CHAPTER FOUR

PARKING AVAILABILITY AND GATE CONTROL SYSTEM IMPLEMENTATION AND HMI SOFTWARE

4.1 Parking availability and gate control system implementation

Parking availability and gate control system model using programmable logic controller SIMATICS7-300 implementation the system designed for model. In addition to that it is used to HMI software to show the parking status.

4.1.1 Parking and gate control system hardware implementation

Parking and gate control system hardware implementation consist of:

4.1.1.1 Entrance gate implementation

Entrance gate implemented by three components installed in wooden board as shown in figure (4.1), first one proximity switch LJ12A3-4-Z/BY, second green led indicator represented entrance gate opened, third red led indicator represented entrance gate closed.

4.1.1.2 Exit gate implementation

Entrance gate implemented by three components installed in wooden board as shown in figure (4.1), first one proximity switch LJ12A3-4-Z/BY, second green led indicator represented exit gate opened, third red led indicator represented exit gate closed.

4.1.1.3 Parking structure implementation

Parking structure implemented by two components type installed two floors in wooden board as shown in figure (4.1), first one 6 led indicator, 6 limit switches distributed on two floors.
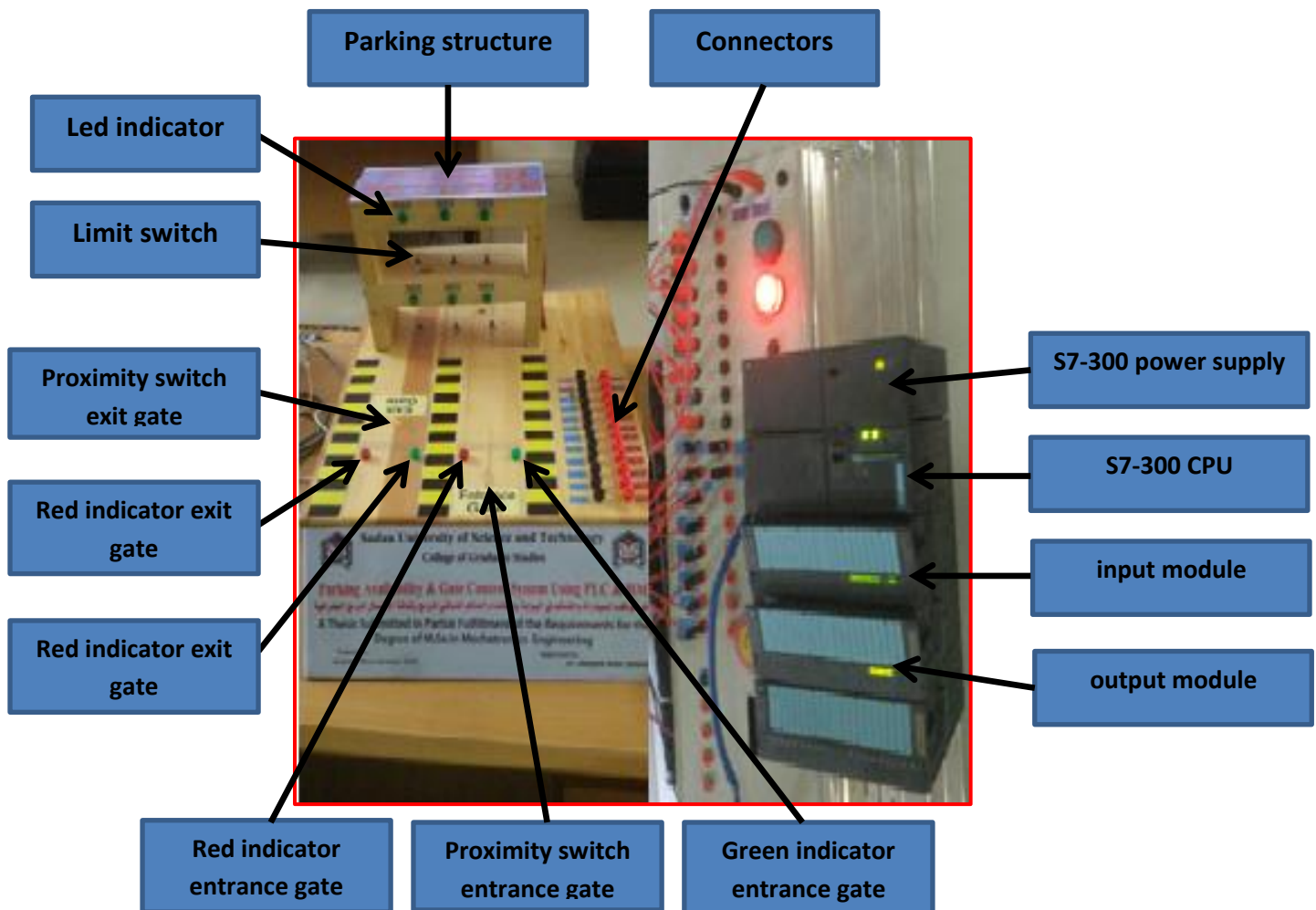
Figure (4.1): Parking structure implementation

