Turtle Cam: Live Multimedia Interaction For Engaging Potential Visitor Population To Canaveral National Seashore

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TURTLE CAM: LIVE MULTIMEDIA INTERACTION FOR ENGAGING POTENTIAL VISITOR POPULATION TO CANAVERAL NATIONAL SEASHORE

by

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ABSTRACT

This project expands the outreach of the Canaveral National Seashore to its visitors, potential visitors, and virtual visitors through its goals in conservancy and preservation of its natural resources. This paper is involved with the current iteration of a series of digital media projects, the Sea Turtle Nest Camera, also known as, Turtle Cam. It details how and why this project was designed to be an ongoing initiative to assist in those goals.

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I would like to take time to thank the following people for their contributions to my graduate education, the content of my research, and this paper.

Team members that contributed directly to this project:

- Phil Peters, Associate Professor of Digital Media at UCF, project Faculty Advisor
- Jon Rife III, Mac Rutan, Reuben Rogak, Victor Randle, Brad Lewter, Brian Mitchell, John Phillip Chatt

Canaveral National Seashore staff:

- Laura Henning, Chief of interpretation
- Myrna Palfrey-Perez, CNS Park Superintendant
- Mike Daily, Michelle, and the rest of interpretive staff and maintenance crew.

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- Scott Hudson, owner Hudson Security
- Adam Lenz, Instructor of Digital Media, UCF
- Jon Friskics, Instructor, UCF

Thesis committee:

- Cheryl Cabrera, Assistant Professor of Digital Media, UCF
- Dr. Robb Lindgren, Assistant Professor of Digital Media, UCF
- Robert Reedy, Professor of Fine Art, UCF

My ever-patient wife, Cindy, and my three amazingly gorgeous children; Quinn, Finnegan, and Lucia, two of whom were not yet born when this project began.

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LIST OF ACRONYMS/ABBREVIATIONS

DM	Digital Media
NPS	National Park Service
RF	Radio Frequency
IP	Internet Protocol

CHAPTER 1: INTRODUCTION AND BACKGROUND

Originally, the relationship between the Digital Media (DM) department at the University of Central Florida and the Canaveral National Seashore began with a project in Professor Phil Peters' 'Design for Media' graduate level course. The class as a whole had agreed to create an immersive, interactive experience to show potential visitors the beauty and history of this National Park on the east coast of central Florida. It would take the form of an interactive web portal.

Brief Parks History

The American National Parks Service (NPS) was created by Congress through the National Park Service Organic Act, was signed by President Woodrow Wilson on August 25, 1916. It is a bureau of the Department of the Interior. There are almost 400 sites including national parks, monuments, battlefields, military parks, historical parks, historic sites, lakeshores, seashores, recreation areas, scenic rivers and trails, and the White House.[www.nps.gov] Following in America's footsteps, 140 countries around the world now have National Park Systems. The World Commission on Protected Areas works through the

International Union of Conservation of Nature to assist the governments of these countries.[www.iucn.org]

Wallace Stegner, historian, novelist, conservationist, and educator 1983:

"National parks are the best idea we ever had. Absolutely American, absolutely democratic, they reflect us at our best rather than our worst."[www.nps.gov]

Figure 1: Baby Sea Turtle. Photo by Melanie Bateman.

It was important for this project to focus on the established missions of the NPS. Canaveral National Seashore is home to fourteen federally listed 'threatened and endangered species'. Sea turtles are one of the most popular of those animals. The Turtle Walk programs are consistently the most popular programs at the park every year. This specific project was designed to bring attention to the endangered sea turtle breeds that nest at

Canaveral, draw visitors into an emotional connection with them, and educate them. Full grown sea turtles only have one natural predator in the wild, large sharks. Baby sea turtles, unfortunately are much more vulnerable. This vulnerability and fragility coupled with their endangered status strikes an emotional chord.

Media Research

To determine the current level of multimedia content, a study was conducted by all project designers to survey the digital media types found on every National Park website. The findings were very surprising.

We found that 24% of the websites for the over 400 NPS sites do not have any kind of media at all. No photo galleries or slide shows of any kind. Only 10% have 'rich media' content (interactive, video, etc.). Some sites have audio files, videos, flash animations, interactive walk-throughs, and even webcams, but they are a small minority and tend to be the huge, anchor parks that are familiar to most Americans.

While I feel that Turtle Cam is revolutionary for the NPS, some parks are already using streaming video and webcams now. They take many forms and serve different purposes from showing beautiful vistas, to spotlighting famous points of interest like lighthouses and geysers. There is also a network of 18 parks that have what are called “Air Quality Web Cameras”. These are used for monitoring and observation of air quality and visibility. The feeds are updated one image every fifteen minutes.[www.nps.org]

Even though webcams are nothing new to the NPS, none of the existing webcams are remote, solar powered, wireless, infrared, and live streaming (the fastest are set to 1 frame every few seconds). The closest to compare to Turtle Cam is the Channel Islands National Park Bald Eagle Cam.[Menard] Even though the distance the signal and its relays travels for this webcam is impressive (a total of about 45 miles) it is neither infrared capable nor mobile. The Turtle Cam system is a step above what other parks have in place due to its design and hardware. It is a backbone that can turn into an expanded network for building a whole custom multimedia program.

Figure 2: Bald Eagle Cam screen capture.

Why Digital Media Works for Conservancy Efforts

The internet has grown rapidly every year since its popularity broke into the mainstream in the mid-1990s. People realized how its structure was perfect for being an information access/dissemination tool. People have always been able to connect with each other through common interests, but the internet made it simpler to do this globally. You could share stories, images, and even video content with like-minded individuals anywhere in the world. Activism and conservation efforts would be permanently changed by this. Participation, discussions, the active role of users, brought together by this global infrastructure became so important for political participation and activism.[Neumayer 42]. The result is like your efforts being multiplied.

