Cretaceous Gardens Controller

Software Requirements Specification

SRS Version 2.0

Team #3
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CS 460 Software Engineering

Contents

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 [1], 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 [2] *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

[1] Introduction by Ezequiel Ramos
[2] 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 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[3] *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

[3]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

This section outlines the control logic of the CGC system. Due to the size of the entire system we have broken down the logic diagrams into the sub-components of the CGC[4] *The explanation for each component can be seen below. The Control Logic diagram for the CGC system as a whole was missed due to time constraints but is planned to be added in the future if time permits.*

Pay Kiosk

The Pay Kiosk logic can be seen below. the goal is to help communicate with potential visitors and help them purchase tokens to gain access to the garden. The system starts at the main screen and will move into separate states to help facilitate the sale. If the emergency mode is triggered in the CGC system than the Pay kiosk will return the the main screen.

[4]Control Logic by Siri Khalsa, Anas Gauba and Santi

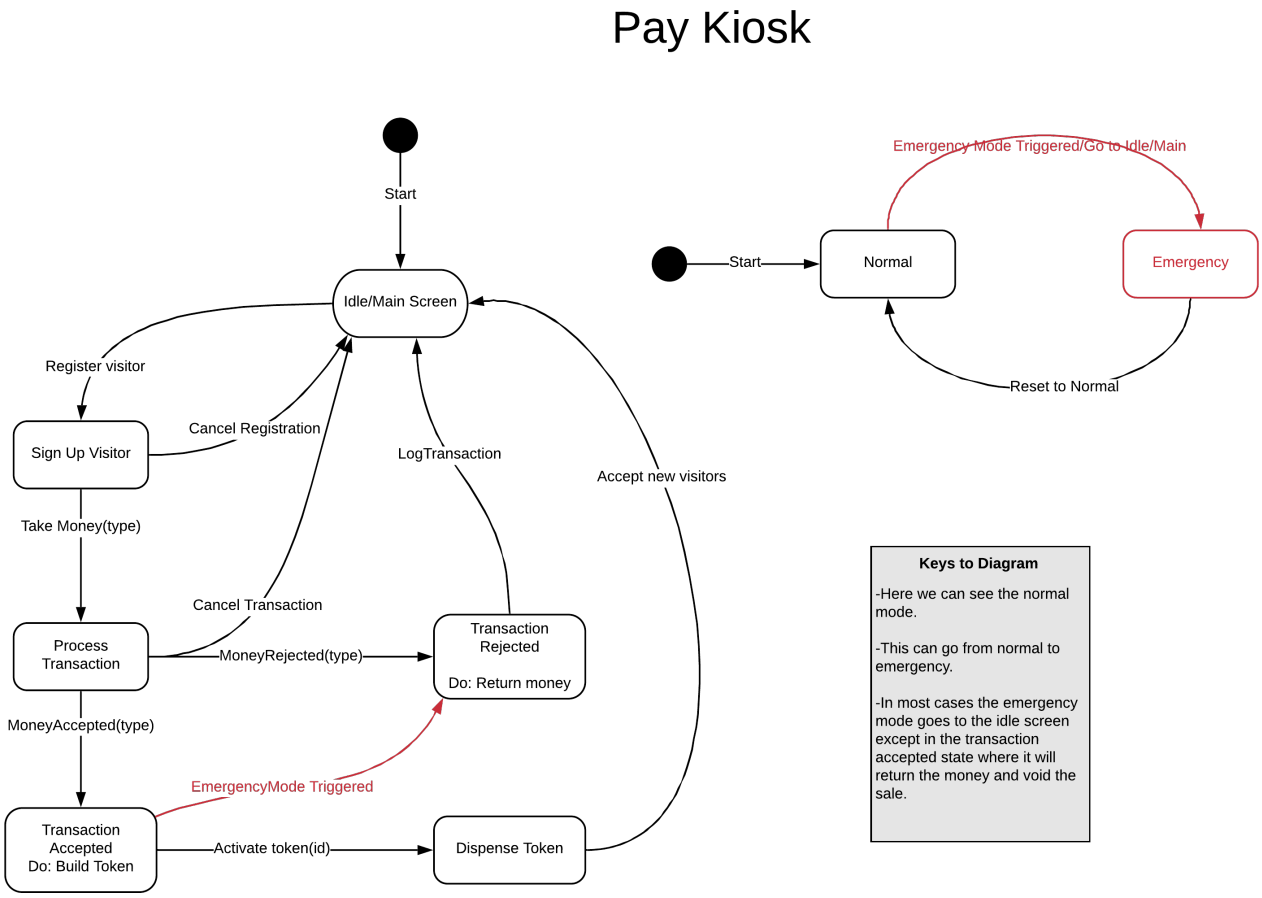

Figure 1: Pay Kiosk Dynamic Control Model

Token

The Tokens logic is extremely simple. It is in an activated state when deployed to a visitor. Here it will perform all of its functions. The GPS will send signals to the GPS server. It will also sound an alarm or display and sound information.