4.2 HMI software

Parking availability and gate control system model using HMI to monitor the system and guide the driver by showing status of barking. HMI WinCC flexible 2008 software screen consist of four main blocks.

4.2.1 System status

This block consists of two main push button is start and stop as a following:

4.2.1.1 Start pushbutton

When is pressed the start pushbutton the running green indicator lamp is illuminated to indicate system at running mode and entrance and exit red indicator lamps are light to indicate the gates are closed as show in picture (4.2).
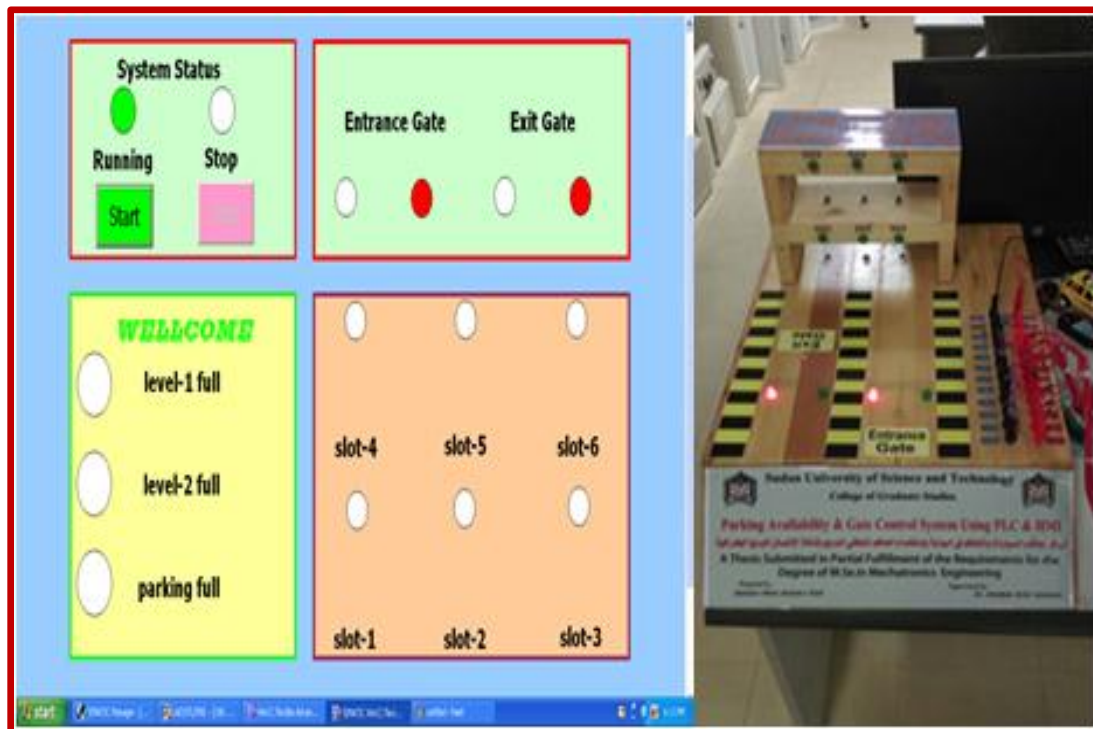
Picture (4.2): Start pushbutton at stop mode

