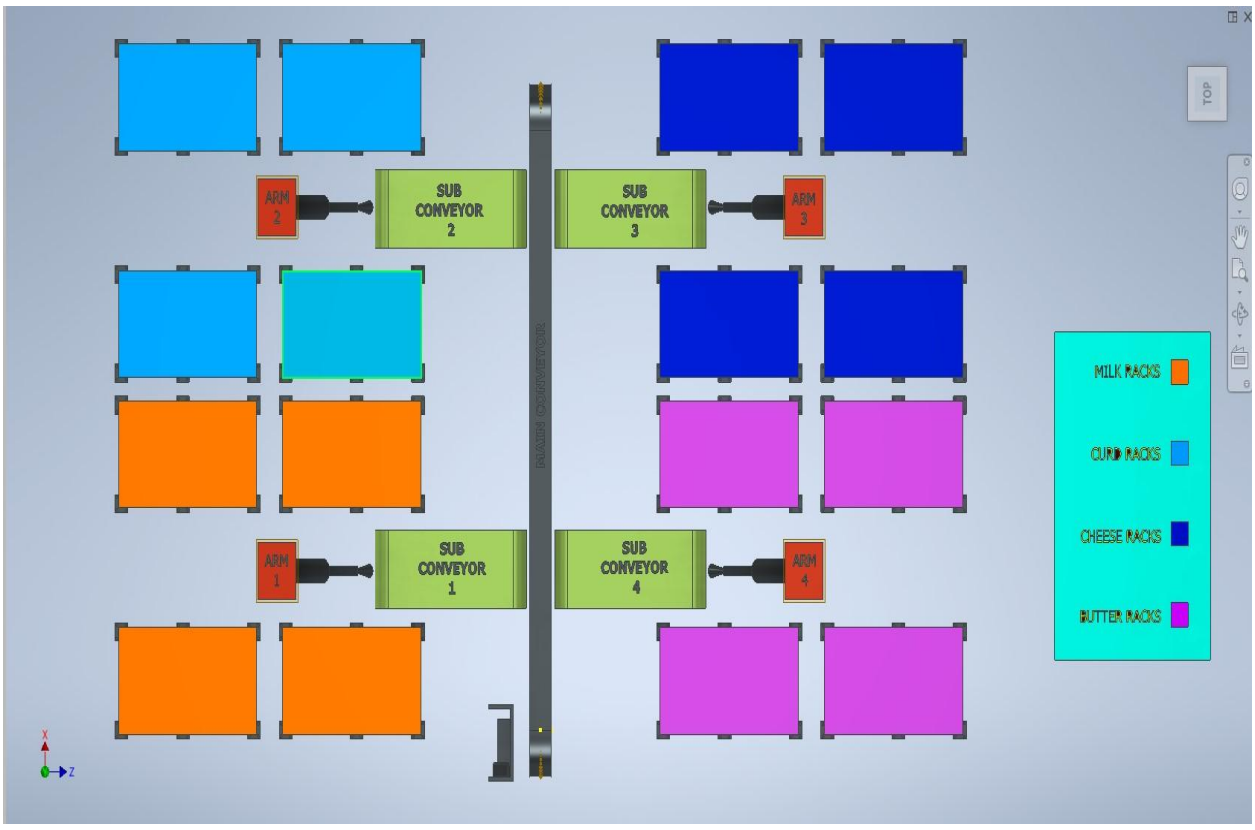
Challenges Faced by Warehousing Logistics in India