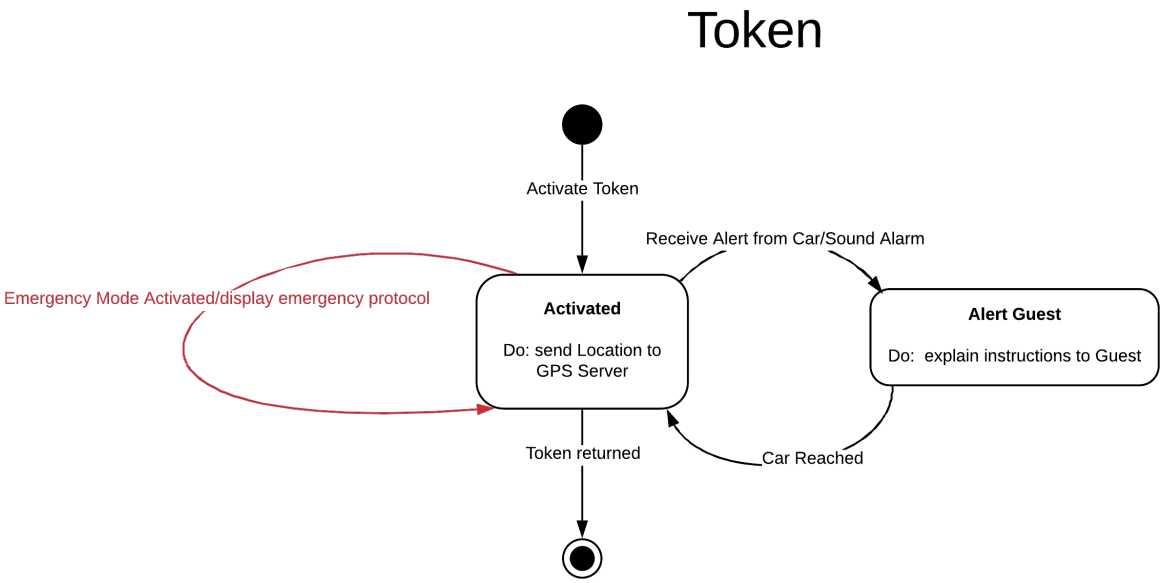

Figure 2: Token Dynamic Control Model

CGC Station

This is one of the more complex subsystems. The logic here states that there are separate screens that act as states. The main screen displays access to other screens and a general overview of the state of everything connected to the CGC. This system can change states to screens such as the Health Status screen, which can display the health status of all reporting devices. Another screen that can be accessed is the Emergency screen here all actions related to controlling the CGC when the emergency mode has been activated can be seen. The same type of logic can be inferred through out the rest of the screens which are made available.