It’s important, however, to realize that not only is the potential for the use of new social tools in wilderness stewardship paramount, the ways in which these new social tools will change wilderness stewardship are paramount also.[Eidson 36]

I feel that streaming video is a good tool to bring people to a conservation topic like the plight of the endangered sea turtles. Christine Ann Decker talked about how real live images from nature have a more effective impact than a fantastical show like those of Sea World.[Decker 41] She wrote about a Fine Art project called Coastal Public Art, where live video streams from salmon rivers were displayed in downtown Seattle. It was an effort to bring awareness of ocean science to the public. This mirrors the aesthetic we were using for this project, to show real, live video streaming from nature to powerfully engage an audience.

Accessibility And ADA

When considering the needs of our proposed audience, we wanted to fill the visitor gap. We asked these two questions: Who was not being served ? Who would be best served by providing an interactive experience of Canaveral ? It was concluded that people who were physically, geographically, or financially restricted could benefit from the new portal. Physically restricted could mean that someone is physically handicapped and house bound, deployed military, or even incarcerated. Geographical restrictions could be that someone lives very far away from a park, even in another part of the world, and making the trip would take a significant investment. Financially restricted potential visitors could even live in a nearby town but be unable to take the time off or spend the money (for admission, gas, travel, food, expenses, etc.) making a visit in person unlikely or impossible. The portal was intended to also be an investigative tool for someone who might come to the park but wanted to preview it on their computer.

Figure 3: ADA Logo.

The Americans with Disabilities Act was signed into law in 1990. It is a comprehensive act that set specific standards for government and private entities and how they were to make concessions for and not discriminate against persons with disabilities. The act defines such persons:

“An individual is considered to have a "disability" if s/he has a physical or mental impairment that substantially limits one or more major life activities, has a record of such an impairment, or is regarded as having such an impairment.”[www.ada.gov]

Much of this act gives protections to disabled persons pertaining to employment, but significant requirements are set forth for physical accessibility to resources. As an example, every public building or place of business you see today has a ramp to an entrance or exit because stairs can be so restrictive to people with physical handicaps. Such things are a result of the passing of the ADA.

The NPS, being a bureau of the federal government, has an official statement pertaining to accessibility.

“The National Park Service is committed to making every possible effort to ensure that all information is accessible to people with disabilities, including both employees and customers we serve.”[www.nps.gov]

Having a digital interactive experience for the park aligns with the NPS statement of “making every possible effort” to accommodate visitors.

Project 1.0

On the first phase of the Interactive Portal project, I was a team member working to make an interactive video walkthrough of one of Canaveral's beautiful, scenic hammock trails. I recorded and edited audio for most of the ambient sound used in the portal. When completed, the project was not posted as a replacement to the Canaveral website, it was published under the address – interactiveparks.org and linked from the official site. Some of the specific projects we built for the web portal were as follows: video walk through of the Eldora Hammock Trail, 360° interactive panning images, computer generated animated fly-over of the park, flash based fishing game, guidebook feature with historical information for each point of interest, 'Virtual Ranger' green screen video overlay of a ranger telling the visitor about certain sites throughout the park, mini-Documentary about clam farming and conservation, kayaking 'Paddle-Through' video on Mosquito Lagoon, and navigation through an interactive map.

Figure 4:Interactive Portal front page with video ranger.

Figure 5: Park Flyover animation video.

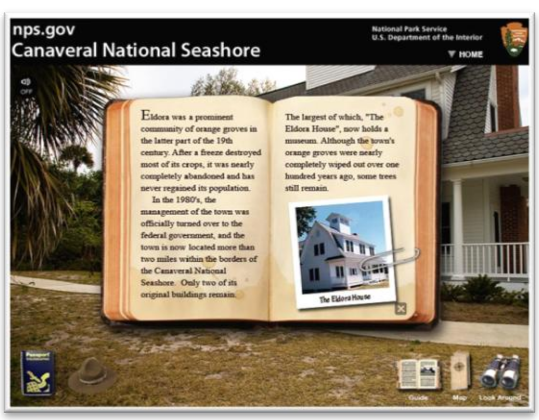

Figure 6: Guidebook at Eldora House.

Project 2.0

I was asked by Professor Peters to come back for phase two of the Interactive Portal project the following year to work with newer graduate students on additions and changes to the original iteration. I was the Art Director of this phase and oversaw the design, look, and feel of the new components of the portal as well as the new Fine Art additions.

Each team of three students, and myself, after spending a couple days in the park, created an installation piece inspired by what we experienced. Canaveral has an abundance of flying, crawling, and swimming wildlife. Through its lagoons and waterways there are numerous pristine islands. Their beach is the longest stretch of untouched coastline on the east coast. The oak hammocks are lush and perfect for hiking and wildlife spotting. The inspirations were everywhere and each group had a very different direction to go in with their installations.

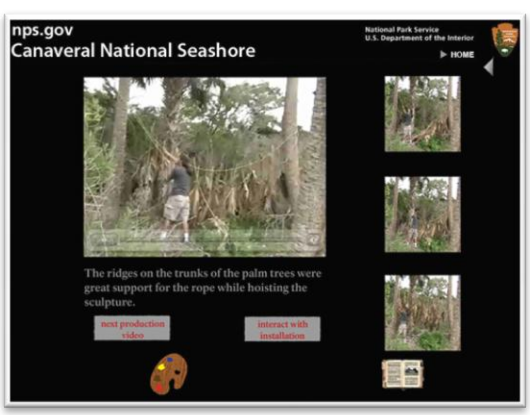

Figure 7: Digitally Interactive version of my installation, "Rustling Overture".

These five installations also had digitally interactive components that were installed into the interactive portal. My own piece was a physical installation of a series of palm fronds and branches suspended between two trees on the water’s edge of the Mosquito Lagoon. I filmed the installation blowing in the breeze and recorded the beautifully serene and calming audio. This was integrated into an interactive Flash application that documented my process and allowed you to interact and affect the audio through manipulation of your cursor over the video area.

