

# Cretaceous Gardens Controller

## *Software Requirements Specification*

*SRS Version 1.0*

Team #3

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**CS 460 Software Engineering**

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# 1 Introduction

The purpose of this document is to *specify* the requirements for the development of the Cretaceous Gardens Controller (CGC). The specification is formalized and diagrammed in order to guide the eventual implementation of the system. Information encountered in the corresponding *Requirements Definition Document* is reiterated and restated here where relevant.

After this introduction <sup>1</sup>, Section 2 gives an overview of the system. Section 3 delves into more detail with subsections 3.2 and 3.1 that feature a more granular view of the *Control Logic* and the *External Interfaces*. Section 6 provides the definition of technical terms that will be commonly used.

## 2 General Description

*This section <sup>2</sup> provides a general overview of the whole system. How the system interacts with the hardware interfaces and its basic functionality are introduced here. A description of parts to be used in the system and the available functionalities for each type are also provided. Some high level constraints and assumptions for the system will be also be presented. It should be noted that a more detailed specification of constraints is covered in its own section.*

### 2.1 Product Perspective

The CGC system as a whole is made up of many smaller subsystems. These systems include cars, T-Rex Monitor, GPS Server, Pay Kiosk, etc. These are clearly defined later in this document primarily in the interfaces section. The CGC is the system that can communicate with everything. The analogy can be used that the CGC is the central nervous system of the entire CGC system. most of the sub-systems will work independent of each other. This is by design. ever system should be able to perform their duties without being affected by the state of another system unless two subsystems are directly interacting. The CGC will get informed that an emergency mode should be triggered from the Electric Fence sub-system. It is the responsibility of the

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<sup>1</sup>Introduction by Ezequiel Ramos

<sup>2</sup>General Description by Siri Khalsa

CGC to inform all other sub-systems that we are now in an emergency mode. It is also up to the CGC with the help of an employee to reset everything back into a normal mode of operation.

## 2.2 Product Functions

The system needs to be maintainable and the redundancy is a central design decision. The CGC itself should be installed on two separate pieces of hardware. Ideally this hardware is located in different physical locations. The secondary location should be located not on the island. This is the recommendation but is not required. The CGC understand the health and status of every subsystem. With the help of human intervention, all components can be maintained. an example is that the cars can report of their health. If one goes down for whatever reason, the CGC already understand this and helps communicate this information to an employee. The system will automatically deploy a new car (Redundant) to help mitigate the problem while the employees work on permanently fixing the broken car. All sub-systems will have this capability.

The product will focus on safety. Every decision that is made leads to the safest possible outcome for the visitors and employees. The system is redundant for safety. There are emergency protocols built into every subsystem to guarantee the safest experience possible for all that interact with the CGC system

The product will push the limits on the latest technology. The entire system is close to being fully autonomous. The product should feel futuristic and high end. This is a feature designed throughout the components.

## 2.3 User Features

One user feature is the ability to monitor then entire network of nodes as a whole from the CGC Station. The CGC station is a primary interface for employees. It allows employees to help control the system.

Another feature also available to employees is the ability to interact with the financial aspects of the entire system. This is again performed at the CGC Station where there is a direct connection to the data collected by the CGC System.

A huge feature of the system is the autonomous behavior of most of the CGC system. The cars pretty much function on their own and most of the other systems do as well. This is a technological advancement that increases the user experience, both visitor and an employee.

## 2.4 Assumptions

We assume that the infrastructure is all redundant. The CGC is installed on redundant servers. The network backbone has physical redundant links to appropriate devices like the cameras, the PA speakers, and the electric fence. We will also program redundancy into the logic. Like the ability to have another car available in case of an emergency or if the car breaks down.

Another assumption is that messages would be encrypted in order to provide the security needed, so the messages can not be intercepted and modified.

## 3 Specific Requirements

### *Section Introduction*

### 3.1 External Interfaces

*The External Interfaces<sup>3</sup> make up all the pieces that the CGC communicates with. The CGC itself must communicate with everything, but a lot of interfaces can function on their own. The car interface is an example of one that needs to be able to function on it's own.*

#### Pay Kiosk

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<sup>3</sup>External Interfaces by Anas Gauba

*The Pay Kiosk interface triggers events in situations where the visitor interaction is required.*

### **Incoming Events**

1. Register visitor(demographics)/request money.
2. Accept money(type)/build token.

### **Outgoing Events**

1. Activate token(id).
2. Dispense token(id).
3. Dispense change(money, receipt).
4. Log transaction.
5. Report health status to CGC.

## **Token**

*The events that the Token interface triggers are specifically related to locate the visitor.*

### **Incoming Events**

1. Trigger Alarm.
2. Return to car(carID).

### **Outgoing Events**

1. Report location to GPS Server(gpsID).

## **Car**

*The Car interface triggers events in situations where the visitor interacts with the car as well as the internal sensors that the car is communicating with.*

### Incoming Events

1. Read token(tokenID)/Unlock doors or deny access.
2. Activate car()[Normal Mode]/Go to south end to pick up visitors.
3. Activate car()[Emergency Mode]/Go to north end to pick up visitors.
4. Arrived(Destination)[Normal Mode]/pick up or drop off visitors following the conditioned the protocol.
5. Arrived(Destination)[Emergency Mode]/pick up or drop off visitors following the conditioned the protocol.
6. Weight detected.
7. Change driving mode(modeName).
8. Activate intercom.

### Outgoing Events

1. The GPS current location(id).
2. Alert visitors(carID).
3. Trigger alarm.
4. Report health status to CGC.

## T-Rex Monitor

*The T-Rex Monitor interface triggers events in situations where the actions of T Rex can be monitored appropriately.*

### Incoming Events

1. Inject tranquilizer.

### Outgoing Events

1. Report T-Rex health.
2. Report health status to CGC.
3. Report location to GPS Server(gpsID).

### Camera Network

*The Camera Network interface triggers events in situations where each specific cameras operations can be easily monitored.*

#### Incoming Events

1. Delete recording(cameraID, date range).
2. Activate recording(cameraID).
3. Monitor streaming(cameraID).

#### Outgoing Events

1. Camera outage(cameraID).
2. Report health status to CGC.

### Electric Fence

*The Electric Fence interface triggers events in the case of any possible distortion in the panels.*

#### Incoming Events

1. Null.

#### Outgoing Events

1. Electricity distortion/trigger an emergency mode.
2. Report health status to CGC.



## Global Alarm System

*The Global Alarm System interface triggers events in situations whenever there are announcements to be made all across the park.*

### Incoming Events

1. Trigger alarms[Emergency Mode]/play emergency alarm sound.
2. Trigger alarms[Normal Mode]/play Public Service Announcement (PSA).
3. Disable alarms.

### Outgoing Events

1. Report health status to CGC.

## CGC Station

*The CGC Station interface triggers events in situations where an employee has to respond in specific situations.*

### Incoming Events

1. Review health status of all the associated devices.

### Outgoing Events

1. Activate tranquilizer.
2. Deactivate emergency mode.
3. Activate intercom.

## GPS Server

*The GPS Server interface triggers events in situations of tracking the GPS devices.*

### Incoming Events

1. Track location(gpsID).

### Outgoing Events

1. Report location(gpsID).

## 3.2 Control Logic

Because the CGC consists of various subsystems, it is important to understand the system within various scopes and from all subsystems' perspectives.

