Software Design Specification: “Unstable Bluff” Detection System

By Maron Vincent Ejanda, Janelle Kwofie, Chanine Malong, and Isaac Pompa

Unstable Bluff Detection System Requirement Specification

Prepared by: Maron Vincent Ejanda, Janelle Kwofie, Chanine Malong, and Isaac Pompa

October 15th, 2021

1 Introduction and Overview

The following will be used to describe The Unstable Bluff Detection System. The Unstable Bluff Detection System's purpose will be to detect bluffs in the Del Mar Area for their stability. Unstable bluffs are known to cause damages such as causing rocks to fall on cars, trains, or even people hence why this system running well and timely is so fundamental. Thus the main purpose of this system is safety. The system will work by tracking tourists in a 300-foot range as well as the bluffs. When the bluffs are recorded to been unstable authorities will be alerted. Ultimately, this system will blend in with the environment and will not disturb the tourists or tracks in the area of the bluffs.

2 User Requirements

The system's main functions will be executed through the cameras. In the 300-foot bluff zone, there will be cameras standing on metal pools capturing 50 by 50-foot partial images of the bluff. These 32-bit, timestamped images will then be sent in hourly increments to the off-sight local facility, the main user of this system. The Unstable Bluff Detection System should then allow the facility to send alerts and alarms to operators and lifeguards in the area when the bluffs hit level 4 or 5. These operators and lifeguards are the only other users of this system therefore, they should be able to receive these messages and alarms.

3 System Requirements

3.1 Functional Requirements

Now knowing the overview and the main users of this system, these functional requirements will list what this system needs to do. This system will monitor about 300-foot rangers of the bluffs by using 6 cameras placed onto poles along the area. These cameras will be able to capture a 50 50 foot area to fully capture the total 300 feet. The image captured will be sent to a local facility hourly where the images will be stored with time and level data for the bluff. This system also has a severity rating where 0 is safe, 1-3 is considered a potential rockslide, 4-5 is a significant

change where alarms go off and the Amtrak rail operators and lifeguards are alerted to block the roads and evacuate the people. The facility will then check the footage to see if any people were left behind. In normal conditions, it is imperative that the system is still sending these images to the facility so they can be accessed and examined. The bluff must be monitored 24/7 by the system showing accurate readings of the levels as well as sending out alerts only when necessary.

Use Cases:

In a normal use case, the cameras and trackers record 24/7. If an unstable bluff of Level 4 or 5 occurs it will offset the alert and alert the authorities. Or in the case of no bluffs, no response will be given if it never hits level 4. If in the case the alarm goes off when it is unnecessary the authorities will confirm a false alarm and the system will be revised for the magnitude that alerts a level 4. In the cases, the camera fails the local facility will be alerted. Overall, in the case of false alarms, it is more important to be overly safe than sorry, and have the authorities confirm the safety of the bluff first.

3.2 Non-functional Requirements

The Cameras:

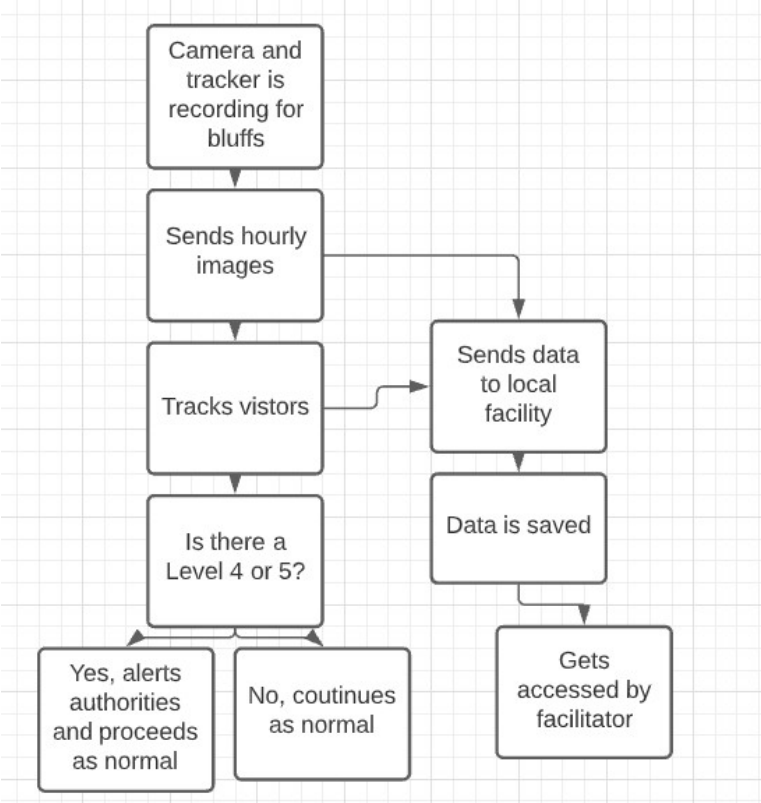
- The Cameras need to be 24/7 and hourly move 32 bit and time stamps will be sent from the cameras to an off-sight local facility.
- Cameras will sit on polls.
- These images need to be 4000 pixels per square bit and 8 bits per pixel. The images should be available in color and greyscale. Additionally, the bluff along with the edge and 300 ft of the surrounding area should be pictured.