Other components of the second phase include: reworking some of the points of interest to include more rich media content, more interactive site exploration, additional walkthroughs, additional video content, and “Kids Zone” with downloadable, fact filled coloring activity sheets.

CHAPTER 2: THE TURTLE CAM PROJECT 3.0

In the Spring of 2010 the project was awarded a $10,000 grant from the National Parks Foundation to move forward with developing, fabricating, and deploying the Turtle Cam Project. I took over the roll of fabricator of all hardware elements (the camera rig, relay pole and mounts), deployed all hardware, generated web content, and tested and troubleshot the system over several months. I worked with other team members and the staff and administration at Canaveral to bring the Turtle Cam online in the Fall of 2010, during the regular sea turtle nesting and hatching season.

Figure 8: NPF Logo.

Hardware Acquisition

The Turtle Cam system required purchase of several pieces of hardware. The transmission hardware was purchased as a package containing a transmitter (4.5″ X 4.5″ X 4.5″ box fitted with coaxial and a/c connections), a relay (7″ X 7″ X 4.5″ box fitted with small, plastic omni-directional antenna for retransmitting the signal), and a receiver (7″ X 7″ X 4.5″ box fitted with coaxial and a/c connections). The receiver was connected to a digital converter box so that the analogue signal could be read by the computer in a digital format and re-broadcast.

To create a durable, reliable, and self sustaining power supply, a large, deep cycle marine battery was chosen to power the system because of it’s ability to withstand the climate of being on the beach for months out of the year and it’s rating for powering the equipment uninterrupted for almost 100 hours. This is a large battery measuring 12.75” X 6.75” X 9.9” and weighing 63 pounds.

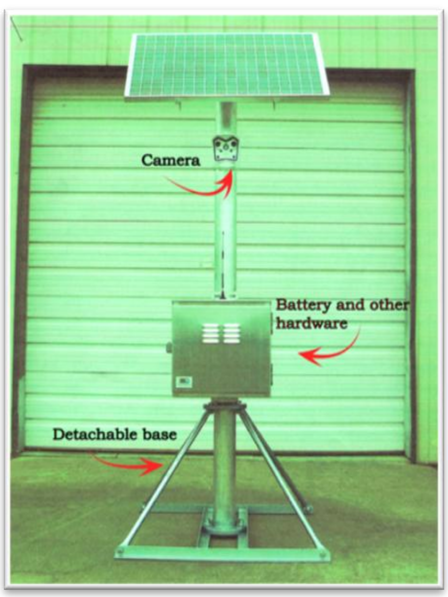

Figure 9: Example camera assembly I worked from.

One of the most difficult tasks in this entire project was in finding a battery box built to our specifications. It had to be made of aluminum, large enough to contain the battery with enough room left over for other components and wiring. It also had to fit onto the portable camera rig without being too bulky. We went to several electrical supply houses, surplus stores, and checked website after website. What we found were a great deal of electrical boxes that remotely fitted our criteria but were about $700 and up in price. This is just for a metal box. Finally, I located a company in California that specialized in solar power applications. They had exactly the right sized box made of powder-coated aluminum.

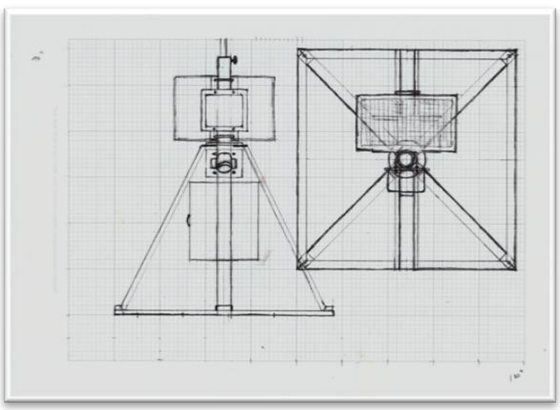

Figure 10: Original design of Turtle Cam Array, top and front views.

To prevent the battery from running down during the day, I designed two failsafe features. First, I fabricated and wired in two on/off switches in the battery box. They supplied power to the transmitter and the camera individually. I saw the simplicity of a park ranger being able to manually turn off the rig to conserve power. Secondly, I installed two light sensors, one for each the transmitter and the camera. The search for just the right kind of sensor took longer than I would have thought as well. We ended up discovering an obscure yet perfect twilight sensor designed specifically for marine applications, called the Night Watchman, that would turn on the components at dusk and turn them off again at dawn. It is a simple 1” X 1” X 1” cube that I mounted on the outside of the battery box.

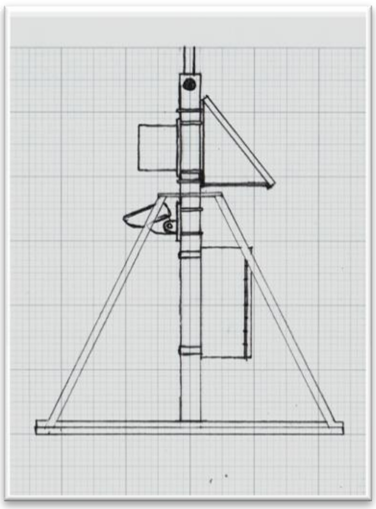

Figure 11: Original design of Turtle Cam Array, side view.

A solar panel charges the battery during daylight hours while the system is not drawing any power. With the use of the light sensors, the components are only drawing power during the night. With some quick computations in the design process, we were able to purchase the right size solar panel to refill the battery from what was drained running the system in the nighttime. This configuration creates a self-sustaining system.