<sup>4</sup>

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<sup>4</sup>Control Logic by Siri Khalsa, Anas Gauba and Santiago Cejas

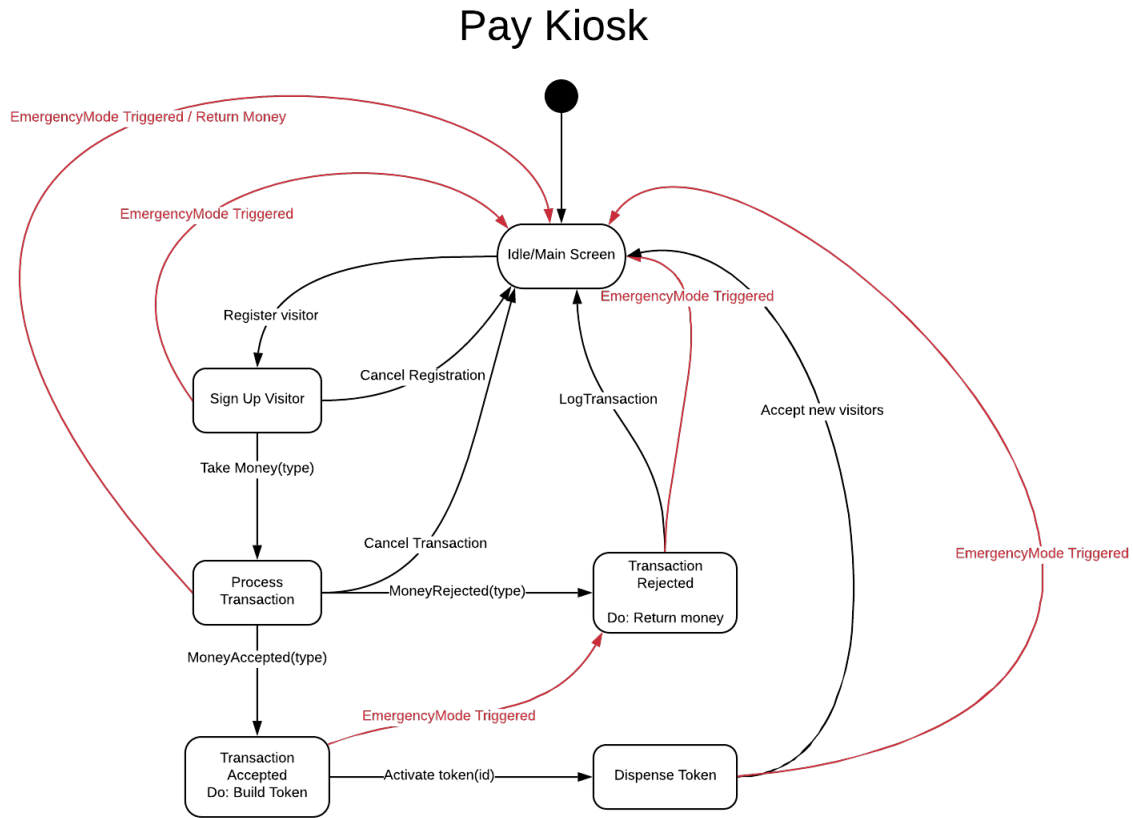


Figure 1: Pay Kiosk Dynamic Control Model

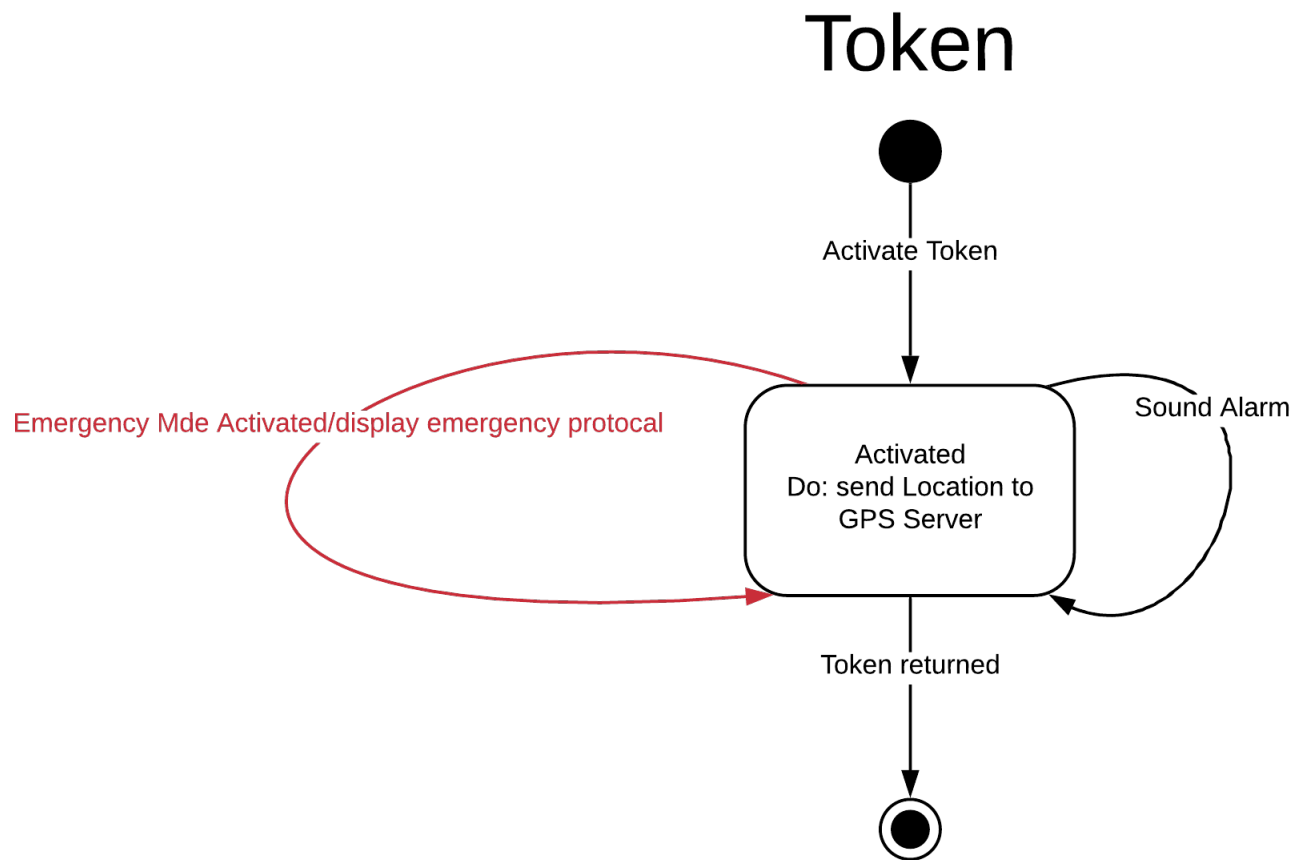


Figure 2: Token Dynamic Control Model

# CGC Station

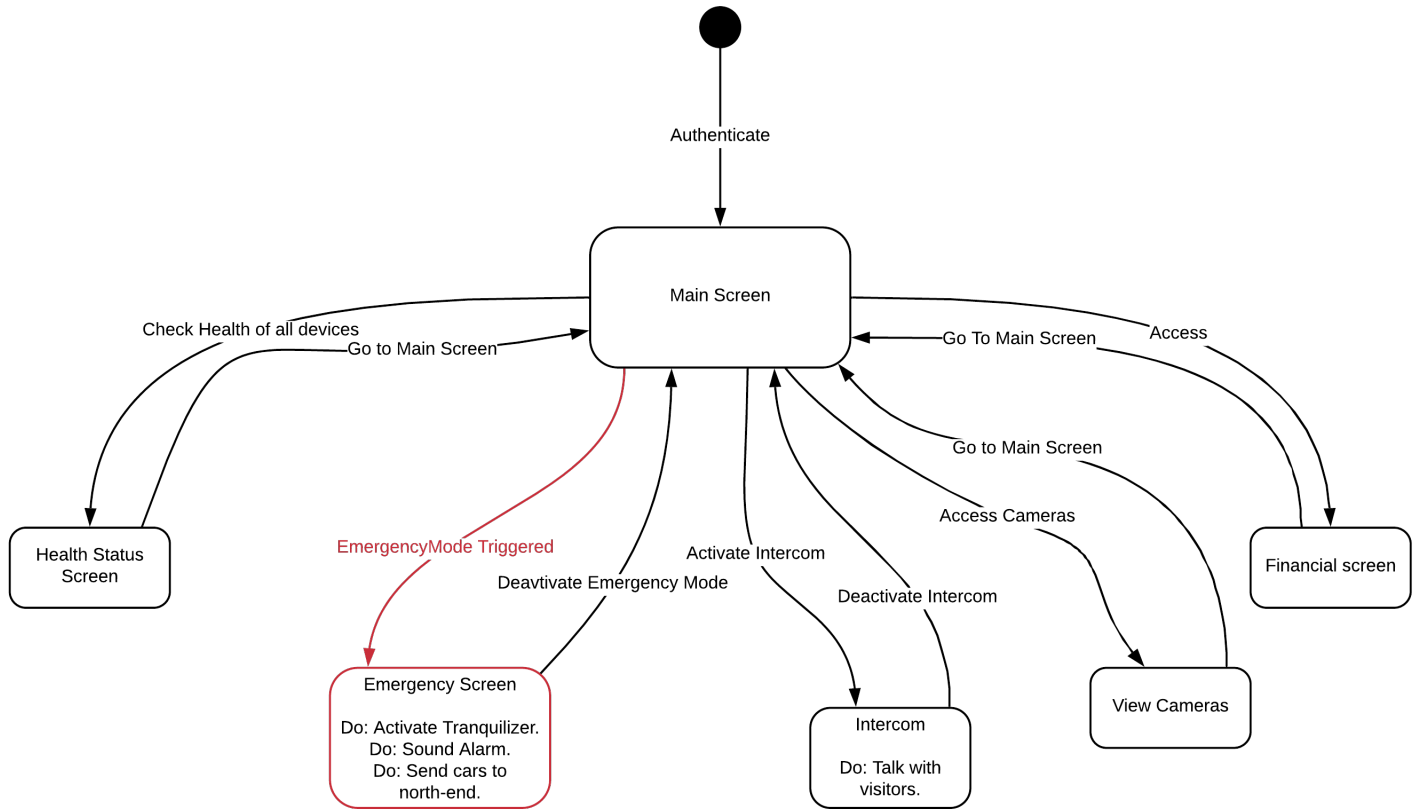


Figure 3: CGC Station Dynamic Control Model

## Car Normal Mode

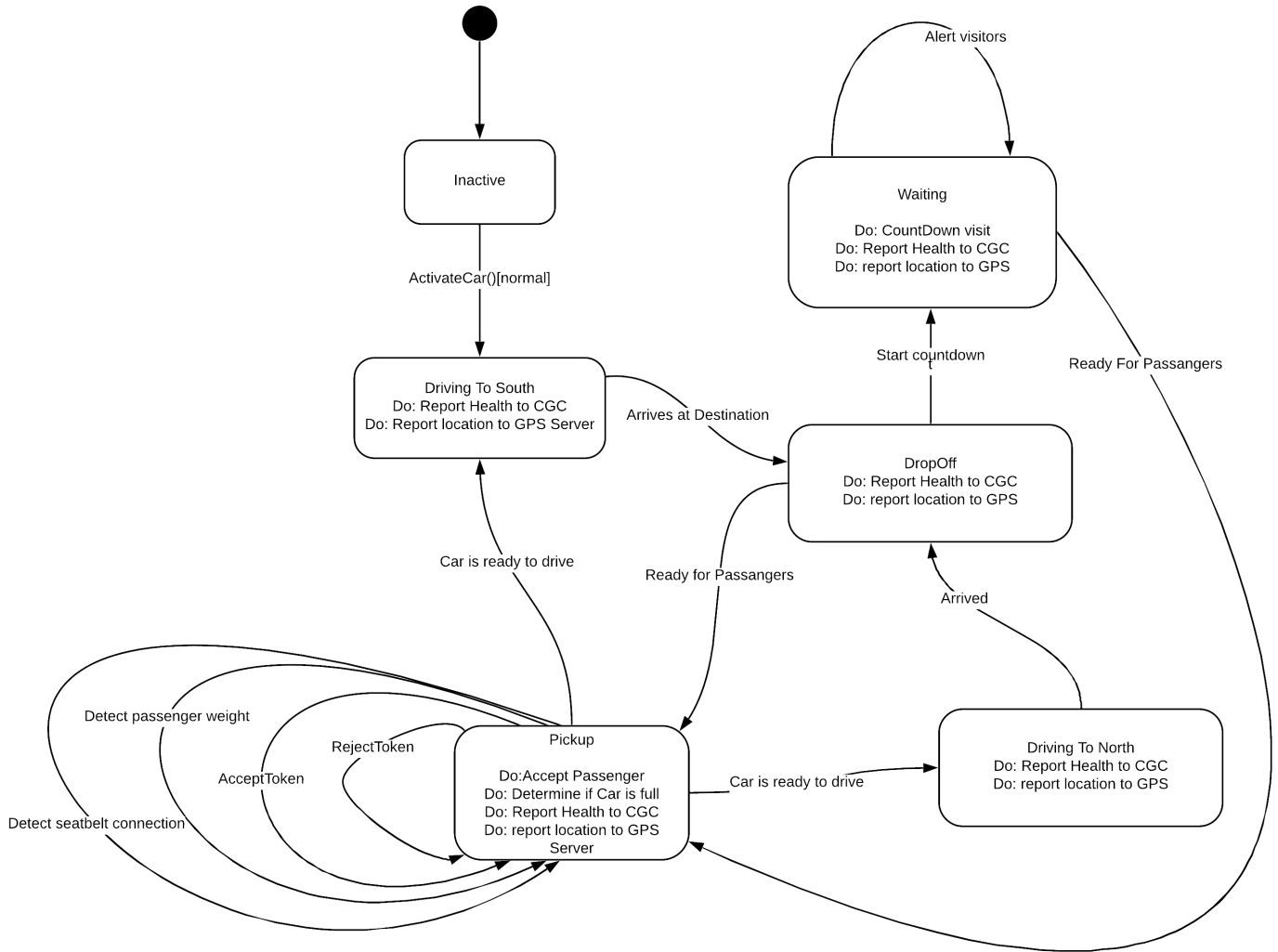


Figure 4: Car Normal Mode Dynamic Control Model

# Car Emergency Mode

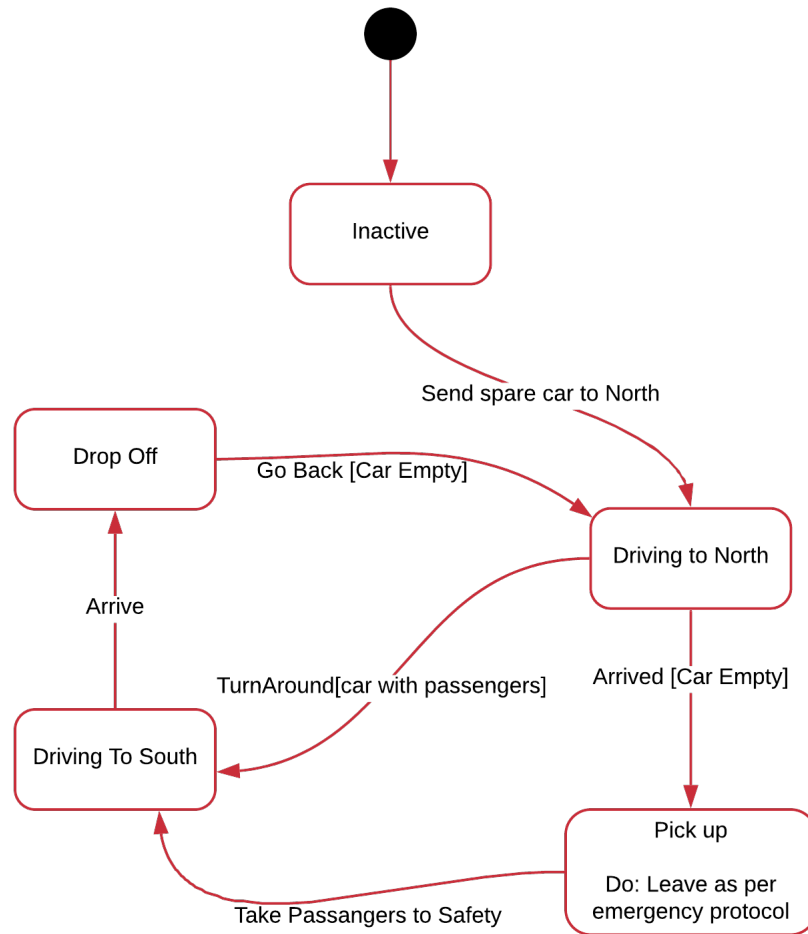


Figure 5: Car Emergency Mode Dynamic Control Model

# GPS Server

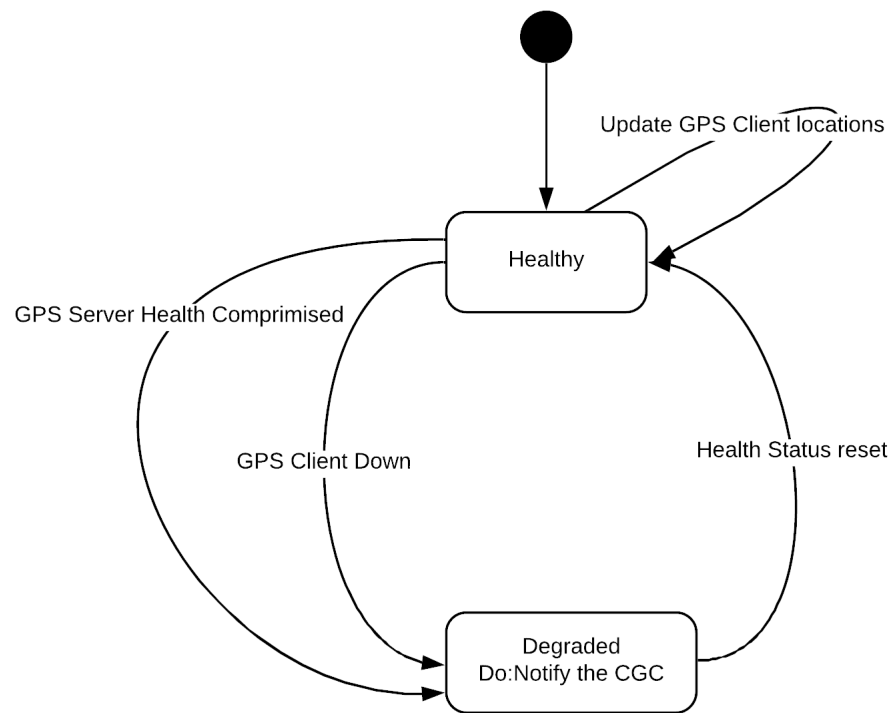


Figure 6: GPS Server Dynamic Control Model



# Global Alarm System

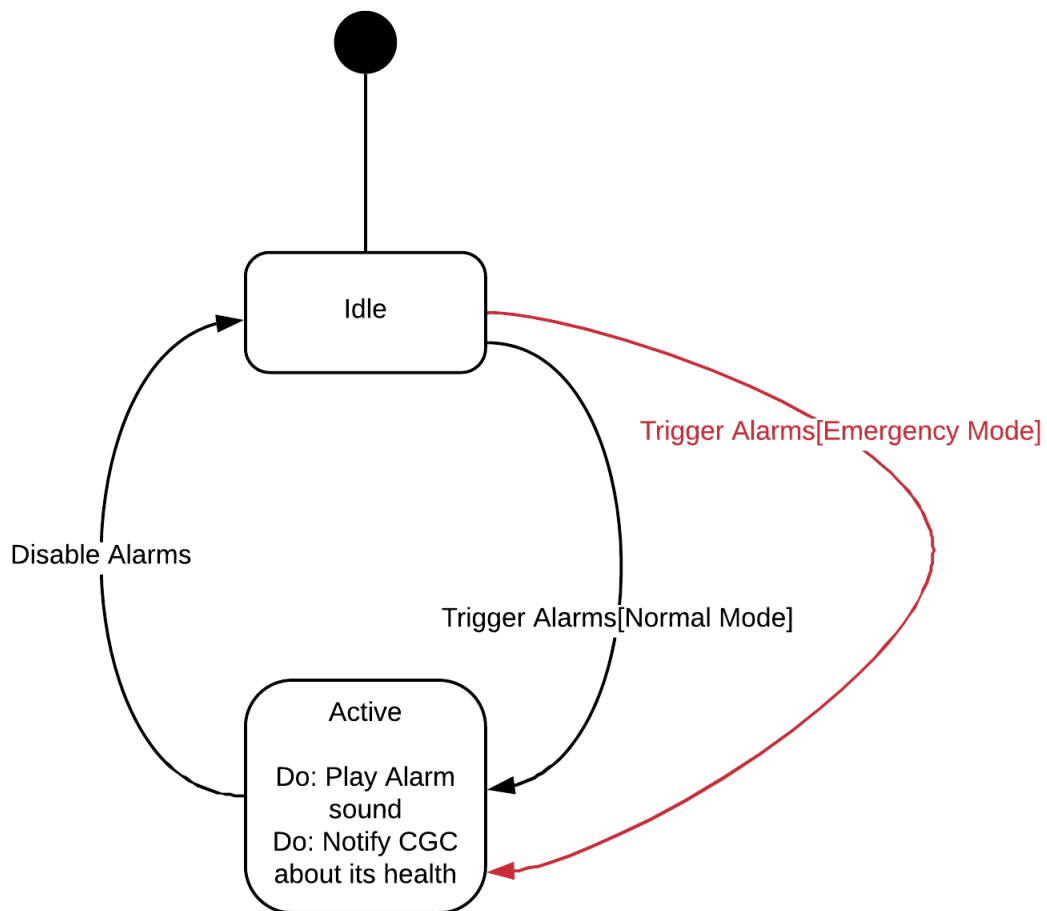


Figure 7: Global Alarm System Dynamic Control Model

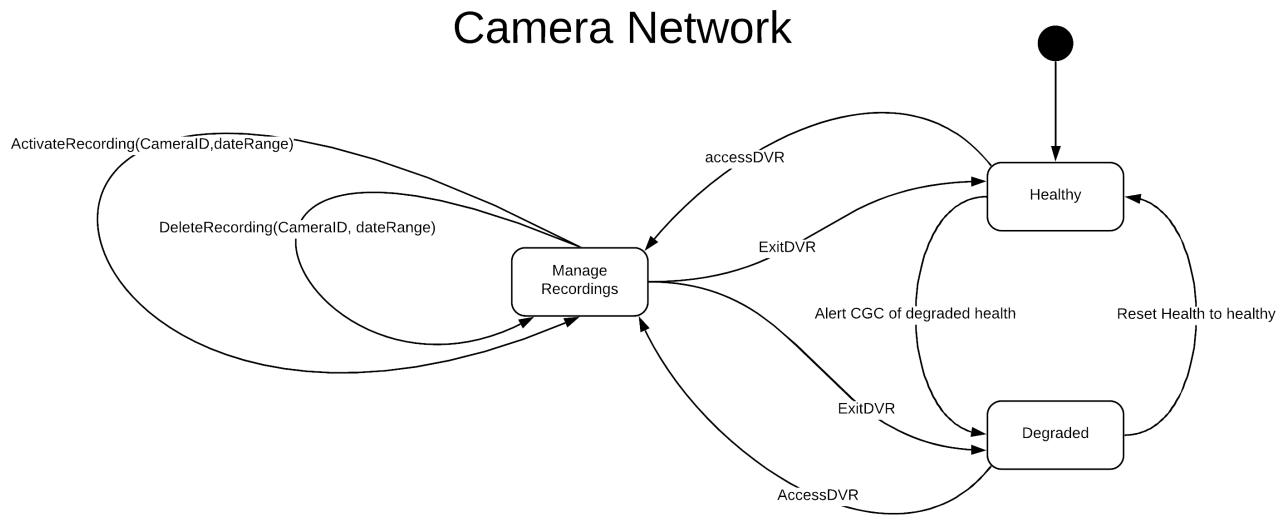


Figure 8: Camera Network System Dynamic Control Model

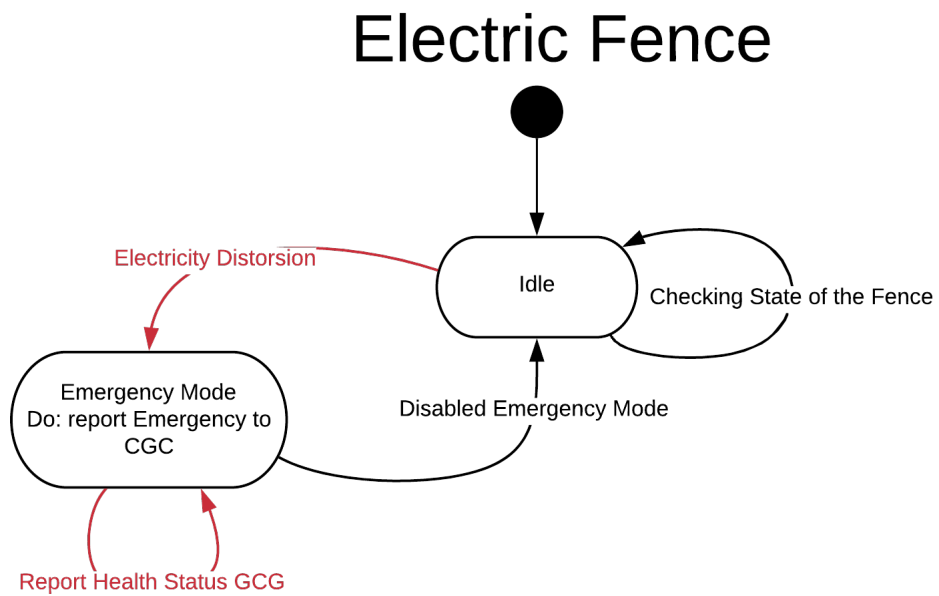


Figure 9: Electric Fence Dynamic Control Model

# T-Rex Monitor

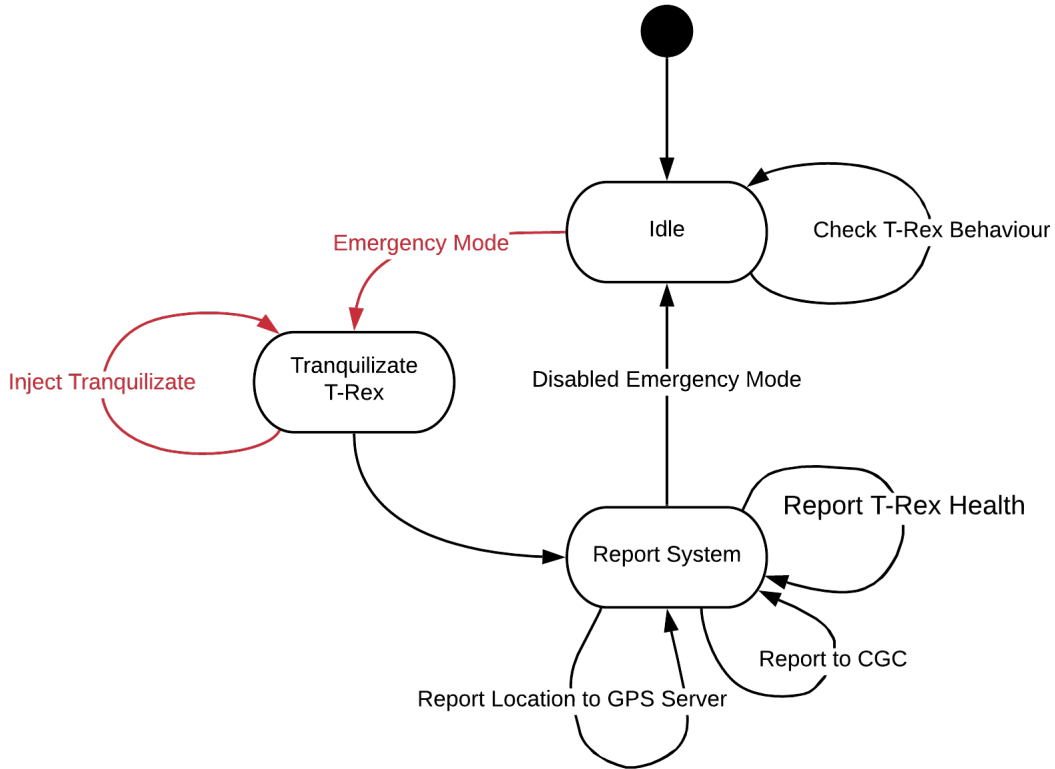


Figure 10: T-Rex Monitor Dynamic Control Model