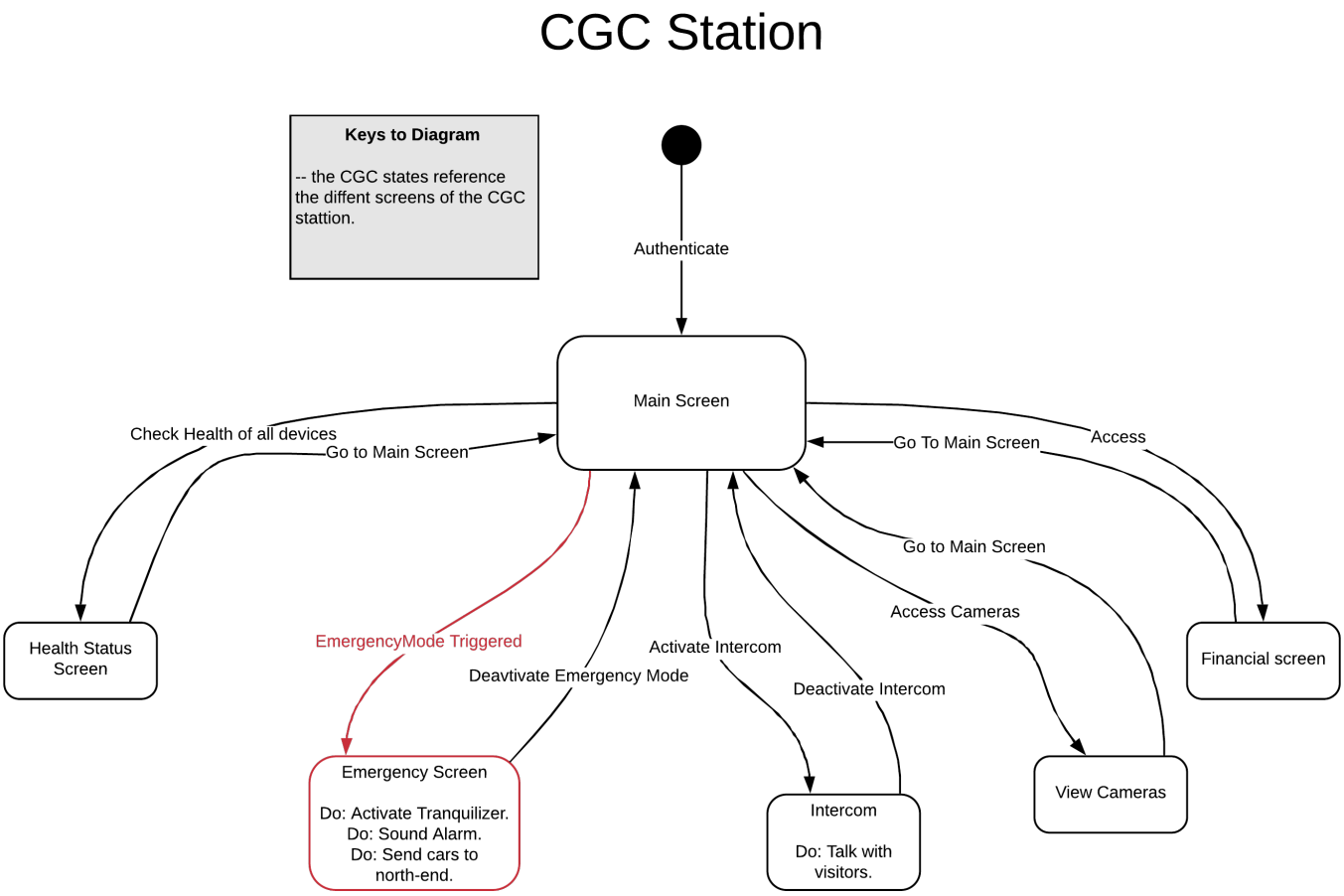

Figure 3: CGC Station Dynamic Control Model

Car Normal Mode

The car is incredibly complex. To successfully explain the Car logic two diagrams were created. This diagram is for the Normal mode of the car. There are some main states that the car is in. All cars start out in an inactive state where they wait to be activated. In the case of this diagram they will be activated with the goal of picking up visitors at the south end of the island. They move immediately into the Drive to South state. This is a state that implies the car is actively drive with the destination of the South end. When the car arrives at the destination is always going into a drop off state. when ready for passengers it will move into a pick up state.

There is another state of Driving to North End. If the car drops off after this destination, It will go to a waiting state while the visitors it brought over enjoy the exhibit.