Hardware Fabrication

The camera, power system, and transmitter needed to be mounted to a rig that could hold them without ending up too bulky or heavy to be portable. Using an example found through research by one of the team members I designed a frame built from right-angle aluminum slats. I made sure that the base had a footprint that would fit in the trailer that Canaveral pulled with its four-wheelers. While the aluminum frame was not heavy, all of the hardware, especially the marine battery, made it too cumbersome for one person to move. It had to be moved from nest to nest by the four-wheeler and trailer. It was centered around a 5’ tall, 2.5” thick aluminum pole. So that the transmitter could get a clear signal, we slid a 12’ tall pole into this frame. It could rotate 360°, but was suspended in the central shaft by a stop-bolt only two feet from the top of the shaft, and held in place by two cinch bolts. These were very simple solutions that proved very effective.

I worked with Superior Metal Fabricators, Inc. to weld up the frame of the camera rig. I brought them the materials with the designs drafted out. I had already written up a ‘cut list’ of exactly the pieces I needed to construct the camera rig and fabricated it with Ben Lake, their Foremen.

Figure 12: Welded frame of Turtle Cam Array at Superior Metals.

The transmitter was mounted on the top of the 12’ pole. Since the pole was free to rotate, once the rig was settled in place, the Ranger could aim the transmitter directly at the relay pole down the beach. Even if the camera rig were a mile away from the relay, the system would maintain a clear signal due to the concentrated, directional transmission. Once aimed, the pole on the camera rig would be locked into place by a cinch bolt. This ensured a more secure, consistent transmission.

Figure 13: Directional transmitter on top of Turtle Cam array.

Originally, the signal relay was a mounted on top of a 12’ aluminum pole that was mounted on the top of a wooden lamppost. This lamppost was located at the access road running parallel to the beach between the dunes and the main road through the park. We installed the pole there for stability in all weather, and because we were able to tie into the reliable electricity already running to the pole for the floodlight. Ben Lake and I fabricated a mounting bracket out of a curved sheet and short pole of aluminum that I screwed into the top of the wooden pole. The 12’ relay pole slid into the bracket’s pole secured by a stop-bolt and two cinch bolts. An omni-directional antenna received the RF signal from the camera rig, and was relayed on to the receiver. Since this was a directional transmission, the pole was rotated to align correctly before being cinched in place. The power cable for the relay was run from the relay’s box, through the pole, through the bracket, down a PVC pipe, right into en electrical box on the pole where we had an ordinary three prong outlet installed. This path prevented any damage due to water.

Figure 14: Original Relay and pole.

Figure 15: Original relay pole bracket.

We found that the location of the relay pole was too far behind the dunes of the beach. The signal was coming through, but we wanted it to be clearer and more reliable. We decided to move the relay right up to the edge of the dunes and extend it up to 20’ tall.

Figure 16: Relay position at sand dunes.

For added stability, the new relay pole was actually made up of two aluminum poles, one sleeved inside the other. They overlapped for 5 feet, secured by three stainless steel bolts spaced evenly through the overlapping area. The relay itself was still mounted on top of the pole and the power cable was still able to run through the pole down to a plastic electrical box. Now we had to use a 100’ exterior power extension chord that ran from the old relay site to the new site. This way, we did not have to worry about batteries and solar panels to power the relay.

Figure 17: Anchoring structure of the relay pole.

The Relay box had to be aimed toward the transmitter because of the ‘line-of-sight’ functionality of the RF signal. This was the reasoning behind having a 20’ pole; the signal could clear the sand dunes and travel from far down the beach and still have a clear transmission. We mounted the receiver box on the edge of the roof of the Canaveral Maintenance facility with large wood screws. We had to run both a/c and coaxial cables from the receiver box under the eaves and around the building. We drilled a hole in the wall directly into the small server room where the phone and internet systems were kept. Our iMac computer is kept there for security and convenience. The a/c cable plugged right into the wall and the coaxial cable was plugged into a digital converter box. This converter was plugged directly into a firewire port on the iMac. This connection allowed Wirecast to access the video feed as a direct video input to the computer. From there, the frame was formatted visually and Wirecast sent the feed to our Amazon streaming server for re-streaming to the Canaveral website. We used an Adobe Flash file that was imbedded on the Canaveral site and programmed to display the video feed from the designated IP address from the streaming server. Within a few seconds of hitting the "play" button, visitors can see a live feed of a sea turtle's nest on the longest stretch of undeveloped beach on the east coast of the United States.

Figure 18: Locations of installed hardware.

CHAPTER 3: THE TURTLE CAM PROJECT Moves Forward

Project 3.3

In the Summer of 2011, Laura Henning, the Chief of Interpretation at Canaveral, decided to set aside enough money from their budget to upgrade the transmitting hardware on the Turtle Cam system. The RF system worked, but newer technology provided for a much more reliable signal. The system was redesigned based on wireless Wi-Fi access points doing the sending and receiving. To ensure a reliable signal at greater distance, I installed external, directional antennas to each access point and allowed for the poles they were mounted on to swivel. This way, the focused transmission of the directional antennas could be lined up for maximum distance and clear reception. An omni-directioal antenna was used for the terminal receiver. I did this so that, when the system is expanded to include multiple camera rigs, directional antennas in different parts of the park can be aimed at one receiving omni-directioanl antenna that has an equal degree of reception from any direction.