4.2.1.2 Stop pushbutton

When is pressed the stop pushbutton the stop green indicator lamp is illuminated to indicate system at stop mode. Stop pushbutton represented emergency stop as show in picture (4.3).
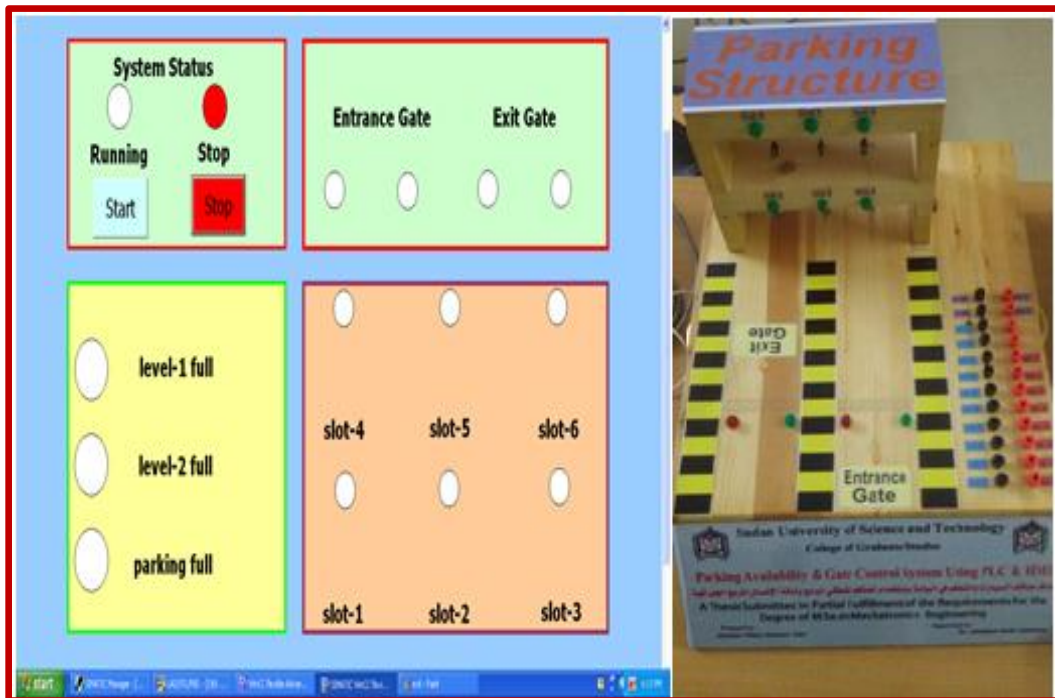
Picture (4.3): Stop pushbutton at running mode