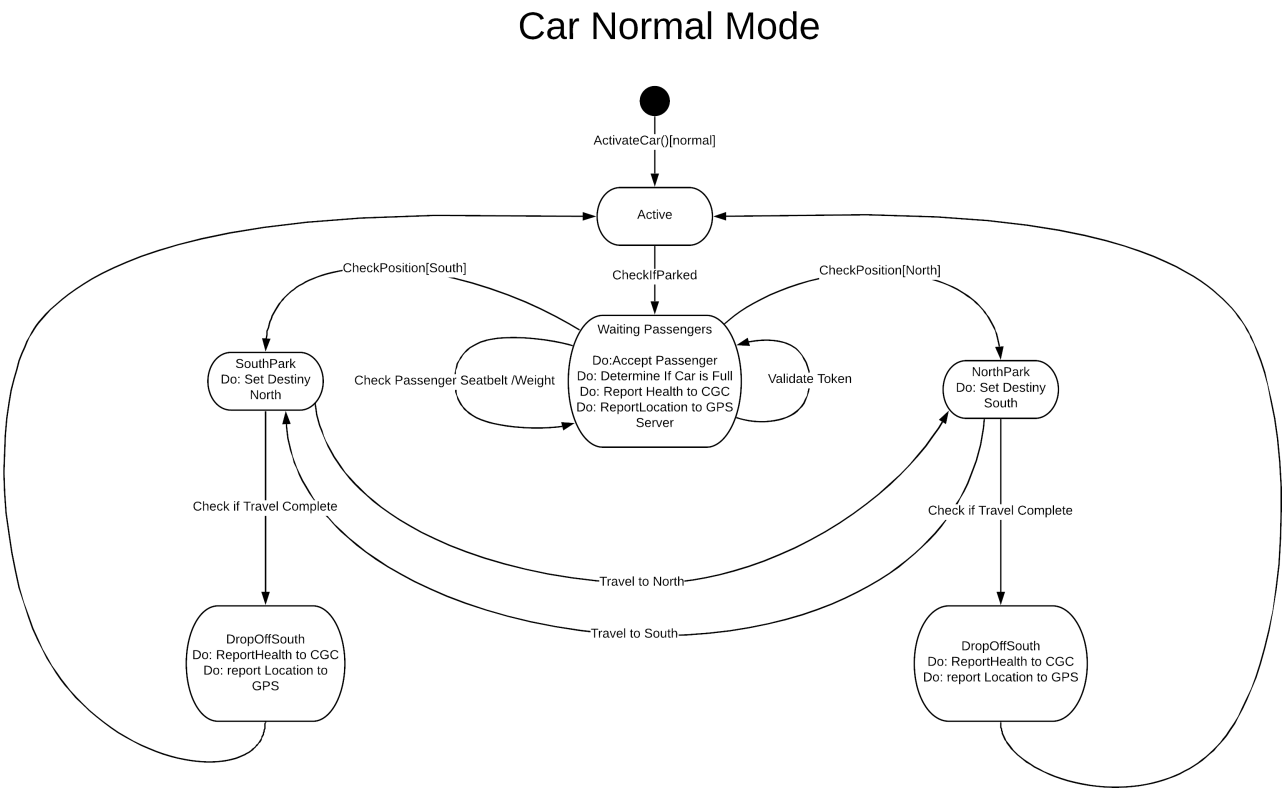

Figure 4: Car Normal Mode Dynamic Control Model

Car Emergency Mode

This is the second diagram for the car. It explains the logic the car follows inside of an emergency triggered state. All spare cars drive to the north end. they pick up passengers and move back to the south end.

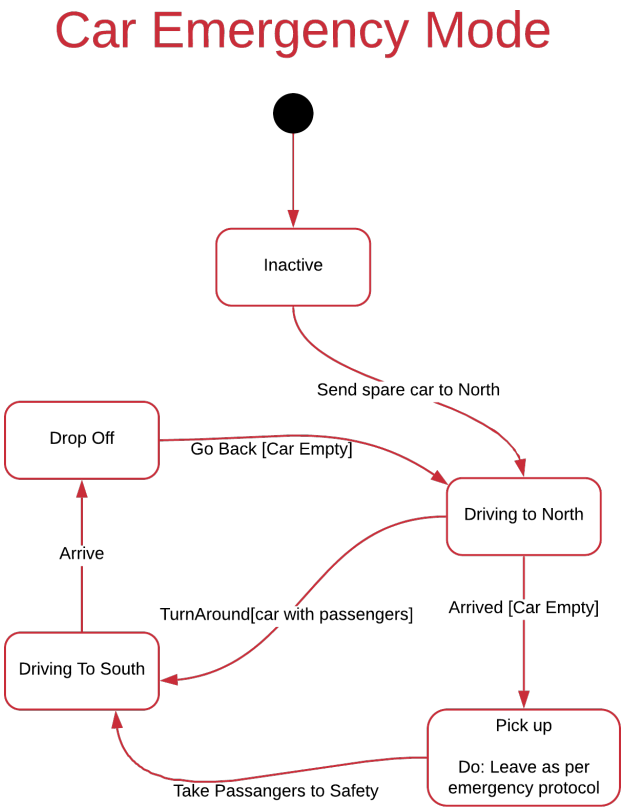

Figure 5: Car Emergency Mode Dynamic Control Model

GPS Server

The Control Logic for the GPS server is very simple the system is either in a healthy state where all nodes are healthy and accounted for and the system itself is running healthy. The other state is a degraded state. This state includes a down GPS client or a down GPS server.

