Smart Parking Project

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USER STORY:

Design and Development a parking System for vehicles
has Features of:

- You can enter it using specific IDs read by a QR code reader.
- IDs are Set By the System Admin.
- LCD to tell the user to show his ID to The QR Reader.
- Green and Red Leds to indicate the Validation of the entered ID.
- Big 7 segment to Show how many available Slots.
- An Enter Gate Controlled by Servo motor open if the User enter a valid ID.
- for Safety there is PIR sensor near to the Gate which will not close until the PIR Sensor make Sure that the car has completely passed.
- At The Exit Gate there is PIR Sensor to Sense there is car want to exit the Exit Gate open and Close if PIR make Sure that the car has completely passed.

PROJECT DESCRIPTION:

System Consist of three ECUs based on ARM Architecture (STM32F103c6)

1- First ECU (ECU1) was Developed to Control Admin system

- Admin System is responsible for setting the valid IDs Which can Enter the Parking.
- ECU is Connect to LCD and Keypad to Make the Admin be able to Set the IDs.
- Also the ECU is Responsible for Checking the validation of the Entered ID.
- Turning on Green or Red Leds which indicate about the validation of the entered ID.
- Send The Enter Gate state Command Based on ID Checking to ECU2.

2- Second ECU (ECU2) was Developed to Control the Gates

- Communicate with ECU1 By UART Communication Protocol To Received The Command (Open or Close)of the Enter Gate.
- Control the Enter gate based on the Received Command From the ECU1 after ID Checking.

- If the Command is 'O' which mean Open the Gate the ECU open the Gate and read the PIR Sensor which be at the Enter Gate to Close the Gate when Make Sure that the Car Passed.
- Also The ECU count the Number of Available Slots to be Displayed on 7 Segment put at the Gate.
- About the Exit Gate the ECU connected with PIR Sensor When it Detect there is Car want to Exit from Parking it will Open the Gate Automatically.
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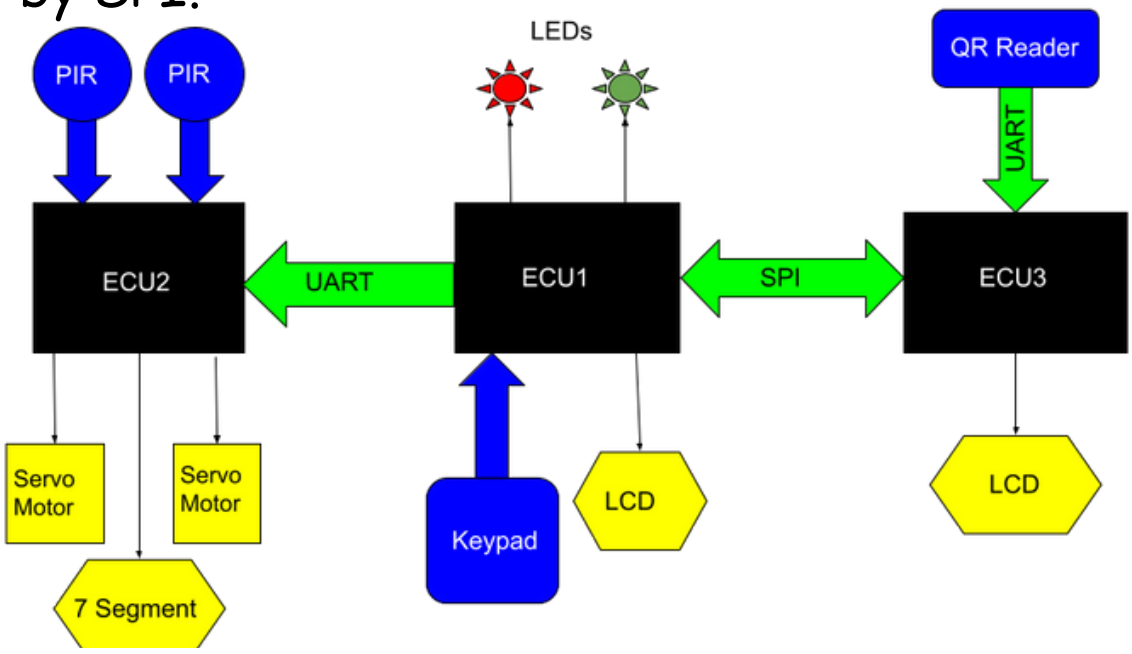
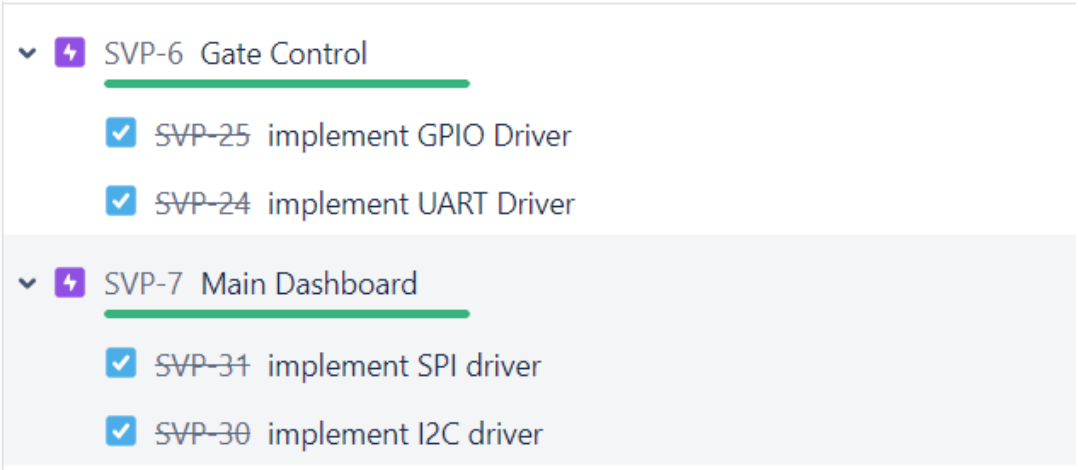
3- Third ECU (ECU3) was Developed to Communicate with the User

