CGC

Technical Feasibility Study

TFS Version 2.0

Team #1
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CS 460 Software Engineering

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1. Introduction

The cretaceous gardens controller is a software that will maintain a new theme park on the island. It is running on the latest firmware and is up to date with required safety codes and laws. It allows visitors to view the T-rex which is confined in the enclosure on the north-end of the island. It has an automated-station on the south-end of the island that charges entry fees and prints unique token for each visitor. The visitors will use the token to get on the vehicle. The self-driving car takes at most 10 visitors from the south-end to the north-end of the island. The autonomous vehicle drops off the visitors on the north-end where the exhibit of the T-rex is located. The alarm integrated with the vehicle sounds when it is time for the visitors to leave.

2. Research and Findings

Findings consist of different material requirements and costs, which are the physical materials needed to build the CGC, software requirements, which are the software side of the CGC, and lastly safety and regulations, in order to ensure our customers have the safest experience, and that the theme park follows adequate regulations.

2.1 Findings

The theme park must have all the important features to ensure the safety of the visitors. The theme park must have security cameras placed everywhere in the park to enhance the security of the visitors. The automated pay station must accept cash as well as debit/credit cards. The automated pay station must use an RFID printer to print the ticket. The automated pay station must have an LCD screen that displays the payment information. The visitors must sign a waiver confirming the potential risk partaking the theme park. The visitors are expected to follow a set of rules and regulations of the theme park. Rules are placed at every exhibit and if they violate the rules and regulation, the visitor's ID will be deactivated and are asked to leave the theme park.

The autonomous car must have an RFID scanner to scan the RFID ticket. The autonomous car must be equipped with all the important sensors like LiDAR, Radar, Ultrasonic sensor, camera, and GPS to provide safe and efficient transport to the visitors. Gps will be used to navigate the autonomous car to the set path. The car must have an Infrared sensor to count the number of visitors getting in the car. The car must also have a door sensor that should not close the door of the car until all the obstructions are out of the way. The area of the enclosure should have adequate

land space for facilitating T-rex to have free movement. Remote sensing must be used to provide real-time alerts to security personnel when there is a failure in the electric fence. It must also provide information about changes in the voltage. The voltage for the electric fence must be between 2,000 and 10,000. 10,000 is the maximum voltage allowed by International regulation.In case of emergency situations, all the visitors are taken to the safe zone by the security personnel. Speakers integrated with the alarm system will alert everyone in the theme park about the emergency situation.

2.2 Material Requirements

An automated pay station that must be able to accept card and mobile device payments will be needed for visitors to pay and receive their individual unique token upon arrival. This token will be provided in the form of a physical RFID chipped card and will be given to each visitor. After payment and receiving a unique RFID card, a barge is needed that will pick up visitors and take them to the south side of the island. For efficiency purposes, this barge is required to fit a minimum of 10 occupants. Next, an autonomous vehicle equipped with locks and an alarm, and able to fit a minimum of 10 occupants will be required to transport visitors from their arrival at the south-end of the island to the attraction at the north-end. For safety and liability purposes, the perimeter of the island will need to be fenced off to prevent visitors from leaving the island without the provided means. The T-Rex exhibit will need to be enclosed in heavy-duty, steel fencing, with additional electric fencing around the exhibit perimeter to force the T-Rex to remain within its enclosure. Lastly, for added security measures, the exhibit will be equipped with a security camera and alarms on both the north and south ends of the island.

2.3 Software Requirements

The CGC will have accept payments and assign and print a unique RFID card for the user. After a user receives their token and takes the barge to the island, the CGC will need to arrange an autonomous vehicle to come and pick up at most ten passengers on the north-side of the island, taking them to the south-side of the island. The software will need to secure the vehicle from the inside, preventing anybody from opening the doors until arrival. The software will track the exact position of the vehicle at all times. The CGC will have a strict emergency protocol implemented, sounding alarms in the vehicles and at the north and south ends of the islands if triggered.

2.3.1 Autonomous Vehicle Software

The Autonomous vehicle will be housed with sensors capable of finding obstructions on the road. It will have a built in GPS locator and will be able to traverse predetermined paths set by the developers of the island. It will also house seat weight sensors which will allow it to figure out far many passengers are inside the vehicle. The software will also feature a democracy mode that is only enabled in

case of emergencies which will allow the car to start without having the required limit of 10 passengers. This will send another car enroute to pick up any stragglers.

2.3.2 Security Software
The island will feature an array of cameras strategically placed around that encapsulates every blind spot. It will have infrared sensors that will be able to detect movement during the night. The highest density of cameras will be surrounding the exhibit and will keep track of the T-Rex' movement at all times. There will be sensors on the exhibit that will detect irregular seismic activity which occurs if the T-Rex attempts to break free from the exhibit and will set the island into ALERT mode.

2.4 Safety and Regulation Requirements
In order to provide the safest experience to our users, the CGC will have both physical and software security implementations in place. The island's perimeter will be enclosed in fencing, ensuring nobody leaves the island. The T-Rex will be contained in a reinforced closure, with electrical fencing around the perimeter. If any part of this electric fence experiences a failure, the GCG will follow emergency protocol, sounding alarms in the vehicle and at both sides of the island. The CGC will also include a camera around the T-Rex exhibit and can utilize emergency alarms upon detecting something is wrong. The autonomous vehicle's speed will be limited to thirty miles per hour, and must be equipped with sensors to detect any premature hardware failures.

2.4.1 Control Center
There will be a control center that will be keeping a watch on the exhibit at all times. They will have access to the array of cameras and are trained with using a tranquiliser gun in case the T-Rex gets aggravated. This team consists of highly specialized zookeepers that are capable of working in extreme conditions and under extreme stress. They will be keeping the T-Rex safe, fed, and inside the exhibit.

3. Conclusion
In our investigation of the requirements for the CGC that was put forth by the customer, we have identified, researched, and elaborated several areas of requirements that deem this software feasible. In our research, we have taken into consideration various different aspects of the project description to ensure complete user safety and security, as well as maximize efficiency in the design and implementation of the CGC. The completion of the CGC will require physical materials and a software implementation, entailing a team of five engineers and will

span a duration of two months. We deem it feasible to start working on the project given the proper equipment and time.

4. References

https://www.stafix.com/en-us/helpful-information/animal-voltage-requirements