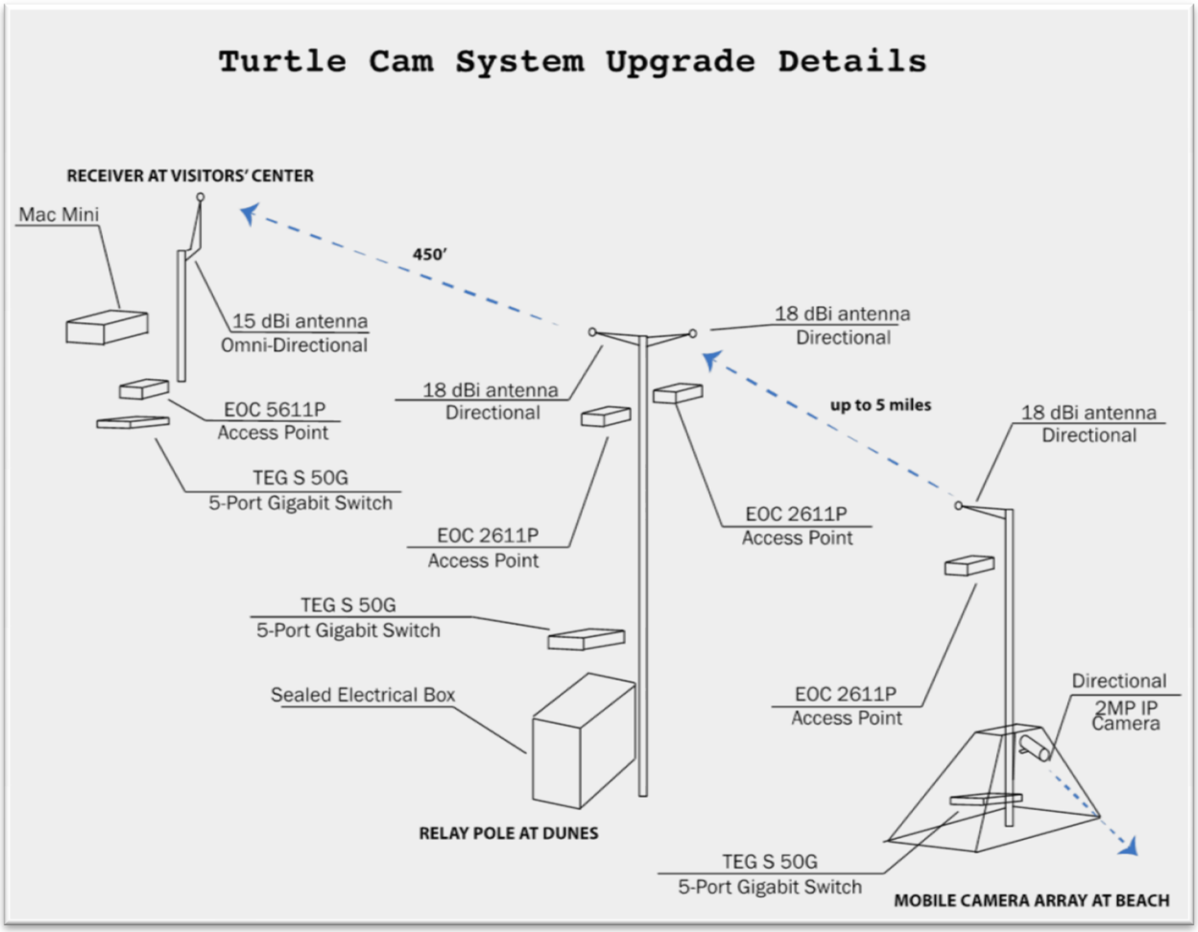

Figure 19: New transmission hardware setup.

The new HD IP camera was added as an upgrade for several reasons. The analog camera was fine, but it's zoom, focus, and resolution were limited. High Definition video resolution gave us a much wider range of what quality image we could put on the Canaveral website. Since it is digital, the viewer's interface for an IP camera can be tailored to many variations. Ours can actually allow multiple viewing options of different image sizes, resolutions, and even frame rates at the same time in the form of a drop down menu in the visitor's web browser window. IP cameras can be accessed very simply. Since they are assigned a permanent IP address, you can simply type the number into your browser, and you are accessing the camera's stream live. With the case of the NPS and the Federal government's tight security protocols, the single direction feed going from the park to the streaming server prevents outside access of the park's protected systems.

Figure 20: IP camera user interface.

In theory, the new hardware was a great upgrade just substituting hardware that was old technology for newer technology. We received excellent advice, counseling, discounts, and demonstrations from Scott Hudson, more than 30-year owner of Hudson Security in Winter Park, Florida. There were a few unanticipated issues that caused us to problem solve our setup and processes.

We wanted to upgrade to a digital IP video camera to take advantage of the ease of access to its video feed. The Eclipse camera’s features were impressive, and the web browser interface was very versatile. When I went to assign the feed as a new IP camera feed in Wirecast, it would not recognize the camera. Telestream, the company that produces Wirecast, informed me that there were only five IP cameras that their technicians had field tested and approved for use with their software, but there were others that would ‘probably’ work. I was told to check the user forums on their website. I spent hours combing through posts and threads looking for someone who had used an Eclipse brand IP camera with Wirecast. The forum monitors had a cut and paste mantra that I saw on every related conversation: ”Support for selected wireless IP cameras (AXIS 211 W, Sony SNC-RZ50, and Cisco WVC80N, AXIS P1344 and AXIS M1104) Wirecast Pro 4. Some have found WebCamXP allows for additional IP cameras not officially supported”.[telestream.net] We bought an Eclipse ECL-IP20MP. I spent more hours researching surveillance and broadcasting software, downloading trial versions, to try and find something that listed our camera as compatible. Some software listed hundreds of cameras as compatible, others just had dozens. Wirecast listed five. I found another streaming server host company that tested our camera remotely. It worked, but would cost us at least $200 a month for hosting.

We needed a software solution to the camera problem. One of my technical consultants, Adam Lenz who was an original member of the project team, tried to find a different way to access the feed from outside the network, but hit roadblock after roadblock, due to the federal institution's firewall security.

After a few weeks of this troubleshooting, I was finally able to get in touch with the Eclipse technicians to ask for advice. I had even installed Microsoft Windows on our iMac through a standard Mac OS feature called BootCamp to see if I could install the (Windows OS only) software that came with the camera. I scheduled a three-way call between Scott Hudson (because they would not talk to anyone other than a licensed installer), their technician, and myself. They told me that their software is the only software that will work with their camera and that it would not broadcast the signal to a streaming server.

