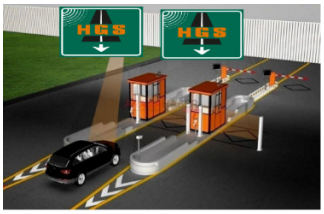
# LAB 4 – HGS Toll LAD Design

- Lab 4 will be done as a **group**.
  - **Design of HGS Toll LAD Code (Midterm Question #4) (5%)**
    - You need to submit 1 .zip file per group
      - .sta and .stu (includes your LAD Code and Animation Table) (.zip)
      - No report or .pdf required
      - No HMI required

## HGS Toll LAD Design (5%) (Midterm Question #4 – Advanced)



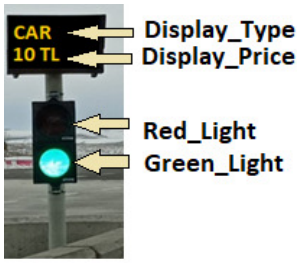

- Start a New Project and Pick: BME P58 3020 & BME XBP 0800
- Functional video of HGS Toll is available on LMS

Inputs:

- Vehicle_Detected (EBool)
- HGS_Type (Int)
- Gate_Fully_Up (EBool) (Sensor)
- Gate_Fully_Down (EBool) (Sensor)
- System_Activate (Mom. Push Button – EBool)
- System_Stop (Momentary Push Buttn – EBool)

Outputs:

- Gate_Motor_Open (EBool)
- Gate_Motor_Close (EBool)
- Toll_Open_Sign (EBool) (LED)
- Toll_Closed_Sign (EBool) (LED)
- Display_Type (String)
- Display_Price (String)
- Green_Light (EBool) (LED)
- Red_Light (EBool) (LED)
- Car_Count (Int)
- Truck_Count (Int)




Functionality:

- Upon power-up, the HGS Toll is de-activated
- When System_Activate button is pressed momentarily, HGS Toll is activated, which consists of:
  - Toll_Open_Sign is ON
  - Toll_Closed_Sign is OFF
  - Green_Light is OFF
  - Red_Light is ON
  - Car_Count set to zero
  - Truck_Count set to zero
  - Gate is closed until fully down
- **When System Is Active:**
  - If vehicle approaches the toll, Vehicle_Detected becomes a 1 otherwise it is 0.
  - When a vehicle is not detected:
    - Gate is closed until fully closed
    - Red_Light in ON
    - Green_Light is OFF
  - When a vehicle is detected:
    - HGS_type is automatically read by the system, and is available as:
      - HGS_type = 0 (No HGS Detected)
      - HGS_type = 1 (Car)
      - HGS_type = 2 (Truck)
  - **If no HGS is detected**
    - Gate remains closed

        - Red_Light is ON
        - Green_Light is OFF

    - **<u>If vehicle has a HGS</u>**
        - Gate is opened until fully open
            - Use Gate_Motor_Open and Gate_Fully_Up
        - Red_Light is OFF
        - Green_Light is ON
        - Display_Type and Display_Price are updated accordingly (Use COMP to figure out vehicle type):
            - If a car is detected:
                - Display_Type should say "CAR"
                - Display_Price should say "19TL"
            - If a truck is detected:
                - Display_Type should say "TRUCK"
                - Display_Price should say "38TL"
        - Car_Count is incremented if the vehicle is a car
        - Truck_Count is incremented if the vehicle is a truck
        - Use CTU for Car_Count and Truck_Count
- When System_Stop button is pressed momentarily, <u>HGS Toll is de-activated</u>, which consists of:
    - Toll_Open_Sign is OFF
    - Toll_Closed_Sign is ON
    - Green_Light is OFF
    - Red_Light is OFF
    - Gate is closed until fully closed

- Feel free to introduce your own variables upon need
- **<u>Include an Animation Table with all System Input & Outputs</u>**

## <u>For this part - Hand In Your code (all in a .zip file):</u>

- Your code (.sta /.stu) files