Off Sight Facility:

- Needs to be an off-sight facility with lots of memory on hand to save all the information.

Alert:

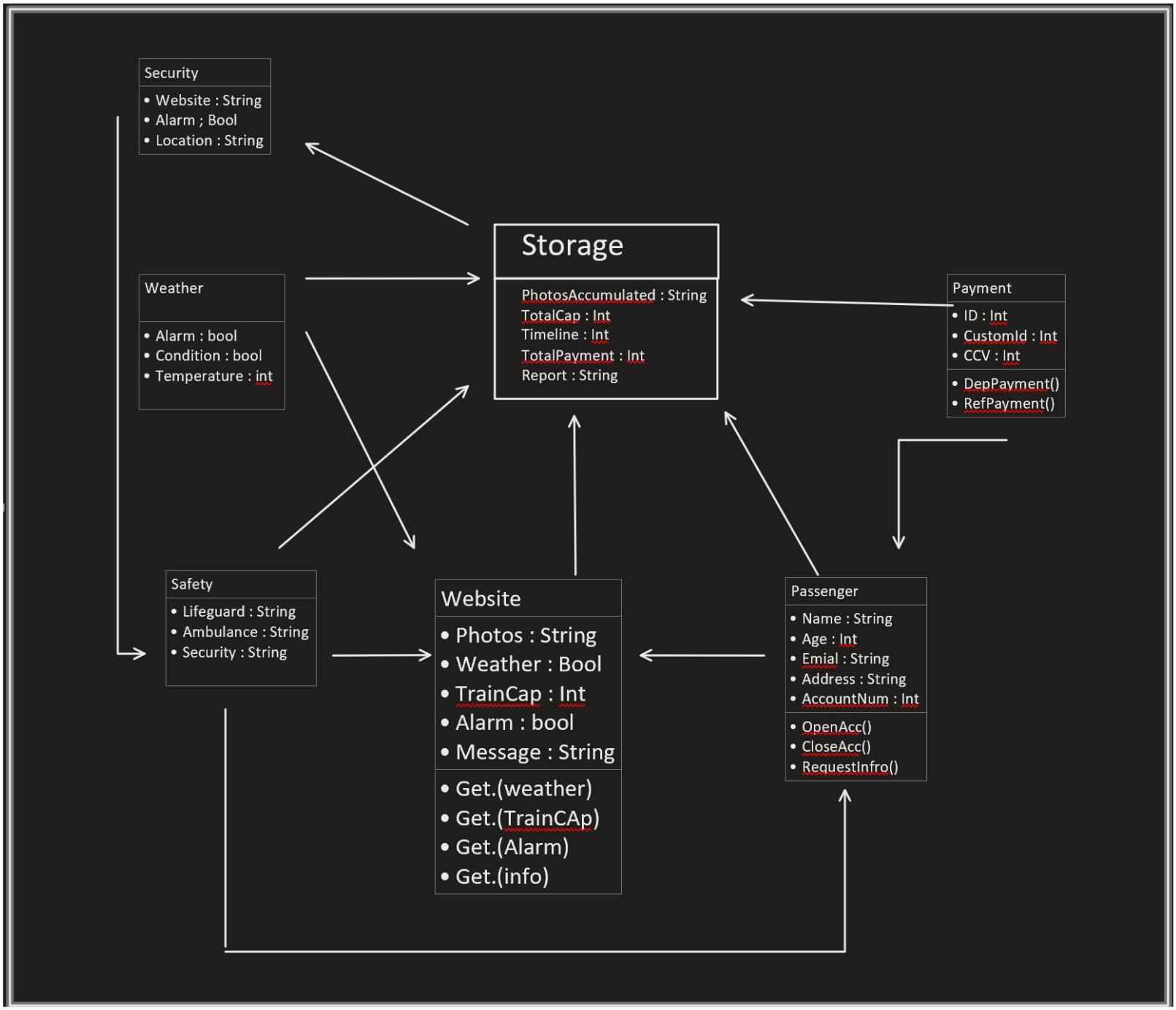
- Should send fast and correct alerts. ● Needs to be 24/7.