The most frustrating part about that ordeal was that the camera worked great inside the park's network. Any computer or mobile device with a web browser was able to watch the video feed from the camera but the camera's IP was not accessible from outside their local network. When I spoke with Frank Draughn, the head if IT security for the National Parks Service Southeastern region, he told me that the security protocols would not allow anyone outside the network access to any IP inside the park's network. It rendered the most convenient attribute of IP cameras ineffective. We needed a different camera. If I had understood the intricacies of the surveillance camera field or if I had found someone who knew the lack of standardization in the field, I would have saved a lot of time and aggravation.

Project 4.0

The possibilities for the next steps in the Turtle Cam project are fantastic. The technology of the hardware, software, and the internet itself as a platform allow for endless practical uses for live streaming video feeds in an educational application focusing on preservation and natural resource awareness.

The most important additions we wanted to make would be an additional mobile camera rig that could be placed in any desired location on the lagoon side of the park. Many educational activities happen there and the mangroves in the Mosquito Lagoon are a wonderful natural resource. Users could check up on the conditions of the water and watch boats, manatee, dolphin, and birds go by.

Since the camera rig could literally take any form so long as it supports the hardware necessary for video capture and transmission, we wanted to construct a rig with independently telescoping legs (in the fashion of a camera tripod) that could be placed in the shallow waters of the mangroves. This Lagoon Cam would observe a whole micro ecosystem in action with the myriad of life that lives in and around these plants on the shorelines.

Canaveral National Seashore has a comprehensive education program. Teachers can bring their classes to the park and participate in many different exploratory, hands-on activities. If I applied the same vision originally from the Interactive Portal, to make the assets and beauty of the park available in an interactive way to everyone with a computer, the impact of every Ranger would be exponentially increased. The camera rigs are mobile. The hardware allows for a microphone input. An educational program that would normally touch a dozen or so students at a time in person, now could touch any number of online participants. The original intent of this project was to bring the park to people who can’t normally go there. This could potentially include entire classrooms of students anywhere in the world who wanted to log on for the scheduled sea turtle nest excavation session and watch live as a NPS Ranger digs up a loggerhead nest to examine the content and study the entire structure. These same streamed video sessions can be recorded simply and archived on the Canaveral website for anyone to access like archived podcasts. Since the cameras are IR capable, you could even do turtle watch programs (Canaveral’s most popular program) at night live. With some simple integration of chatting technology (text or video) these programs could be completely interactive.

Figure 21: Cheif of Interpretation, Laura Henning, conducting a program with students.

Since this process and system is being proven and tested at Canaveral, it does not take much imagination to see that any NPS site could benefit from the application of this technology. The system itself can be 'productized' and reworked to fit a myriad of applications in different parts of the country. Soon, we will set up appointments with NPS regional supervisors to present our process, hardware setups, and results. I would discuss how this system could be used in additional parks and offer myself as a consultant/system architect.

On October 22nd of 2011, the National Science Foundation, Advancing Careers of Excellence Scholarships and Scholarships to Enhance Life Sciences held a symposia at the Texas Agricultural & Mechanical University (Texas A&M) in Corpus Christi, Texas. They hosted Representatives from the National Parks Service (Biscayne Bay National Park and the Canaveral National Seashore) and U.S. Fish and Wildlife Service to discuss careers, internships, and research opportunities with interested students. Both NPS sites conducted live, remote, interactive broadcasts from their parks to the Texas A&M campus. Turtle Cam footage of a sea turtle nest excavation was broadcast and narrated by Canaveral Interpretive staff. Rashaad Rosalle, a current Turtle Cam team member and UCF Digital Media graduate student, produced a short video introducing the students to the parks, detailing the Turtle Cam program, and showing them the equipment. This was shown at the symposium prior to the excavation video. During the video, John Stiner, Canaveral's Resource Management Specialist, narrated the video live over the phone and fielded questions from the symposium attendees. This use of Turtle Cam as a remote broadcasting education tool, speaks of its validity and versatility.

Figure 22: John Stiner demonstrating turtle nest conservation techniques.

Figure 23: Screen capture from Turtle Cam footage of nest excavation.

In November of 2011, one of the grants that I had submitted a written proposal for, was granted and awarded $9750 to fund the upgrades I have been proposing here. It involves designing, fabricating, and deploying the Lagoon Cam, and using the two rigs to broadcast live educational content with new partners. Florida Virtual School, with an annual enrollment of over 122,000 students in the 2010-2011 school year, is an excellent and appropriate partner we will be working with. We also have a long standing relationship partnering with the Orlando Science Center.

Since I was an Orange County Public School Visual Arts Teacher for several years, I have initiated a partnership with a hand full of K-12 schools in the Orlando Metro area. The specifics of content delivery and participation are still in development at the time of writing this paper.

In January of 2012, I requested sponsorship from Axis Communications, a leading international manufacturer of surveillance equipment and software, for this next step of the project. The Regional Sales Representative, Curtis Smith, and Public Relations Specialist, Domenic Locapo, helped get a 'permanent loan' approved for the best camera that works with our Wirecast software, the Axis P1344-E (valued at $2000), and the Axis Q1602-E (valued at $3000). The Q1602 is a new camera with the highest light sensitivity on the market. Axis representatives told me that they hoped we could even get color images at night with this new model. I have received both cameras in their climate-controlled cases (each valued at $250) and am testing them now.

CHAPTER 4: CONTEMPORARY ARTIST RESEARCH

The computer as a tool had its beginnings in Math and Science. Many artists began decades ago to see the potential for the computer and the digital realm in Fine Art applications. Here, I wanted to discuss contemporary, working artists and how I was influenced by their work with video, documenting, and using Digital Media to draw on and create relationships between humans and the world around us.