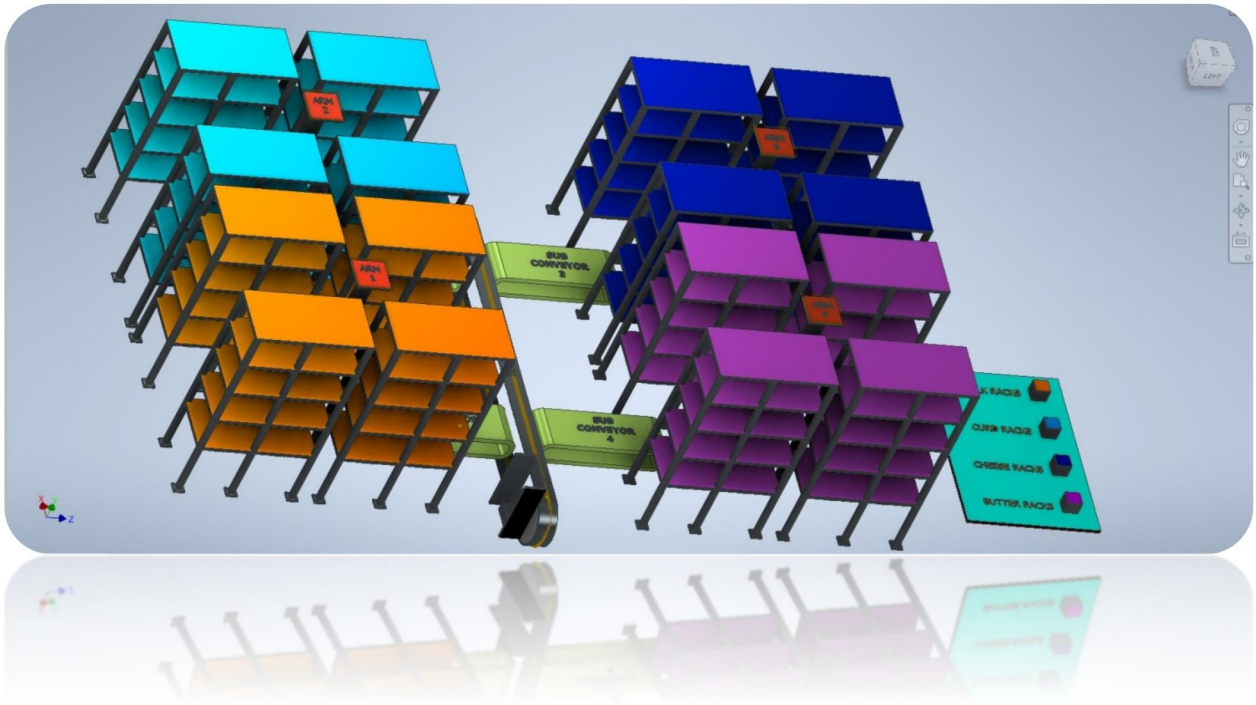
- Automated Inventory
- Environmental Control
- Space Utilization

Block Diagram:



CAD Lay out:

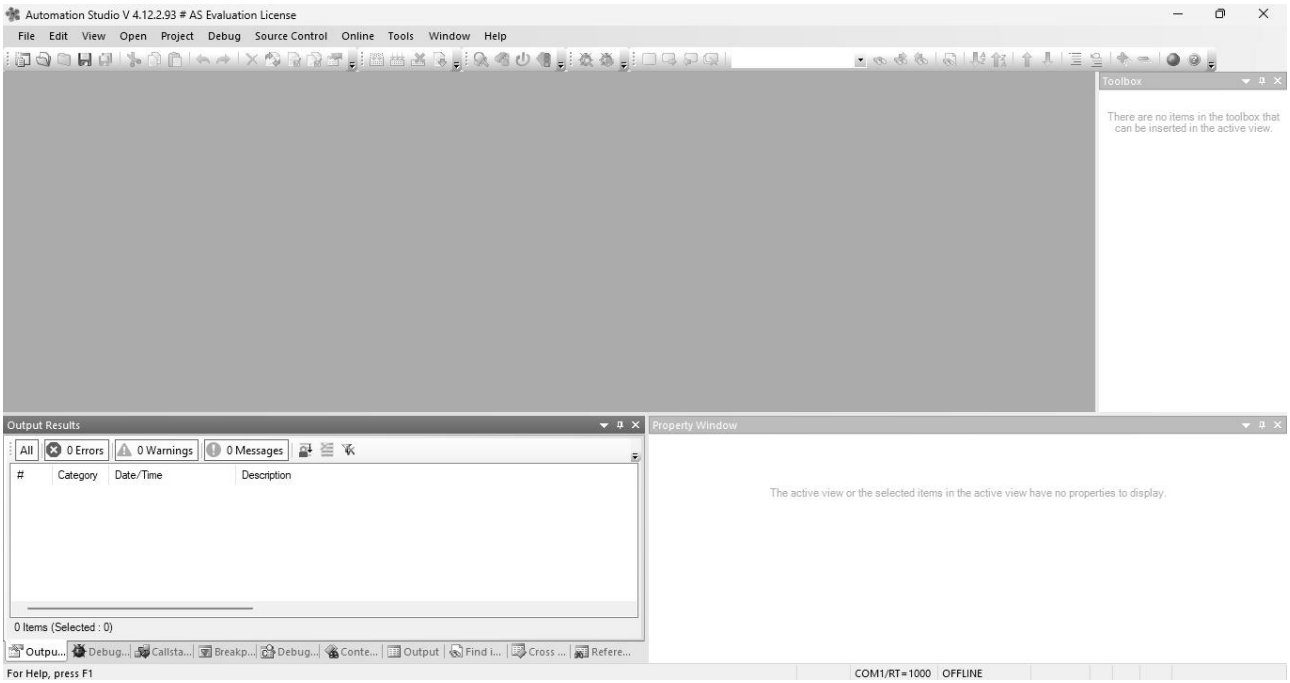




From 31.01.2023 to 07.02.2023 we completed the training which B&R Automation provided us.

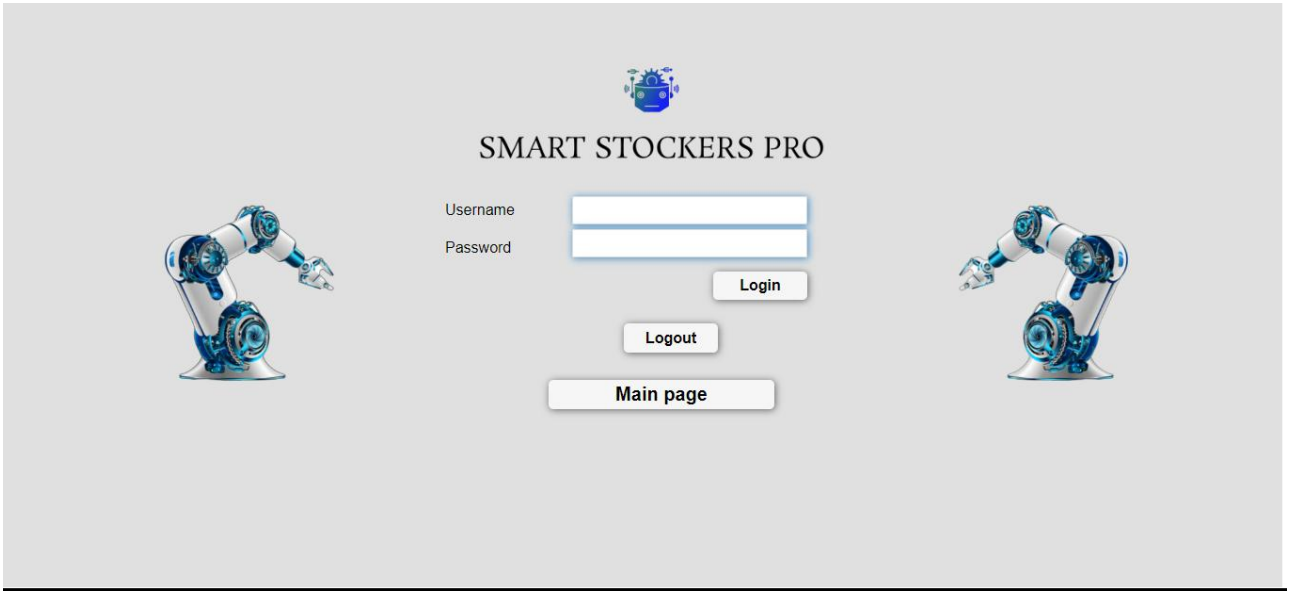
Day 1 – 08.02.2023

Attendend the Inauguration Meeting and learn how to use the Automation Studio to implement our theme to the Open Automation Challenge.



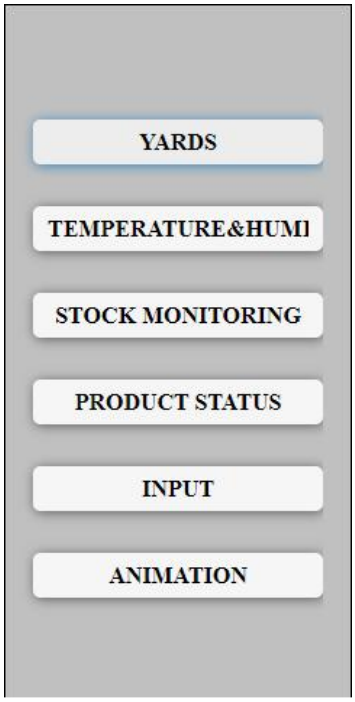
Day 2 – 09.02.2023

Implementation of HMI Layout and login page.