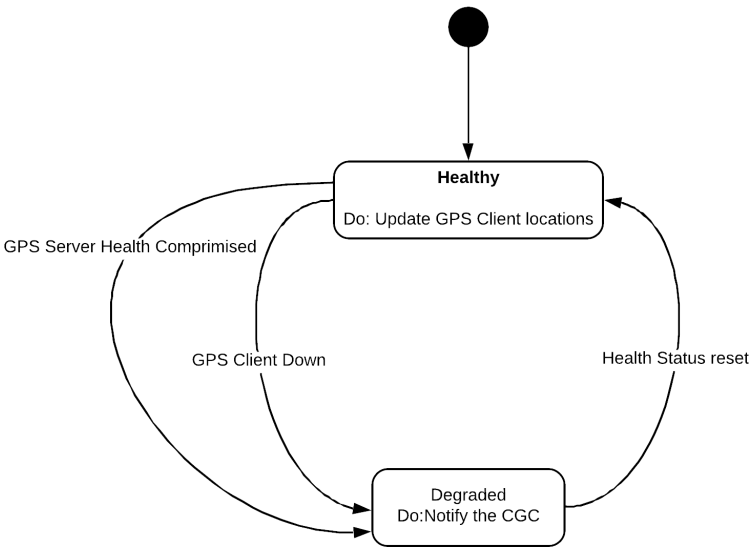

Figure 6: GPS Server Dynamic Control Model

Global Alarm System

The Global Alarm System logic is also very simple. the speakers can either be active and doing something or the system can be idle waiting to be triggered into an active state.

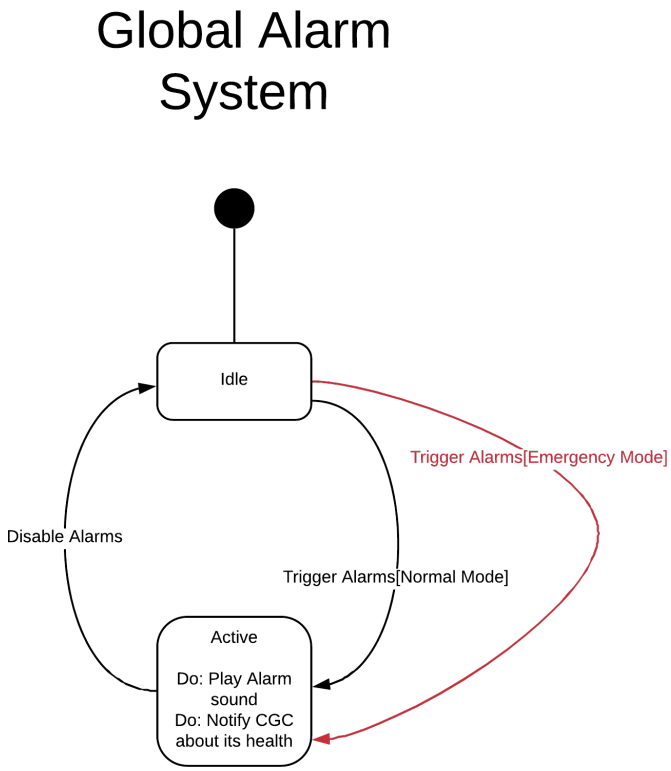

Figure 7: Global Alarm System Dynamic Control Model

Camera Network

The camera network has a healthy state and degraded state. it also has a DVR state where the system can manage recordings of video feeds.