Bruce Nauman

Bruce Nauman is an example of an artist that has used video, in a surveillance fashion, as a media. Since the late 1960's, Bruce Nauman, has been creating installations that were spaces and situations to alter peoples' perceptions of what a space can do to you and how it can make you feel. In the early 1970's, he set up a series of spaces (hallways, rooms, corridors) that force you to experience tight spaces, being enveloped by colors and sound, and being video taped. Nauman's work is said to force the viewer to not just view the work but to "perform" the piece and that the success of the work is contingent on this interaction.[Kraynak 42]

Figure 24:"Four Corner Piece", 1970, Bruce Nauman. 4video cameras, 4 monitors, 120" x 240", Museum of Contemporary Art.

In "Four Corner Piece", viewers are funneled through four corridors with a video monitor and a surveillance camera at each corner. By using closed circuit cameras he produces a sense of paranoia, forcing the viewer to become a part of the pieces he created. What he found was that when someone would turn a corner and see a monitor displaying the last glimpse of their own back turning the corner, a feeling of paranoia would rise in them, a tension that was very uncomfortable. The effect calls attention to the viewer's own body while disorienting his or her sense of time and place.[www.pbs.org] The Artist is using design fundamentals and psychology to intentionally manipulate spaces to invoke emotional and physical responses from participants.

"If I was an artist and I was in the studio, then whatever I was doing in the studio must be art. At this point art became more of an activity and less of a product."[www.pbs.org]

I see visitors to Turtle Cam as being involved in the creation of the thing that is the culmination of the whole project. Watching something remotely in real time draws you in. You become a part of what you are looking at, and your sense of place and identity are skewed. The video feed is framed on their monitor, and the angle of the camera on the Turtle Cam rig is set up to give them a shot from the nest to the surf. They can witness the tiny baby sea turtle from the point they emerge from their nest, to the point that they reach relative safety in the ocean's waters.

The emotional aspect of viewers' experiences would be a factor as well. The 'Turtle Watch' programs at Canaveral National Seashore are, by far, the most popular and consistently attended. People love sea turtles. There is a sense of desperate longing and hope when it comes to baby sea turtles as well. Adults lay an average of 80 – 120 eggs in each nest yet only about 1 in 1000 reach adulthood.[www.conserveturtles.org] People who are fans of these endangered creatures know these statistics. They know the odds are against each one of those adorable little creatures. They *will* them to emerge from their sandy nest.

Bill Viola

Born in 1951, Bill Viola has been at the spearhead of video art and digital sound since the early 1970's. He received his BFA in Experimental Studios from Syracuse University in 1973 where he studied visual art and electronic music. From there he began traveling the world, working with other pioneers in both video and audio art.

Viola filmed many of his pieces with a simple hand held camera. For two pieces produced in 1992, "The Nantes Triptych", and "Heaven and Earth", he even filmed a birth and a death. The birth was one of his friends giving birth, and the death was the slow wasting away of his own mother, which he has said was emotionally the hardest experience he has had to deal with in his life.[Atkinson] The two images juxtaposed, one person at the beginning of life, and the other at the very end of it are allowing the viewer to use Viola's camera as a surveillance camera of sorts to peer in on two monumentally intimate scenes.

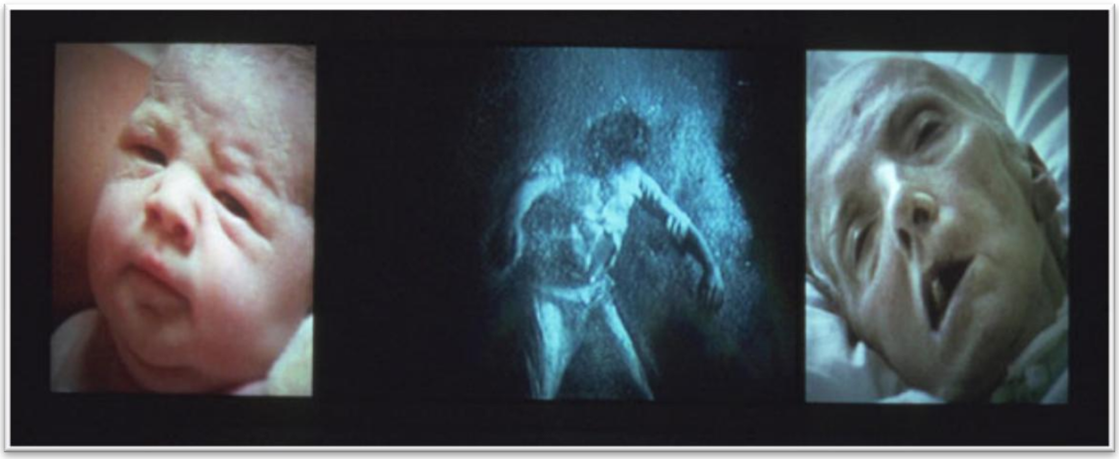

Figure 25: "The Nantes Triptych", 1992, Bill Viola, video installation.

Figure 26: "Heaven and Earth", 1992, Bill Viola, video installation.

"These are the great universal experiences, they happen to be the most private and personal experiences and the camera is the embodiment of the invasion of privacy which is where the tension comes in."[Atkinson]

With the Turtle Cam Project, I feel that people are drawn to watch, not just because they like sea turtles as a friendly yet endangered species, but also because they are watching birth. They are virtually sitting in on that intimate moment of life emerging from the cold, lifeless sand.

<u>James Balog</u>

Starting out as a mountaineer, James Balog taught himself photography to document his adventures. After receiving his MA in Geography from the University of Colorado specializing in geomorphology (|jēō□môr□ fäləjē| noun. the study of the physical features of the surface of the earth and their relation to its geological structures.), he decided to pursue photojournalism full time.

Balog was sent out into the field to document glaciers by National Geographic. Inspired by what he saw, he started the Extreme Ice Survey. It is a series of 38 Nikon D-200 digital camera rigs set up at 22 glacier locations around the globe. They capture one image per hour over an extended period of time during daylight hours. The images are compiled to create time-lapse videos of the effects of climate change on those glaciers as a report of natural conditions. EIS camera setups must withstand winds as strong as 160 mph, temperatures as low as -40°F, blizzards, landslides, torrential rain, and avalanches. They are powered by a combination of solar panels, batteries, and other electronics (much the same as Turtle Cam), to make them sturdy remote image capturing rigs. [www.extremeicesurvey.org]

Figure 27: Balog with Extreme Ice Survey equipment.