## 4 Design Constraints

*There are quite a bit of constraints<sup>5</sup> that the CGC must address in order to successfully function.*

### 4.1 Client

- The visitors must arrive and purchase tokens from the pay kiosks on the south-end of the island.

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<sup>5</sup>Design Constraints by Anas Gauba

- The visitors must get a token which acts as a GPS device as well as RFID key to easily access the perks.
- There must only be one token per visitor.

## 4.2 Safety

- There must be an emergency mode in the event of the enclosure failure.
- The vehicles must alert and instruct visitors in the event of an emergency.
- The alarm system must be audible on both the north and south ends.
- The vehicles must facilitate evacuation in the event of an emergency.
- There must be a surplus of vehicles on either end of the island at all times.
- The tokens must provide additional evacuation information such as visitor's location.
- The cars must maintain safe speeds at all times.
- The cars must lock the doors before moving to its destination.

## 4.3 Regulations

- The vehicles should accommodate up to ten visitors (excluding the emergency scenario).
- The vehicles must alert visitors once their allotted time is up.

## 4.4 Security

- The T-Rex location is critical and it must be known at all times.
- The camera network stream must be available around the island at all times.
- The employee must directly monitor the health of all the devices, especially the ones which can cause harm to the visitors, such as, T-Rex and Electric Fence.

## 5 Sample Use Cases

*The CGC lends itself for a substantial amount of uses. Some notable uses include financial, official, managerial, medical, and technical connotations.*

### 5.1 CGC Station Operator

*The CGC Station Operator (GSO) is the actor responsible for monitoring the central CGC system that controls all other components. This individual may communicate with guests or other employees through the car intercom, may place vehicles into manual mode, and has access to the camera network.*

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**Use Case:** ReprimandTroublesomeGuest

**Primary Actor:** CGC Station Operator

**Goal in Context:** To reprimand a guest that is causing trouble by incremental warnings ranging from casual notice, to threats of banishment from the resort.

**Preconditions:** The system and all components are functioning properly.

**Trigger:** A guest is caught throwing rocks into the enclosure.

**Scenario:**

1. The GSO reviews an alert from the electric fence interface.
2. The GSO reads that small voltage spikes have been detected.
3. The GSO heads to the surveillance camera that corresponds to the panel in question.
4. The GSO observes a guest hurling rocks at the enclosure, which explains the voltage spikes.
5. The GSO immediately and firmly tells the guest to stop throwing rocks through the PA system near the site.
6. The GSO is ignored by the guest who gives the finger to the camera.

7. The GSO dispatches the nearest patrol vehicle to the location.
8. The GSO explains the situation to the security guard that happens to be in the patrol vehicle at the time.
9. The GSO firmly alerts the unruly guest that a security guard has been sent.
10. The security guard arrives and reprimands the guest.
11. The guest become violent and gets tased and pepper sprayed.
12. The guest is apprehended and placed in the patrol vehicle.
13. The GSO dismisses the electric fence alerts.

**Exceptions:**

The system is triggered into emergency mode.