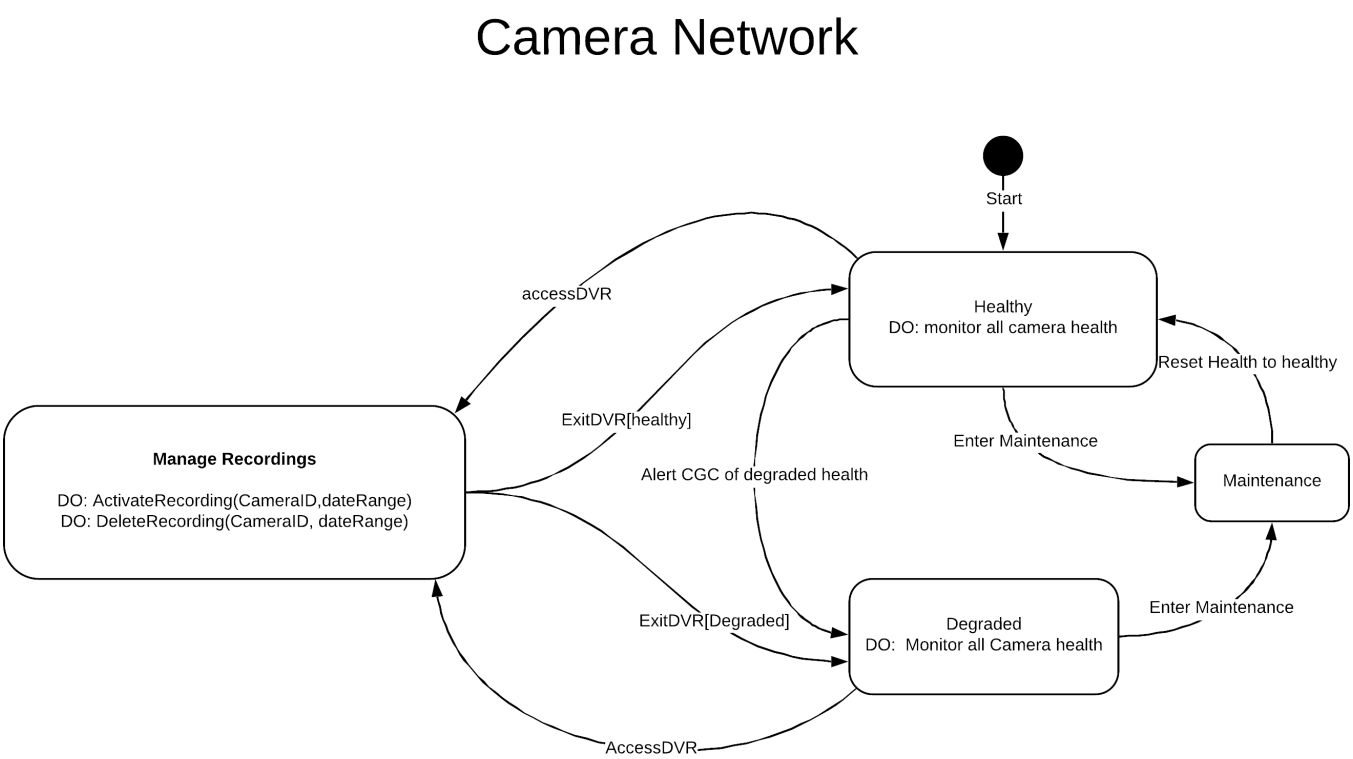

Figure 8: Camera Network System Dynamic Control Model

Electric Fence

The electric fence can either be in an Idle or healthy state. It could also be in an Emergency state at this point it triggers the entire CGC to go into emergency mode.