The finished pieces draw the viewer into a reality captured through direct surveillance. Their perception is heightened to an exaggerated sense of time and place.[Balog] The reality of the implications of conservancy is thrust in their face. This project dwells somewhere between documentation, empirical science, and fine art and inspires me in my work.

Figure 28: EIS Camera rig on site filming a glacier on Mt. Everest.

Current Digital Media/Fine Art Crossover

Launched January 29, 2008, Streaming Museum is a hybrid museum that presents multimedia exhibitions in cyberspace and public space on seven continents and live programming at partnering cultural centers. The exhibitions are generated in collaboration with international cultural, educational, and public centers and artists, curators and visionary creators.[Creatives at Work]

Streaming Museum is produced in New York, and broadcast to sites such as the city's Big Screen Plaza. The museum's exhibitions have been seen on big, outdoor screens in cities such as Milan, Italy; Seoul, South Korea; Melbourne, Australia; Bucharest, Romania; Port Elizabeth, South Africa; and in multiple cities in England. Exhibitions have also been streamed to South Korea, Norway, Greece, and Argentina’s Jubany Scientific Base in Antarctica.[www.streamingmuseum.org]

Figure 29: Streaming Museum event.

The Fine Art world has embraced digital technology to a large extent. Many major museums have comprehensive, media rich websites complete with chat rooms where a visitor can chat with an expert on specific topics. In Vasil Dikov Dikov’s research into digital media and its place in the Art world, he said that the Gugenheim Museum’s chat room was a place of learning, saying “one might describe the language [used] as being academic”. [Dikov 54]

One of the newer additions to the internet, Google’s Art Project, uses audio, video, and streaming content along with their Street View technology to allow you to virtually visit and explore some of the worlds most respected museums. This use of Digital Media will bring minute details of Hieronymus Bosch’s brush strokes to the eyes, hearts, and minds of students and ordinary people alike who may never have seen a seminal artwork like that in their life.

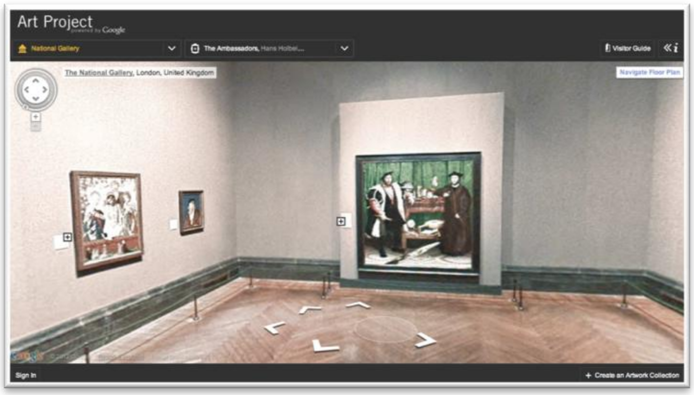

Figure 30: Google Art Project navigation through gallery space.

Figure 31: Close up, high resolution image of "Christ Mocked", 1490 - 1500, by Bosch.

CHAPTER 5: CONCLUSION

Throughout this document, I have shown the motivation for the original exploration and work, and the evolution and progression of the project. Contemporary examples of similar projects within the National Park Service have been detailed highlighting the differences between these projects and Turtle Cam and the significant need for this technology. Examples of established Fine Artists currently working with similar technology and/or motivations show the legitimacy of Turtle Cam as a tool to build relationships with visitors through their emotional connection to baby sea turtles and other natural resources particular to Canaveral. Streaming video technology is now an established component in education programs worldwide. The vast diversity of its applications can continue to be explored far into the future. The Turtle Cam Project is doing its own small part to bring more attention to the Canaveral National Seashore, its programs, and sea turtle conservancy as a legitimate concern we can all get behind.

APPENDIX A: SUPPLEMENTARY INFORMATION WEBSITES

1. National Park Foundation - www.nationalparks.org/
2. National Parks Conservation Association - www.npca.org/
3. The Parks Company - www.theparksco.com/
4. National Parks Trust - www.parktrust.org/
5. http://en.wikipedia.org/wiki/National_Park_Service_Organic_Act
6. http://en.wikipedia.org/wiki/List_of_national_parks
7. NPS quotes
   http://www.theparksco.com/explore/park_quotes_past.html
   http://www.theparksco.com/explore/park_quotes_cont.html
8. Harper's Ferry Center - http://www.nps.gov/hfc/
9. PBS page on Ken Burn
   http://www.pbs.org/aboutpbs/news/20100113_nationalparksimpactbaseball.html
10. 2001 NPS budget press release
    http://home.nps.gov/news/release.htm?id=118
11. 2008 NPDS budget article
    http://www.usatoday.com/news/washington/2007-02-04-budget-parks_x.htm
    Sea Turtle Conservancy - http://www.conserveturtles.org/

APPENDIX B: LINKS TO NPS WEBCAMS

1. Jordan Pond
2. Curecanti National Recreation Area
    i. Elk Creek
    ii. Lake Fork
3. Yellowstone National Park
    i. Old Faithful
    ii. Upper Geyser Basin
    iii. Mammoth Hot Springs
4. Yosemite National Park
    i. View From Turtleback Dome, Ahwahnee Meadow, Sentinel Dome, Happy Isles Gaging Station
5. Zion National Park
    i. Temple and Tower of the Virgin
6. Cape Hatteras National Seashore
    i. View From Lighthouse
    ii. View Of lighthouse
7. Channel Islands National Park
    i. Bald Eagle webcam
    ii. Anacapa Island Covecam
8. NPS Air Quality Webcameras for observation of air visibility

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