- The ECU is Connected to LCD Which Display words to User Like welcome Words and To tell him To Enter his ID.
- The ECU take the ID from User by QR code Reader Communicate with it by UART.
- Then Send the ID to ECU1 which Communicate with it by SPI.



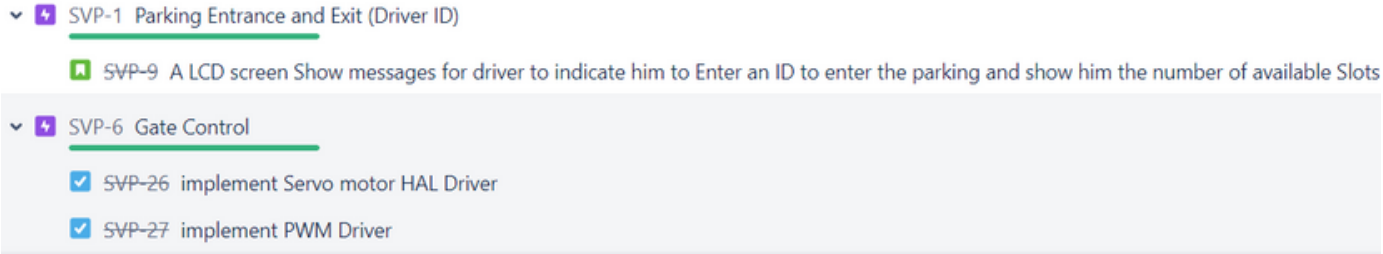
AGILE SCRUM RELEASES

Release1



Release1.1

Release1.2



- SVP-7 Main Dashboard
  - ~~SVP-28~~ Implement Keypad driver
  - ~~SVP-29~~ implement LCD driver
- SVP-8 Testing
  - ~~SVP-33~~ Test LCD / Keypad HAL driver
  - ~~SVP-36~~ Test PWM / Servo motor Driver