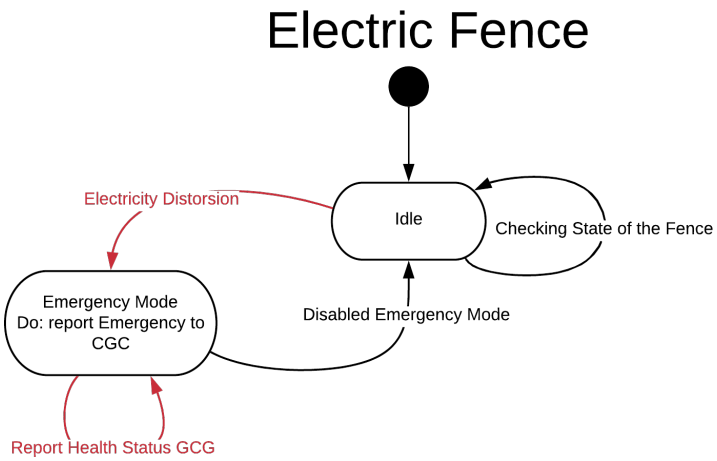

Figure 9: Electric Fence Dynamic Control Model

T-Rex Monitor

The logic in this diagram is for the T-Rex Monitor

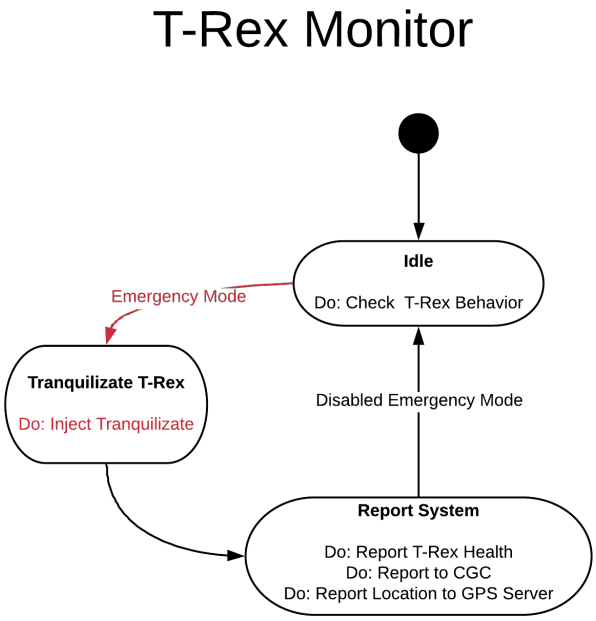

Figure 10: T-Rex Monitor Dynamic Control Model

4 Design Constraints

There are quite a bit of constraints[5] *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.
- 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.

[5] Design Constraints by Anas Gauba

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.

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 Emergency Personnel

Emergency Personnel (EP) may be police officers, federal agents, paramedics, and in certain contexts even security guards. Among the many actions that may be taken by such an actor are search and rescue, arrest, perform CPR, and many more.

Use Case: SearchAndRescue

Primary Actor: Emergency Personnel

Goal in Context: To find any potentially remaining guests after a disaster has occurred on the island.

Preconditions: Emergency mode may or may not be currently active, but it has definitely been triggered prior to the arrival of the actor.

Trigger: A distress signal has been received from Cretaceous Gardens (from Isla Trueno).

Scenario:

1. The platoon has received orders to address an emergency on Isla Trueno.
2. The troops arrive to the island littered with debris and corpses.
3. Some Pay kiosks remain active with an eerie glow coming from an uncannily cheerful welcome screen.
4. Screams of terror can be heard in the distance, followed by tremendous roars.
5. The Emergency Personnel head to the kiosks and enter special codes that provide them with an enormous supply of token devices.
6. The EP diffuse throughout the island as they sweep for survivors.
7. Several helicopters can be heard swarming overhead and small group is sent to the CGC Station.
8. As the troops move inland they find severely injured, but alive, guests.
9. The troops give the injured new tokens which may be detected by the team at the station.
10. A second group arrives at the island, and is directed by the team at the station (via walkie talkies) to the injured.
11. The team notices the T-Rex Monitor signal moving toward the sweeping group of soldiers and they alert them immediately to get into offensive positions.
12. The helicopters overhead lower themselves to wait for the animal.
13. Permission to engage is granted and the beast is taken down.
14. The troops continue their operation until sunrise as teams of paramedics are shipped to the island.

Exceptions:

The T.Rex destroys the CGC Station.

Priority: Essential, must be implemented.

When Available: On demand.

Frequency of Use: Hopefully never.

Channel to Primary Actor: Token GPS

Secondary Actors: Guests, Tokens, Pay Kiosks

Channels to Secondary Actors:

Guests: tokens

Tokens: pay kiosks

Pay Kiosks: direct

Open Issues:

None known.

5.3 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 5.4).
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: Essential, must be implemented

When Available: During business hours.

Frequency of Use: Up to thousands of times per day

Channel to Primary Actor: External media source, island dock, pay kiosk interface, car door, seatbelt buckle, exhibit gate, electric enclosure

Secondary Actors: Pay Kiosk, Token, Car, T.Rex

Channels to Secondary Actors:

Pay Kiosk: pay kiosk touch screen, card or cash receptacle, token dispenser

Token: token dispenser

Car: car door, seatbelt and buckle

T.Rex: all the above, and the electric fence enclosure

Open Issues:

None known.

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 5.10).
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.

5.4 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.

5.5 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

5.6 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.

5.7 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.

5.8 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.

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.

5.9 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?

5.10 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.

5.11 Veterinarian

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

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?

5.12 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.

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 [6] *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*

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.

[6] Definition of Terms by Anas Gauba