4.2.2 Entrance and exit gate

When a car is enters the entrance proximity switch sense it and a bears in HMI screen that entrance gate green indicator lamp is illuminated to in dictate the gate it is opened as shown in picture (4.4) and when a car is moved it is a bears in HMI screen that exit gate red indicator lamp is illuminated to in dictate the gate it is closed as shown in picture (4.11).
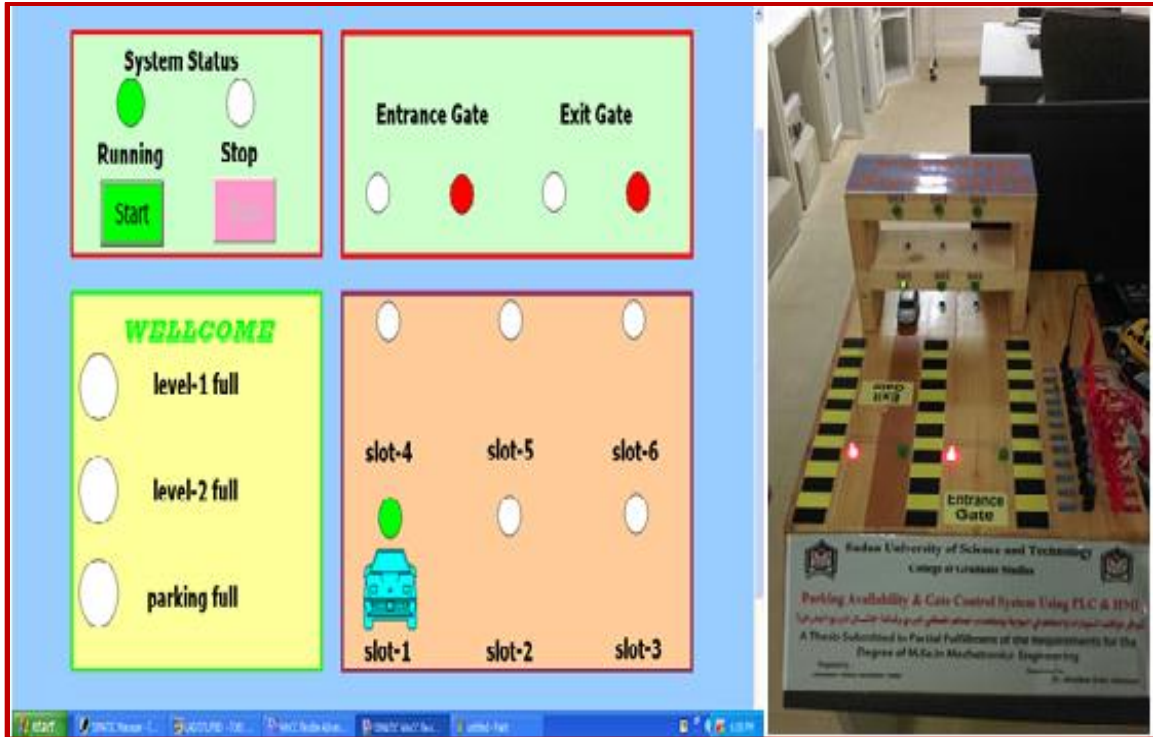
Picture (4.4): Entrance and exit gate

4.2.3 Slot status and parking levels

When a car parks in any slots in implemented mode it is a bears in HMI screen that green indicator lamp is illuminated according to the car where it is which slots.