4 Other

This section (or following subsections) contains any relevant information not covered in any previous section. Examples include risks, constraints, assumptions (not already identified), and potential future changes.

- Alerts need to be correct and sent to everyone in the area, not just safety personal
- Images need to be adaptable to time of day, i.e. night mode versus day mode.
- Needs to not disturb visitors, tracks, or safety measures.
- Should ensure that alerts have the right information to set off for each level.


Security
• Website : String
• Alarm ; Bool
• Location : String
Storage
PhotosAccumulated : String
TotalCap : Int
Timeline : Int
TotalPayment : Int
Report : String
Weather
• Alarm : bool
• Condition : bool
• Temperature : int
Payment
• ID : Int
• CustomId : Int
• CCV : Int
• DepPayment()
• RefPayment()
Safety
• Lifeguard : String
• Ambulance : String
• Security : String
Website
• Photos : String
• Weather : Bool
• TrainCap : Int
• Alarm : bool
• Message : String
• Get.(weather)
• Get.(TrainCAp)
• Get.(Alarm)
• Get.(info)
Passenger
• Name : String
• Age : Int
• Emial : String
• Address : String
• AccountNum : Int
• OpenAcc()
• CloseAcc()
• RequestInfro()

Software Architecture Description

- The website class will contain the following attributes:
  - Photos of the bluffs for the system to catch any differences
  - Weather report because it can cause rockslides
  - Train capacity lets the operators know how many people there should be if an evacuation were to happen
  - The alarm alarms the lifeguards and operators by sending a message All of these attributes can be accessed by using the get() method for each.

- The weather class has the temperature and condition and will alarm if the condition is bad.

- In the passenger class, the attributes include:
  - All personal information such as name, age, email, address, and account number
  - Allows them to open an account by requesting the user's personal information - Can also close the account if they want

- After creating an account, they can purchase train tickets by providing their payment information in the payment class.
  - User must input their ID, CustomID, and CCV number of card - Can pay for a ticket or get a refund

- Under the security class, the attributes would be:
  - The website, alarm, and location of which area within the 300 feet bluffs have been affected
  - This will then be passed to the safety class

- The safety class is how the lifeguards, ambulance, and security will be alerted and is sent the location where the rocks are unstable. These people can access the main website and passenger data for safety.

- Meanwhile, all the data from the weather, safety, website, passenger, and payment classes are stored in the storage class.
  - Photos accumulated and timeline will be saved up in the storage for one year - Total capacity saves the total capacity of each train - The report is where the rating system occurs.
  - 0 = no noticeable changes
  - 1-3 = subtle changes, but not dangerous
  - 4-5 = significant changes and information is sent to the security and safety classes to alert the lifeguards and operators

Development Plan and Timeline:

As a team we would take 6 months to complete our software system. Nelle would be in charge of implementing the website class where it contains photos of bluffs, weather reports, train capacity, and the alarm that alerts the operators. Nelle would also be responsible for the weather class which includes temperatures, conditions, and the alarm that turns on if the condition is bad. Chanine will be in control of fulfilling the passenger and payment class. The passenger class has the passenger's personal information and permits a passenger to open and close an account by asking the user's personal information. The payment class would allow the user to input their debit/credit card information to purchase a ticket or request a refund. Vincent would be in charge of creating the security and safety class. The security class will have the location of the bluff that has been affected within 300 feet, the website, and alarms. The safety class will allow lifeguards, ambulance, and security to view the location of the unstable rocks. The safety class will also allow the lifeguards, ambulance, and security to access the passengers data. Finally, Isaac will be responsible for implementing the storage class which will let the system store all the classes information. For example, photos accumulated and timeline will be saved up in the storage for one year, the total capacity of each train, and reports of the rating system.