Day 3 – 10.02.2023

Implementation of live monitoring features in HMI Panel like yards, temperature and humidity, stock monitoring, product status.,etc, using Mappview.

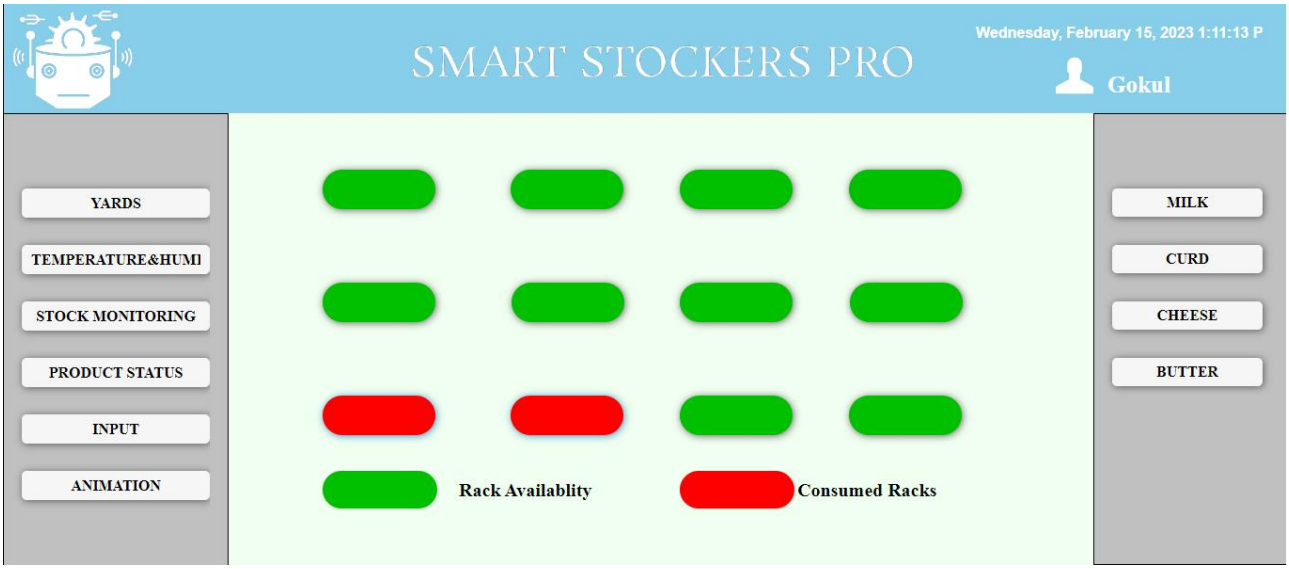


Day 4 – 11.02.2023

Implementation of structured text coding in automation Studio for the above features.