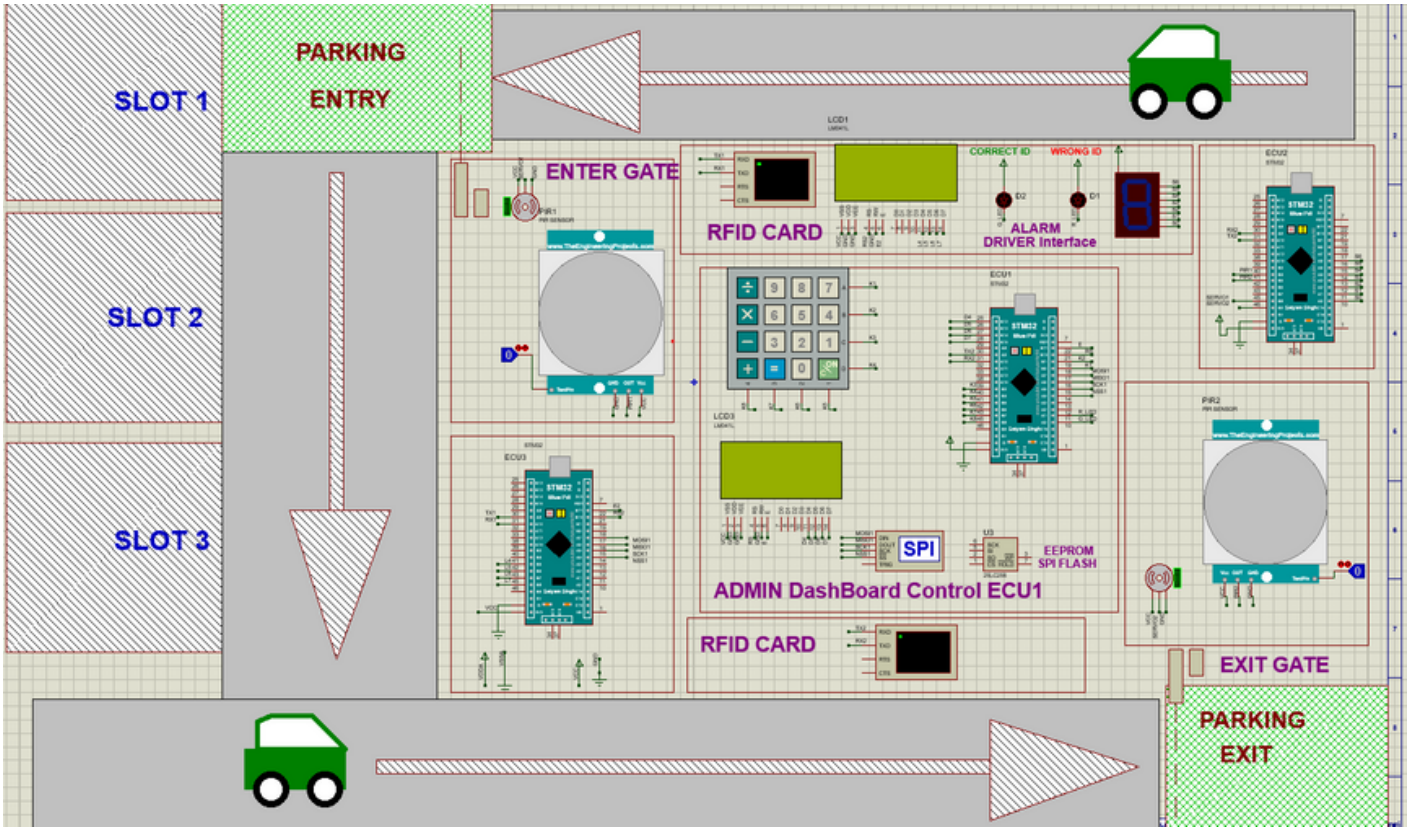
Release2

- SVP-1 Parking Entrance and Exit (Driver ID)
  - ~~SVP-9~~ A LCD screen Show messages for driver to indicate him to Enter an ID to enter the parking and show him the number of available Slots
  - ~~SVP-11~~ Open the Gate if the Driver entre the valid ID
- SVP-2 Parking Entrance (Available Slots)
  - ~~SVP-17~~ Show on 7 segment the available Number of Slots
- SVP-3 Parking Entrance (Alarm)
  - ~~SVP-15~~ Green and Red LEDs indicate the ID validation
- SVP-5 Admin Control
  - ~~SVP-21~~ The Admin manage the IDs for Clients

Release3

- SVP-8 Testing
  - ~~SVP-39~~ Test Admin control System
  - ~~SVP-37~~ Test Interfacing between MCUs
  - ~~SVP-38~~ Test The all project after integration

HARDWARE DESIGN



Simulation Link:
https://drive.google.com/drive/folders/1yevIup0NM9SU5S6gC43kUXZtqyWPmv_Z

GitHub Link:
https://github.com/MohamedBadr552002/Embedded-Systems/tree/main/Projects/Secondterm