**Priority:** Moderate, not necessary, but can be useful.

**When Available:** On demand.

**Frequency of Use:** More frequent with higher volumes of visits.

**Channel to Primary Actor:** Electric fence panel, CGC Station GUI, camera

**Secondary Actors:** Patrol Vehicle, Security Guard, Electric Fence, Guest

**Channels to Secondary Actors:**

Patrol Vehicle: direct

Security Guard: car intercom

Electric Fence: direct

Guest: PA system, electric fence

**Open Issues:**

None known.

## 5.2 Guest

*The guest is the primary benefactor of many to the system's features. The primary role of this actor is to safely indulge in what the resort has to offer. The most common use for a guest is to see the main exhibit but there may be several prerequisite uses that lead up to that.*

---

**Use Case:** ViewTRex

**Primary Actor:** Guest

**Goal in Context:** To see a live dinosaur.

**Preconditions:** The system and all components are functioning normally.

**Trigger:** The guest wishes to see a dinosaur since the age of five.

**Scenario:**

1. Upon hearing of the grand opening of Cretaceous Gardens, the guest immediately heads to the island by whatever means possible.
2. On arrival, the guest witnesses tremendous lines formed at many pay kiosks near the entrance of the resort.
3. After what seems like an eternity, the it is the guest's turn to purchase entry to the resort.
4. The guest is welcomed through a pleasant graphical display.
5. The guest is asked a series of questions in order verify compliance with the park policies (e.g. How old are you? Do you consent to having your picture taken? Do you accept full responsibility for any injuries sustained due to personal choices? Do you accept the risks of seeing a live Tyrannosaurus Rex and free Cretaceous Gardens of any and all consequences of doing so?)
6. After ignoring all the fine print and zipping through the legal stuff, the guest finally arrives at the screen that will allow the rental of an access token.
7. The guest enters the amount of time he or she plans to stay and is given the total price.

8. The guest is prompted to enter payment.
9. The guest pays after confirmation and receives the rental token device.
10. Instructions on what to do next are displayed on the kiosk screen.
11. The guest uses the token device to enter the resort via a small gate.
12. The guest eventually arrives at a parked car, into which others may or may not be entering.
13. The guest enters the token device into the seatbelt buckle and secures the seatbelt.
14. The guest lets the car do its job (see section 5.3).
15. The guest arrives at the exhibit and exits the car, taking the token device along.
16. The guest heads toward another gate which scans the token device to provide access.
17. The guest sprints toward the enclosure.
18. The guest is lucky and gets to see the mighty T.Rex sniffing around.

**Exceptions:**

Guest changes his or her mind anywhere in the scenario and decides to leave.

The system is triggered into emergency mode.

**Priority:** \*level of implementation importance (e.g. correct change is a must)\*

**When Available:** \*when or during which interval of time the action is to supported by the system\*

**Frequency of Use:** \*number of uses per unit of time (e.g. annually, billions per second, etc)\*

**Channel to Primary Actor:** \*means through which the system interacts with actor\*



**Channels to Secondary Actors:** \*means through which the primary and secondary actors interact\*

some channel

some other channel

...

**Secondary Actors:** \*intermediary or auxillary actors required to complete the goal\*

**Open Issues:** \*itemization of current problems with any of the above\*

some issue

some other issue

...

---

**Use Case:** Evacuate

**Primary Actor:** Guest

**Goal in Context:** To leave the island as quickly and as safely as possible.

**Preconditions:** There exists some imminent threat to the guest (it may be an enclosure failure, inclement weather, or any other emergency of similar caliber). Sudden guest death (unrelated to the island or system) may also be the case.

**Trigger:** Something horrible occurs. For simplicity, the following scenario assumes the T.Rex destroys its enclosure and is now on the loose.

**Scenario:**

1. The T.Rex destroys the enclosure (see subsection 5.9).
2. Emergency mode is activated.
3. 22 All guests are alerted via the car intercom, the token devices, and an island wide speaker system, the Global Alarm System.

4. Guests receive instructions via the above means with interleaved reassurances that extra vehicles are on the way to pick them up.
5. Guests are also informed that they may enter any vehicle, with or without tokens.
6. Once in the vehicle, guests are asked (via the token device) whether or not they would like to depart.
7. If at least one individual submits a yes, the car transmits a message to indicate imminent departure with a warning that doors will soon close.
8. Once in motion, the guest in the driver seat is offered the option to place the vehicle into manual mode.
9. If the individual chooses to do so, then he or she may now pilot the vehicle as he or she wishes.
10. Otherwise, the car will head south as quickly and as safely as possible.
11. Once at the south end, the car will park and wait for guests to exit.
12. After it has been confirmed that no guests remain in the vehicle (seat weight sensors indicate all seats are empty), the guests are given another warning to stand back.
13. As the guests head toward the exit, the car closes its doors and speeds north to collect more guests.

**Exceptions:**

The car suffers damage that causes it to malfunction.

**Priority:** Essential, must be implemented.

**When Available:** On demand.

**Frequency of Use:** Hopefully never, but at least once in reality.

**Channel to Primary Actor:** Car doors, tokens, interior car components (if manual mode is enabled)

**Channels to Secondary Actors:**

T.Rex: breached enclosure

Token: device display and speaker

Emergency Personnel: directly at any stage during the evacuation.

**Secondary Actors:** T.Rex, Tokens, Emergency Personnel

**Open Issues:**

None known.

### 5.3 Guest Vehicle

*The guest vehicle (GV) plays a vital role in facilitating the guest experience. The actor primarily moves guests to and from the exhibit, but may exhibit other functions when the system is in maintenance or emergency mode.*

---

**Use Case:** ShuttleGuestsToExhibit

**Primary Actor:** Guest Vehicle

**Goal in Context:** To transport guests to the northern part of the island so they may visit the exhibit.

**Preconditions:** The system is in normal mode and all components are functioning properly.

**Trigger:** A transaction is confirmed and a tokens are provided to guests.

**Scenario:**

1. The guests are directed to the parked GV.
2. The guests enter the GV.
3. The GV instructs guests to enter their token devices into their belt buckles.
4. The GV detects all token-containing buckles have been used to fasten corresponding seatbelts.

5. The GV locks its doors and unlocks window functionality for guests.
6. The GV performs a quick system check.
7. The GV heads toward the exhibit.
8. The GV arrives and parks in front of a gate that leads to the exhibit.
9. The GV reminds the guests to take their tokens with them as it grants them access through the gate.
10. The guests exit the vehicle and make their way toward the gate.
11. The GV parks itself nearby and starts a timer.

**Exceptions:**

A guest loses his or her token device, thus preventing seatbelt access, which necessitates staff intervention.

**Priority:** Essential, must be implemented.

**When Available:** On Demand.

**Frequency of Use:** Up to thousands of times per day.

**Channel to Primary Actor:** Direct.

**Secondary Actors:** Guests, CGC Station Operator, Tokens

**Channels to Secondary Actors:**

Guests: doors, seatbelts, speakers

CGC Station Operator: direct

Tokens: seatbelt buckles

**Open Issues:**

None known.

---

**Use Case:** ShuttleGuestsFromExhibit

**Primary Actor:** Guest Vehicle

**Goal in Context:** To transport guests to the southern part of the island so they may leave the island.

**Preconditions:** The system is in normal mode and all components are functioning properly.

**Trigger:** The guests' time is up at the exhibit.

**Scenario:**

1. The car alerts the guests it shuttled to the exhibit that time is up.
2. The guests hear the alert from the car and from their token devices.
3. Some of the guests immediately head to the car while others delay.
4. The guests that head to the car enter it and fasten their seat belts.
5. The GV sends another alert to those remaining.
6. The rest of the guests finally arrive and enter the GV.
7. The GV locks its doors after everyone has fastened their seatbelts.
8. The GV heads south.
9. The GV arrives to the southern part of the island where it parks.
10. The guests release their seatbelts.
11. The GV unlocks its doors and allows the guests to exit.
12. The GV is dispatched elsewhere.

**Exceptions:**

A guest happens to be injured and requires another type of transportation.