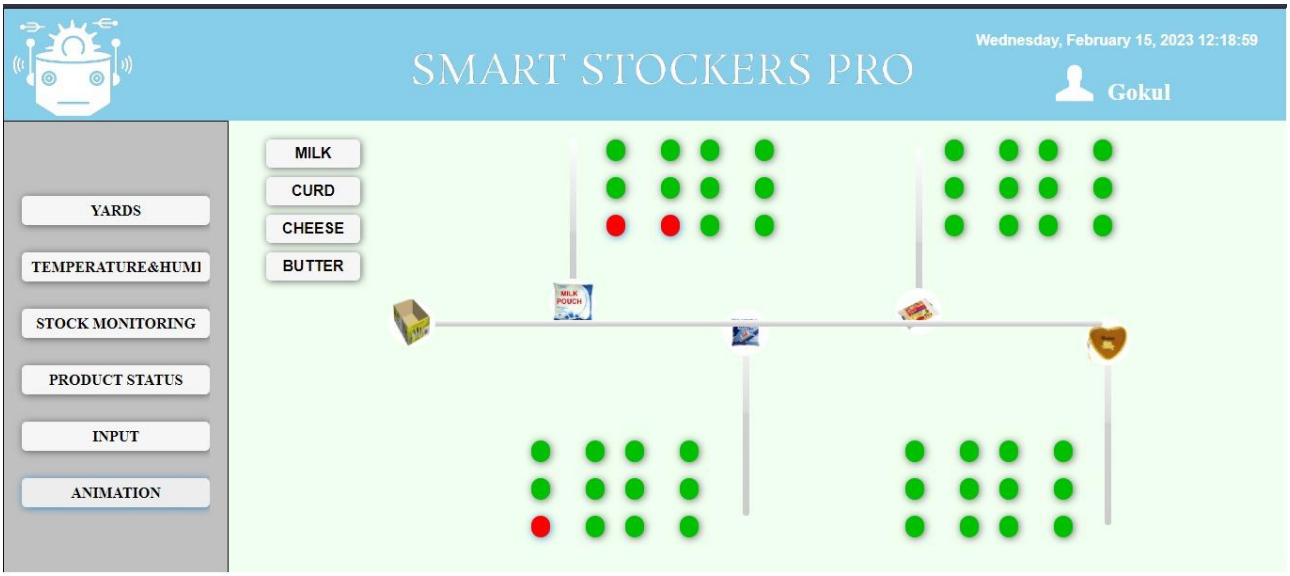
Day 5 – 12.02.2023

Degin of HMI panel with execution of above features.



Day 6 – 13.02.2023

Implementation of Animation using basic sliders.



Day 7 – 14.02.2023

Preparation of Presentation with all the contents mentioned above with our college mentor.

Day 8 – 15.02.2023

Submission of our project.

Structured Text Coding:

(TEMPERATURE AND HUMIDITY)

```
PROGRAM _INIT
MaximumTemperature := 4.6;
MinimumTemperature := 0.5;
MinimumHumidity := 50;
MaximumHumidity := 60;

END_PROGRAM

PROGRAM _CYCLIC
IF MaximumTemperature < MilkTemp THEN
TempStart := TRUE;
MilkTemp:=MilkTemp-1;
ELSIF MinimumTemperature > MilkTemp THEN
TempStart := FALSE;
MilkTemp:=MilkTemp+1;
END_IF;
IF MaximumHumidity < MilkHum THEN
HumiStart := TRUE;
MilkHum:=MilkHum-1;
ELSIF MinimumHumidity > MilkHum THEN
HumiStart := FALSE;
MilkHum:=MilkHum+1;
END_IF;

IF MaximumTemperature < CurdTem THEN
TempStart := TRUE;
CurdTem:=CurdTem-1;
ELSIF MinimumTemperature > CurdTem THEN
TempStart := FALSE;
CurdTem:=CurdTem+1;
END_IF;
IF MaximumHumidity < CurdHum THEN
HumiStart := TRUE;
CurdHum:=CurdHum-1;
ELSIF MinimumHumidity > CurdHum THEN
HumiStart := FALSE;
CurdHum:=CurdHum+1;
END_IF;

IF MaximumTemperature < CheeseTem THEN
TempStart := TRUE;
CheeseTem:=CheeseTem-1;
ELSIF MinimumTemperature > CheeseTem THEN
TempStart := FALSE;
CheeseTem:=CheeseTem+1;
END_IF;
IF MaximumHumidity < CheeseHum THEN
HumiStart := TRUE;
CheeseHum:=CheeseHum-1;
ELSIF MinimumHumidity > CheeseHum THEN
HumiStart := FALSE;
CheeseHum:=CheeseHum+1;
END_IF;

IF MaximumTemperature < ButterTem THEN
TempStart := TRUE;
ButterTem:=ButterTem-1;
ELSIF MinimumTemperature > ButterTem THEN
TempStart := FALSE;
ButterTem:=ButterTem+1;
END_IF;
IF MaximumHumidity < ButterHum THEN
HumiStart := TRUE;
ButterHum:=ButterHum-1;
ELSIF MinimumHumidity > ButterHum THEN
HumiStart := FALSE;
ButterHum:=ButterHum+1;
END_IF;

END_PROGRAM

PROGRAM _EXIT
(* Insert code here *)

END_PROGRAM
```

