1. **Functional Requirement**

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| **ID** | **Functional Requirement** | **Description** |
| FR-01 | Reserve parking slots | System shall allow drivers to reserve parking slots. |
| FR-02 | Manage parking facilities | System shall allow operators to manage parking facilities. |
| FR-03 | Control an entry gate | System can open/close an entry gate. |
| FR-04 | Detect cars in entry gate | System shall detect when cars arrive at the entry gate. |
| FR-05 | Serve different Reservation method | System will get the reservation via mobile app, laptop and desktop app. |
| FR-06 | Look up available parking space | System enable drivers look up if there are parking space available |
| FR-07 | Get reservation info. | System will get the reservation info. car plate number, day and time to park, payment info(credit card) |
| FR-08 | Return confirmation info. | System will return the confirmation info (reservation id) after making reservation. |
| FR-09 | Issue parking space id | System shall issue the parking space identifier. |
| FR-10 | Lift an entry gate | System shall lift the entry gate. |
| FR-11 | Manage reservation | System allows grace-period and release parking slot if the customer doesn’t show up within the grace period. |
| FR-12 | Configure grace-period | System should allow configuring the grace-period. |
| FR-13 | Manage no-show customer | System shall manage the no-show customers to prohibit their next reservation opportunity. |
| FR-14 | charge | System shall charge on their credit card for the duration of their stay. |
| FR-15 | Provide continual status | System will provide continual status to the parking attendant.   * Which parking spots are open and which are occupied. * How long a care has occupied a particular parking spot. |
| FR-16 | Reallocate parking space | System shall notify attendant that someone parked in a spot other than the one assigned and reallocate the parking space. |
| FR-17 | Detect wrong parking | System will detect the wrong parking such as cross the line, occupying two parking spaces. |
| FR-18 | Indicate wrong parking | System will provide a visual indicator (blinking LED) at parking spot when a car crosses the line. |
| FR-19 | Notify wrong parking | System will notify parking attendant after two minutes. |
| FR-20 | Serve basic statistics | System shall serve such a basic statistics for owner and can add more statistics.   * Average occupancy, peak usage hour, parking slot statistics. |
| FR-21 | Be secured | System should be secured   * Prevent unauthorized users * Only allow owner to view facility data. |
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1. **Use Case Scenario**

**2.1) FR-01**

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| --- | --- |
| **ID: FR-01** | **Description** |
| **Title** |  |
| **General description** |  |
| **Entities involved** |  |
| **Preconditions** |  |
| **Primary use case flow of events** |  |
| **Post-conditions** |  |
| **Alternate use case** |  |

1. **Quality Attribute**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ID** | **Quality Attribute** | **Priority** | **Description** | **Stakeholder(s)** |
| QA-01 | modifiability |  | The system shell add more component(sensors, LEDs, gate servos) and use multiple controllers to accommodate a larger facility. | Owner, developer |
| QA-02 | availability |  | Each H/W parts work correctly. For example, if LED doesn't blink when a car parked incorrectly, it can cause increasing operating cost. | Owner, Attendant, developer |
| QA-03 | Security |  | The system should prevent unauthorized users from accessing information such as reservation, credit card, and so forth. | All stakeholders |
| QA-04 | scalability |  | The system is able to scale out to other parking facilities including large and small parking lots and garages. The size of parking facilities will vary from parking lots with 5 parking places, to multilevel parking garages with 500 or more parking spaces. | Owner, Developer |
| QA-05 | modifiability |  | The system should be extensible to enable developers to add more analysis algorithms or analysis applications without disrupting operation to add the new features. | Owner, Developer |
| QA-06 | performance |  | Drivers will be able to determine if there are parking spaces available in a garage and reserve a spot. | Owner, attendant, developer |
| QA-07 | performance |  | The owner would like to have basic statistics on facility usage to include average occupancy, peak usage hours, parking slot statistics and revenue. |  |

1. **Quality Attribute Scenario**

**4.1) QA-01**

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| --- | --- |
| **Title** |  |
| **ID** | QA-01 |
| **Quality Attribute** | Modifiability |
| **Scenario** |  |
| **Source of stimulus** |  |
| **Stimulus** |  |
| **Artifact** |  |
| **Environment** |  |
| **Response** |  |
| **Response measure** |  |

1. **Quality Attribute Utility**

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| --- | --- | --- | --- | --- |
| **ID** | **Quality Attribute** | **Description** | **Difficulty** | **Priority** |
|  |  |  | Difficult | High |
|  |  |  | Challenging | Medium |
|  |  |  | Easy | Low |
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1. **Business Constraint**

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| **ID** | **Business Constraint** | **Description** |
| BC-01 | Reducing complain | GTPS wants to reduce driver frustration when customers find an available parking slots and reserve them. |
| BC-02 | Increasing profits | More efficiently utilize the space in the parking facilities. |
| BC-03 | Reducing liabilities | Reduce traffic congestion and the chance for accidents inside the parking facilities. |
| BC-04 | Reducing operating costs | More efficiently utilize personnel and reduce the number of employee. |
| BC-05 | Applying other garage | GTPS would like to market the system to other garage owners around the world. |
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1. **Technical Constraint**

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| **ID** | **Technical Constraint** | **Description** |
| TC-01 | H/W System | Wi-Fi enabled Arduino(mega 2560)  - Flash Memory: 256KB of which 8KB used by bootloader  - SRAM: 8KB  - EEPROM: 4KB  - Clock Speed: 16MHz |
| TC-02 | Programming language | For development Arduino: C/C++  For server and application: Java |
| TC-03 | Network | Wi-Fi |
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**Q&A**

1. The document says, the system will return confirmation information when a driver reserve parking space. And system also give a driver "parking space identifier" when a driver show up an entry gate after reservation. "confirmation information" and "parking space information" can be same? Or it's just our decision?