A guest loses his or her token device, thus preventing seatbelt access.

**Priority:** Essential, must be implemented.

**When Available:** On Demand.

**Frequency of Use:** Up to thousands of times per day.

**Channel to Primary Actor:** Direct.

**Secondary Actors:** Guests, CGC Station Operator, Tokens

**Channels to Secondary Actors:**

Guests: doors, seatbelts, speakers

CGC Station Operator: direct

Tokens: seatbelt buckles

**Open Issues:**

None known.

## 5.4 Maintenance Personnel

*Maintenance Personnel (MP) is responsible for the physical connections and addressing any issues with the physical components used with by the CGC (e.g cameras, kiosks, cars, enclosure panels, etc.). This individual would be in charge of responding to nodal failures.*

---

**Use Case:** RepairExternalEnclosureCamera

**Primary Actor:** Network Maintenance Personnel

**Goal in Context:** To fix or replace a malfunctioning or broken camera that has been detected to be in such a state by the CGC. The camera in question resides outside the exhibit enclosure.

**Preconditions:** The CGC is not in emergency mode but may be in either normal or maintenance mode, and the issue has already been diagnosed (i.e. it is known with certainty that the problem is the camera and not the link to the camera).

**Trigger:** The CGC reports an error in some camera within the Camera Network after failing to make contact via alternate paths.

**Scenario:**

1. NMP is dispatched and transported in an self-driving car to the location of the problem by the CGC Station Operator (CSO).
2. NMP arrives and performs a repair, exchanges the broken camera for a new one, or attaches a new one if it happens to be gone all together.
3. The CSO and NMP perform tests to ensure proper function.
4. The maintenance is concluded.
5. The NMP is dispatched to any other components that may need servicing.

OR

6. The NMP returns any removed parts (e.g. the broken camera) to a stock room.

**Exceptions:**

Maintenance materials are out of stock.

Emergency mode interrupts the procedure.

**Priority:** Moderate, should be implemented.

**When Available:** On Demand.

**Frequency of Use:** It may vary with respect to the average lifetime of the cameras in the network.

**Channel to Primary Actor:** CGC Station, Car, Camera, Camera Network

**Secondary Actors:** CGC Station Operator, Camera Network

**Channels to Secondary Actors:**

CGC Station Operator: Car Intercom

Camera Network: Camera

**Open Issues:**

None known

## 5.5 Patrol Vehicle

*This actor is a special type of autonomous vehicle that patrols the island for an added layer of protection and in the interest of guest welfare.*

---

**Use Case:** PatrolIsland

**Primary Actor:** Patrol Vehicle

**Goal in Context:** To provide a means via which security personnel may patrol the island. The vehicles are to be on a mostly predetermined route, so the security guards (in this context) are mostly passive agents.

**Preconditions:** The system is in normal mode and all components are functioning properly.

**Trigger:** The resort opens for business.

**Scenario:**

1. Cretaceous Gardens opens to employees before opening for the business day.
2. The Patrol Vehicle (PV) is dispatched via a routine protocol.
3. The PV performs a test run around the island before picking up the security guard of the shift.
4. The security guard enters the PV, after which the PV performs another test trip.
5. The security guard double checks state of the route.
6. Anything out of the ordinary is reported to the relevant parties (maintenance for example).
7. The PV returns to the southern part of the island.
8. The security guard confirms an all clear with other employees.
9. The rest of the employees continue their setup as the security guard enters the PV.
10. The PV begins its daily patrolling routine (one or more simple circuits around the island).



**Exceptions:**

The system is triggered into emergency mode.

**Priority:** Low, not necessary but may be useful.

**When Available:** During business hours.

**Frequency of Use:** Daily.

**Channel to Primary Actor:** Direct.

**Secondary Actors:** CGC Station Operator, Security Guard

**Channels to Secondary Actors:**

Security Guard: Car door, inner components of car

CGC Station Operator: CGC station interface

**Open Issues:**

None known.

## 5.6 Sales department

*The sales department (SD) is, for the sake of simplicity, is the actor interested in maximizing ticket sales and profits. The SD is interested in any financial trends for the sake of such aims. They may also be interested in finding efficiency bottle necks that incur unnecessary costs.*

---

**Use Case:** VisualizeSalesData

**Primary Actor:** Sale Department

**Goal in Context:** To acquire and study data related to sales within some given period of time.

**Preconditions:** The system is not in emergency mode nor maintenance mode and all components are functioning properly.

**Trigger:** It is about time to wrap up a fiscal quarter to plan for the next one.

**Scenario:**

1. A meeting is scheduled in order to plan for the next quarter.
2. The SD gathers all sales data provided by the CGC.
3. The SD uses a provided interface to organize the data into meaningful visualizations.
4. The SD exports the visualizations for a presentation at the meeting.
5. The meeting is held and the SD presents their findings.
6. The SD contribution helps guide the conversation for what to do next.
7. The meeting concludes.

**Exceptions:**

The system enter emergency mode.

**Priority:** Extremely low, need not be implemented.

**When Available:** On demand.

**Frequency of Use:** May be used continuously (as a live data feed), or any number of snapshots may be taken hourly, daily, weekly, etc.

**Channel to Primary Actor:** An auxiliary interface specialized for financial data visualization.

**Secondary Actors:** CGC Control Station

**Channels to Secondary Actors:**

CGC Control Station: some network link to forward relevant data

**Open Issues:**

An interface separate from the Control Station interface would have to be developed as it would reside elsewhere on the island.

## 5.7 System Administrator

*The this actor (SA) specializes in addressing hardware issues with the CGC Station. This individual is responsible for repairing disk drives, monitors, redundancy elements within the station, updating machine operating systems, etc.*

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**Use Case:** UpgradeSystemMemory

**Primary Actor:** CGC System Technician

**Goal in Context:** To upgrade the memory of the machines within at CGC Control Station (e.g. add 16 GB RAM).

**Preconditions:** The CGC is not in emergency mode but may be in either maintenance or normal mode.

**Trigger:** Cretaceous Gardens experiences an increase in demand, which (if the trend continues) will require more computational resources to handle more guests, more efficiently.

**Scenario:**

1. The Sales Department notices a distinct upward trend in sales.
2. The findings percolate through the relevant business entities within the company.
3. The CST is dispatched to the Control Station.
4. The CST enables maintenance mode.
5. The CST upgrades machines that are currently being used for redundancy.
6. The CST enables maintenance mode on the redundant machines.
7. The redundant machines and active machines, switch roles.
8. The CST upgrades the now-redundant machines.
9. The CST performs tests.
10. The CST disables maintenance mode in both active, and redundant machines.

**Exceptions:**

The trend is ignored by management.

**Priority:** Moderate, should be implemented.

**When Available:** On demand.

**Frequency of Use:** Every two or three fiscal years.

**Channel to Primary Actor:** Control station hardware.

**Secondary Actors:** Sales Department, CGC Control Station, Pay Kiosk

**Channels to Secondary Actors:**

Sales Department: pay kiosk transaction logs

CGC Control Station: direct access

Pay Kiosk: direct connection

**Open Issues:**

None known.

## 5.8 System Auditor

*This actor (SA) may be an external individual that may either be hired by Cretaceous Gardens to test the robustness of the system, or whose inspection may be mandated by law.*

---

**Use Case:** SimulateProtocols

**Primary Actor:** System Auditor

**Goal in Context:** To observe currently implemented protocols within the system and provide an analysis regarding their safety.

**Preconditions:** The system is not in emergency mode nor maintenance mode, but may be put into such modes for testing purposes (presumably outside business hours).

**Trigger:** The time for a system audit has arrived, either after being scheduled or at random.

**Scenario:**

1. The SA arrives to the CGC Control Station outside of business hours.
2. The SA requests to observe a simulation of the currently used functions of the system.
3. The SA is provided with a set of protocols that may be simulated.
4. For each protocol, the SA runs a simulation.
5. The system passes the audit and the SA leaves.
6. OR
7. The system fails while simulating one or more protocols and the auditor presents a deadline to fix the issue lest a fine is incurred.