(PRODUCT)

```
PROGRAM _INIT
(* Insert code here *)
SUM := 12;
SUM1:=12;
SUM2:=12;
SUM3:=12;
x :=0;
END_PROGRAM

PROGRAM _CYCLIC
                                (* PRODUCT *)
(*
product1 = milk
product2 = curd
product3 = cheese
product4 = butter
*)
R_TRIG_0.CLK:= product1;
IF R_TRIG_0.Q THEN
SUM := SUM -1;
FOR i:=SUM TO 11 BY 1 DO
Bar1[i] := TRUE;
END_FOR;
END_IF;

R_TRIG_1.CLK:= product2;
IF R_TRIG_1.Q THEN
SUM1 := SUM1 -1;
FOR i:=SUM1 TO 11 BY 1 DO
Bar2[i] := TRUE;
END_FOR;
END_IF;


R_TRIG_2.CLK:= product3;
IF R_TRIG_2.Q THEN
SUM2 := SUM2 -1;
FOR i:=SUM2 TO 11 BY 1 DO
Bar3[i] := TRUE;
END_FOR;
END_IF;


R_TRIG_3.CLK:= product4;
IF R_TRIG_3.Q THEN
SUM3 := SUM3 -1;
FOR i:=SUM3 TO 11 BY 1 DO
Bar4[i] := TRUE;
END_FOR;
END_IF;

IF R_TRIG_0.Q = TRUE THEN
Sno[x] := x;
ManDate[x]:=D#2023-02-15 ;
ExpDate[x] := 'best before 3 days from the date of
Manufacturing';
name[x] := 'milk';
x := x+1;
END_IF

IF R_TRIG_1.Q = TRUE THEN
Sno[x] := x;
ManDate[x]:=D#2023-02-15 ;
ExpDate[x] := 'best before 5 days from the date of
Manufacturing';
name[x] := 'curd';
x := x+1;
END_IF

IF R_TRIG_2.Q = TRUE THEN
Sno[x] := x;
ManDate[x]:=D#2023-02-15 ;
ExpDate[x] := 'best before 6 months from the date of
Manufacturing';
name[x] := 'cheese';
x := x+1;
END_IF

IF R_TRIG_3.Q = TRUE THEN
Sno[x] := x;
ManDate[x]:=D#2023-02-15 ;
ExpDate[x] := 'best before 3 months from the date of
Manufacturing';
name[x] := 'butter';
x := x+1;
END_IF


R_TRIG_0();
R_TRIG_1();
R_TRIG_2();
R_TRIG_3();


END_PROGRAM

PROGRAM _EXIT
(* Insert code here *)

END_PROGRAM
```

(ANIMATION)

```
PROGRAM _INIT
(* Insert code here *)
i:=0;
j1:=0;
j2:=0;
j3:=0;
j4:=0;
SUM := 12;
SUM1 := 12;
SUM2 := 12;
SUM3 := 12;
END_PROGRAM

PROGRAM _CYCLIC

IF MilkAni = TRUE THEN
IF i <= 25 THEN
i:=i+1;
END_IF
IF i >= 25 THEN
j1:=j1+2;
END_IF
IF j1 = 100 THEN
MilkAni := FALSE;
i:=0;
j1:=0;
SUM := SUM -1;
Bar1[SUM] := TRUE;
END_IF;

END_IF


IF CurdAni = TRUE THEN
IF i <= 50 THEN
i:=i+1;
END_IF
IF i >= 50 THEN
j2:=j2+2;
END_IF
IF j2 = 100 THEN
CurdAni := FALSE;
i:=0;
j2:=0;
SUM1 := SUM1 -1;
Bar2[SUM1] := TRUE;
END_IF
END_IF


IF CheeseAni = TRUE THEN
IF i <= 75 THEN
i:=i+1;
END_IF
IF i >= 75 THEN
j3:=j3+2;
END_IF
IF j3 = 100 THEN
CheeseAni := FALSE;
i:=0;
j3:=0;
SUM2 := SUM2 -1;
Bar3[SUM2] := TRUE;
END_IF
END_IF

IF ButterAni = TRUE THEN
IF i <= 100 THEN
i:=i+1;
END_IF
IF i >= 100 THEN
j4:=j4+2;
END_IF
IF j4 = 100 THEN
ButterAni := FALSE;
i:=0;
j4:=0;
SUM3 := SUM3 -1;
Bar4[SUM3] := TRUE;
END_IF
END_IF

R_TRIG_0();
END_PROGRAM

PROGRAM _EXIT
(* Insert code here *)

END_PROGRAM
```