4.2.3.1 Slot-1 and parking levels

When a car parks in slots-1 in implemented mode it's a bears in HMI screen that a car is located in the slot-1 and green indicator lamp is illuminated as show in picture (4.5). In this situation all levels lamps aren't illuminated and welcome message appear because of the parking slots are unoccupied.
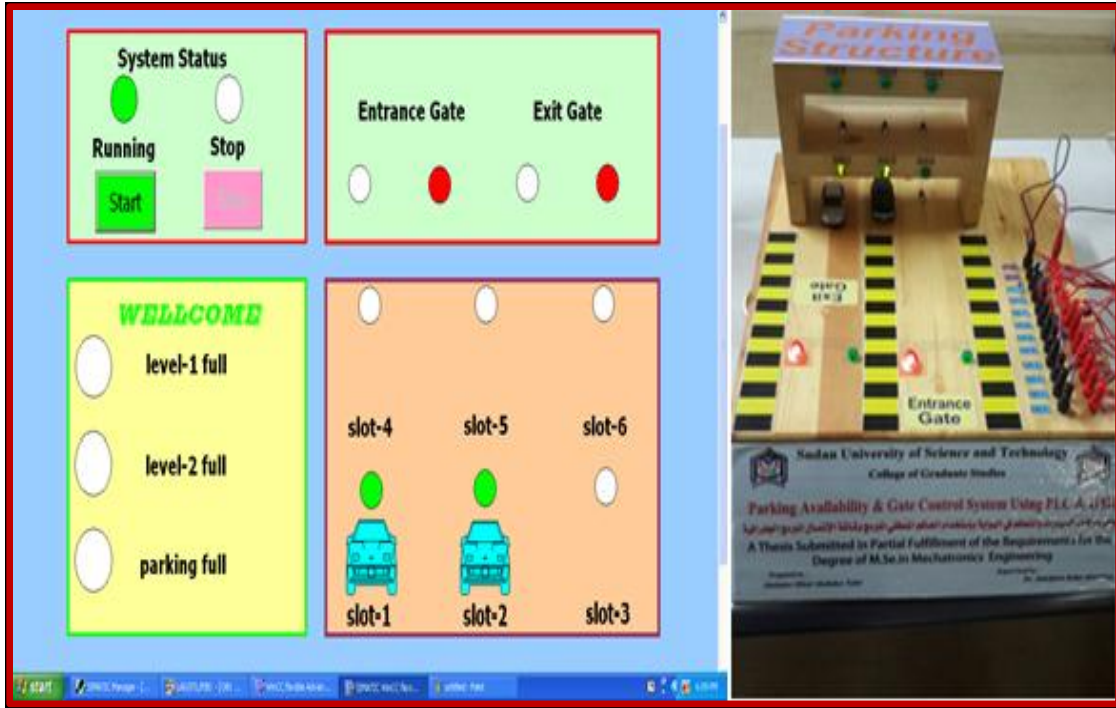
Picture (4.5): Slot-1 and parking levels

4.2.3.2 Slot-2 and parking levels

When a car parks in slots-2 in implemented mode it's a bears in HMI screen that a green car is located in the slot-2 and green indicator lamp is illuminated as show in picture (4.6). In this situation all levels lamps aren't illuminated and welcome message appears because of the parking slots are unoccupied.

Figure (4.6): Slot-2 and parking levels

4.2.3.3 Slot-3 and parking levels

When a car park in slots-3 in implemented mode it a bears in HMI screen that a green car is located in the slot-3 and green indicator lamp is illuminated as show in picture (4.7). In this situation red lamps level-1full is illuminated and welcome message appears because some parking slots are unoccupied but level-2 full and parking full red lamps aren't illuminated because of slots-4, slots-5 and slots-6 are unoccupied.
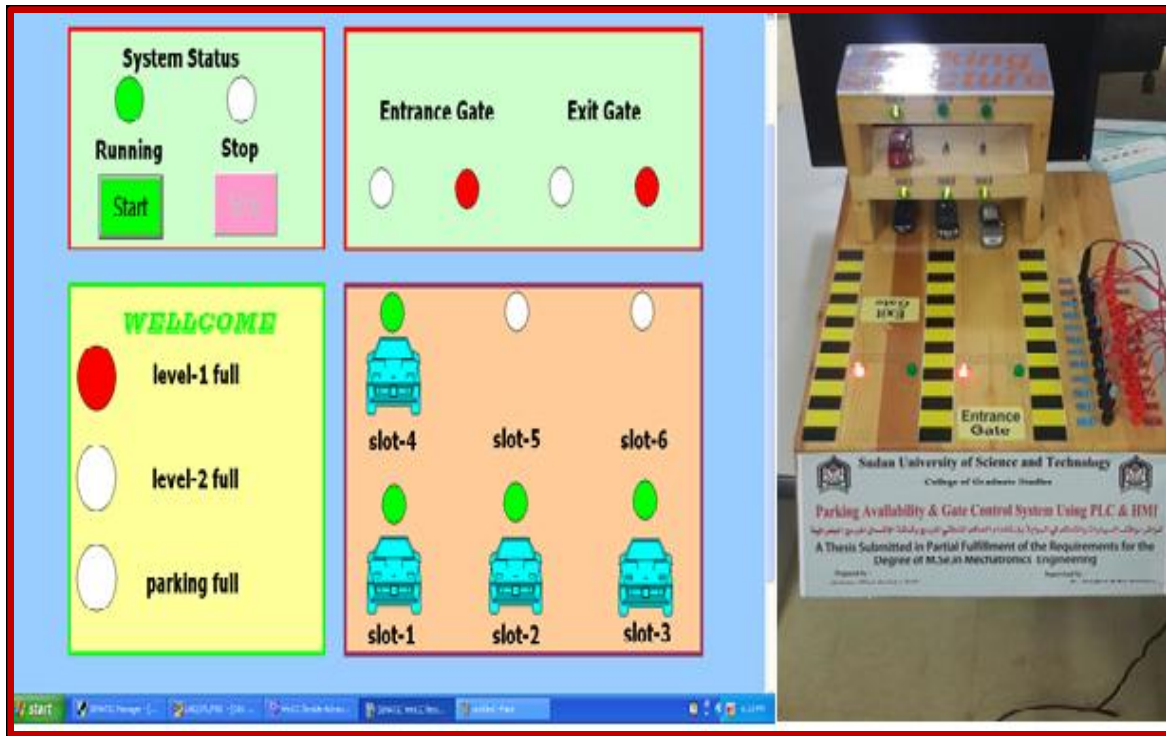
Picture (4.7): Slot-3 and parking levels