**Exceptions:**

An audit occurs in the middle of a system upgrade.

The system is triggered into emergency mode (due to an actual emergency)

**Priority:** Low, not explicitly required, but may be useful for legal robustness.

**When Available:** On demand.

**Frequency of Use:** Annually or less frequently.

**Channel to Primary Actor:** CGC Control Station interface

**Secondary Actors:** CGC Control Station, Pay Kiosks, Cars, Electric Fence, T.Rex, T.Rex Monitor, Camera Network

**Channels to Secondary Actors:**

CGC Control Station: simulation

Pay Kiosks: simulation

Cars: simulation  
Electric Fence: simulation  
T.Rex: simulation  
T.Rex Monitor: simulation  
Camera Network: simulation

**Open Issues:**

What factors should be relevant in a simulation?

## 5.9 Tyrannosaurus Rex

*It may be argued that this is not a legitimate actor, but despite its unconscious interaction with the system, the T.Rex can act on the system in a variety of - possibly unpredictable - ways.*

---

**Use Case:** LeaveEnclosure

**Primary Actor:** T.Rex

**Goal in Context:** To get somewhere that happens to be outside the enclosure.

**Preconditions:** Actor is not sedated, the system is not in maintenance mode nor emergency mode, and all components are functioning properly.

**Trigger:** The T.Rex sees or smells something outside the enclosure.

**Scenario:**

1. The actor looks through the enclosure, toward an imagined near-future destination beyond the enclosure.
2. The actor walks toward the target destination.
3. The actor is impeded by the electric fence.
4. The actor becomes fearful.
  - (a) The actor retreats from the fence.

OR

(b) The actor attacks the fence.

5. The electric fence increases its voltage.

6. The scenario may repeat from either act 1, from act 3, or continues such that:

(a) the actor is sedated to prevent further damage to self or enclosure, and maintenance mode is triggered

OR

(b) the enclosure is breached, the actor heads toward the target destination, and emergency mode is triggered.

OR

(c) the actor relinquishes the desire to head toward the target destination, no significant damage is incurred, and the normal mode of operation continues.

**Exceptions:**

Actor Perishes.

**Priority:** Essential, must be implemented.

**When Available:** At random.

**Frequency of Use:** Preferably never, but less likely with time (ideally)

**Channels to Primary Actor:**

Electric Enclosure Panel

T.Rex Monitor

**Secondary Actors:** CGC Station Operator, Global Alarm System

**Channels to Secondary Actors:**

CGC Station Operator: Camera Network, T.Rex Monitor

Global Alarm System: Electric Enclosure Panel

**Open Issues:**

None known.

## 5.10 Veterinarian

*The veterinarian role includes uses such as routine checkups or medical treatment for the T.Rex.*

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**Use Case:** RoutineCheckup

**Primary Actor:** Veterinarian

**Goal in Context:** To perform a regular physical exam on the T.Rex.

**Preconditions:** The T.Rex has been successfully sedated, the veterinarian is completely prepared, the CGC is not in emergency mode, and all components are functioning properly.

**Trigger:** The time for a physical has arrived.

**Scenario:**

1. The CGC Station Operator dispatches the veterinarian in a self driving car to the edge of the enclosure closest to the current location of the T.Rex.
2. The veterinarian requests an all-clear confirmation from the operator.
3. The CGC Station Operator confirms sedated state of the T.Rex.
4. The operator disengages the electricity of the panel to provide access.
5. The veterinarian enters and travels toward the animal.
6. The operator starts a timer.
7. The veterinarian arrives at the location of the animal.
8. The operator stops the timer.
9. The veterinarian performs a physical exam while the operator provided updates on the sedative state of the T.Rex.
10. The operator alerts the veterinarian when the previously recorded elapsed time is approaching the approximated amount of time until the T.Rex wakes up.



11. The veterinarian concludes the exam.
12. The veterinarian replenishes the sedative reservoir in the T.Rex Monitor.
13. The veterinarian travels toward the point of entry.
14. The veterinarian exits the enclosure.
15. The Operator confirms successful exit.
16. The Operator reengages the electricity of the panel.

**Exceptions:**

The T.Rex is found to be in poor health.

The sedative lasts less time than expected.

**Priority:** Essential, must be implemented.

**When Available:** On Demand.

**Frequency of Use:** As little as once a year.

**Channel to Primary Actor:**

Enclosure Panel, T.Rex Monitor

**Secondary Actors:** CGC Station Operator, T.Rex, Car

**Channels to Secondary Actors:**

CGC Station Operator: Car Intercom, Camera Network

T.Rex: Enclosure Panel, T.Rex Monitor

**Open Issues:**

Should the panel remain inactive while the veterinarian is inside?

Should the veterinarian simply wear an electric safety suit to avoid disengagement all together?

## 5.11 Zookeeper

*A zookeeper may interact with the CGC in a variety of ways, but some of the major roles of such an actor (as with any zookeeper) are to prepare the diet of the T-Rex, feed the T.Rex, to observe its behavior, or groom it.*

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**Use Case:** FeedTRex

**Primary Actor:** Zookeeper

**Goal in Context:** To safely provide food for the T.Rex, whether it be live, frozen, thawed, or prepared prey.

**Preconditions:** The CGC is not in emergency mode, and all components are fully functional.

**Trigger:** It is time to feed the T.Rex.

**Scenario:**

1. The CGC Station Operator dispatches the zookeeper in a self driving car to the edge of the enclosure furthest from the current location of the T.Rex.
2. The Zookeeper requests an all-clear confirmation from the operator.
3. The operator disengages the electricity of the panel to provide access.
4. The Zookeeper enters and travels a significant distance into the enclosure.
5. The Zookeeper drops off the food.
6. The Zookeeper travels back the point of entry.
7. The Zookeeper exits the enclosure.
8. The Operator confirms successful exit.
9. The Operator reengages the electricity of the panel.

**Exceptions:**

There is a shortage of food on the island.

The T.Rex is sick or injured and does not want to eat.

The T.Rex reaches the zookeeper before the zookeeper exits the enclosure.

**Priority:** Essential, must be implemented

**When Available:** On demand and via operator-zookeeper protocol

**Frequency of Use:** Periodically (it can be daily, weekly, or monthly for example)

**Channel to Primary Actor:**

Enclosure Panel

**Secondary Actors:** CGC Station Operator, T.Rex, Car

**Channels to Secondary Actors:**

CGC Station Operator: Car Intercom, Camera Network

T.Rex: Enclosure Panel

**Open Issues:**

Should the panel remain inactive while the zookeeper is inside?

Should the zookeeper simply wear an electric safety suit to avoid disengagement all together?

## 6 Definition of Terms

*The following is a list of definitions<sup>6</sup> of the most commonly used technical terms within this document, whose meaning may not be immediately apparent to the lay reader. Most definitions come from no specific source; instead they are defined by the authors in the context of their use in this document and originate from the vocabulary shared across the general references cited . In the event that a definition was taken directly from a source, it is followed by a citation*

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<sup>6</sup>Definition of Terms by Anas Gauba

**CGC:** Acronym for Cretaceous Gardens Controller

**DVR:** Acronym for Digital Video Recorder

**Electrical Conduction:** The movement of electrically charged particles through a transmission medium.

**GPS:** Global Positioning System

**Hardwired Ethernet:** This references the latest IEEE standard for Ethernet utilizing physical cables.

**Network:** All nodes with which the CGC interacts, the links that connect them to each other and to the CGC, the CGC itself, and all related databases.

**Node:** The generic term that refers to any device connected to the CGC in any way. This includes autonomous vehicles, tokens, the T.Rex monitor, all electric fence panels, all kiosks, and all cameras.

**Safely Inactive:** A state in which a vehicle is fully functional and ready to be dispatched.

**Safely Occupied:** A state in which a vehicle contains at least one person, is locked, and is ready to depart.

**Token:** An interactive device used by the visitor that grants access to locations.