4.2.3.4 Slot-4 and parking levels

When a car parks in slots-4 in implemented mode it a bears in HMI screen that a green car is located in the slot-4 and green indicator lamp is illuminated as show in figure (4.8). In this situation red lamps level-1 full is illuminated and welcome message appear because some parking slots are unoccupied but level-2 full and parking full red lamps aren't illuminated because slots-5, slots-6 are unoccupied.
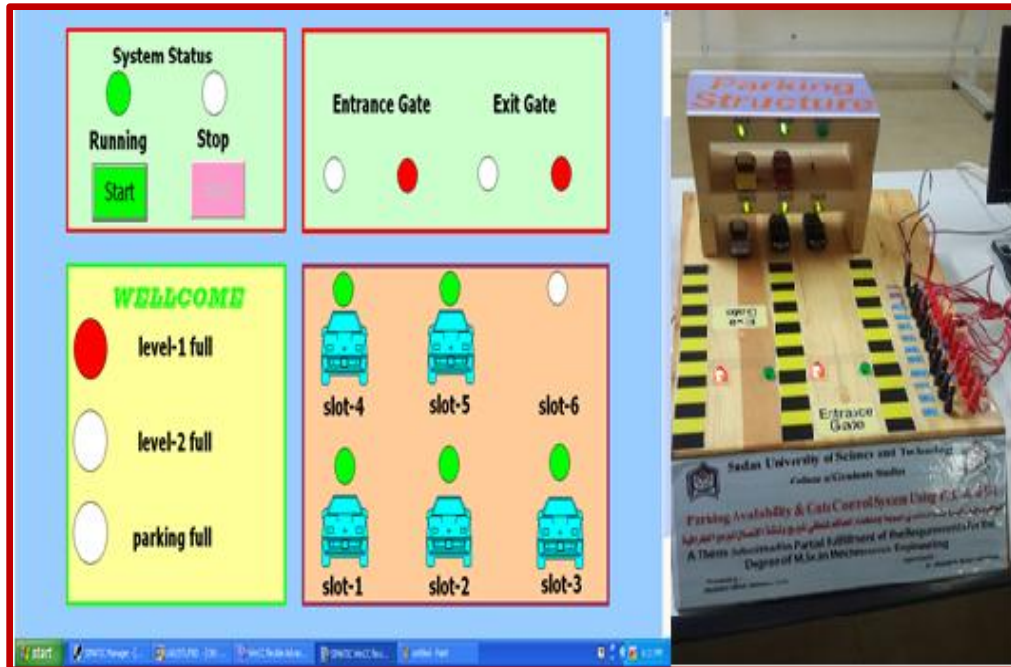
Picture (4.8): Slot-4 and parking levels

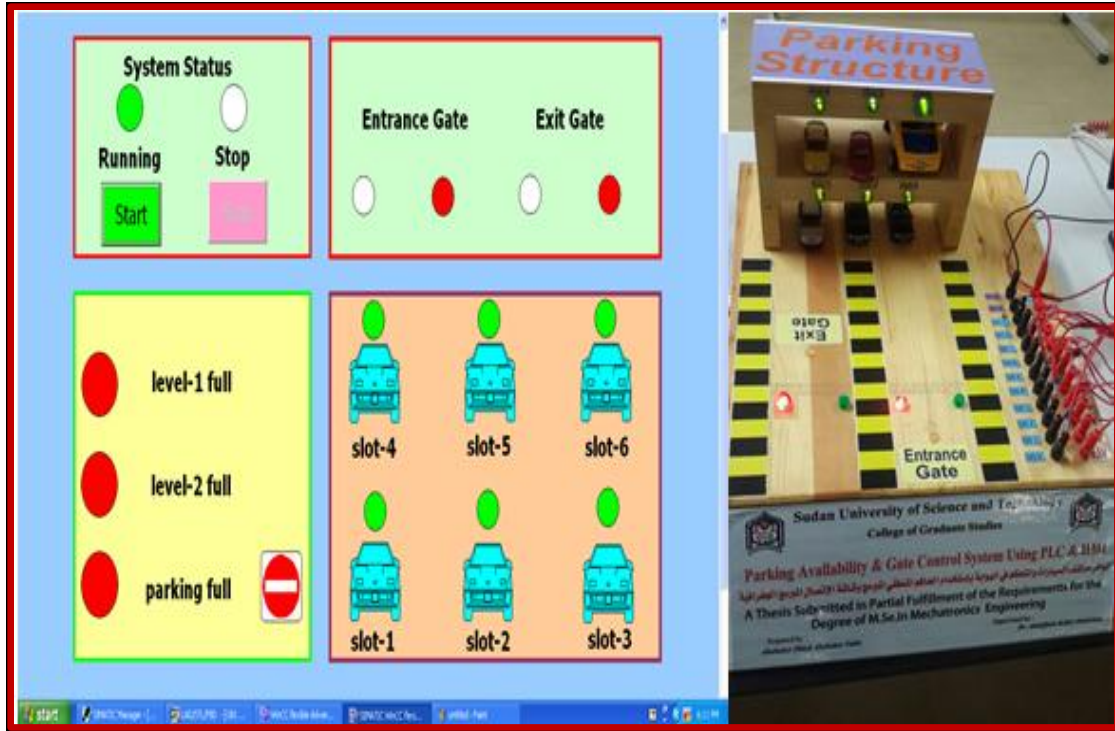### 4.2.3.5 Slot-5 and parking levels

When a car parks in slots-5 in implemented mode it a bears in HMI screen that a green car is located in the slot-5 and green indicator lamp is illuminated as show in figure (4.9). In this situation red lamps level-1 full is illuminated and welcome message appear because some parking slots are unoccupied but level-2 full and parking full red lamps aren't illuminated because slots-6 is unoccupied.

Picture (4.9): Slot-5 and parking levels

4.2.3.6 Slot-6 and parking levels

When a car parks in slots-6 in implemented mode it's a bears in HMI screen that a green car is located in the slot-6 and green indicator lamp is illuminated as show in figure (4.10).In this situation red lamps level-1 full, level-2 full and parking full red lamps are illuminated and welcome message is not appear because all parking slots are occupied.

Picture (4.10): Slot-6 and parking levels

4.2.3.7 Slot-6, parking levels and exit gate

When a car leaves a park in slots-6 in implemented mode it a bears in HMI screen that a green car is disappeared in the slot-6 and green indicator lamp isn't illuminated as show in figure (4.11).In this situation red lamps level-2 full and parking full aren't illuminated and welcome message is appear because slots-6 parking is unoccupied. Exit gate green indicator lamp is illuminated to in dictate the gate it opened.

Figure (4.11): Slot-6, parking levels and exit gate