

IPRO 338 retrofits existing structures for Smart Grid technology

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IPRO 338: Techno Economic Analysis of Electrical Smart Grid Technology Solutions Retrofitting the Soldier Field Parking Structure Overall Project Summary.

IPRO 338 revolves around the techno-economic analysis of a pre-existing structure (in this case a parking garage) and proposing ideas that could be used in order to make said structure more energy efficient and sustainable. This IPRO is also taking part in this year's NECA Green Energy Challenge. Its goals are similar to the IPRO program, but teams from across the nation from several top schools compete in order to come up with the most innovative and energy efficient solutions for their respected sites.

The site for our team's audit is the parking structure for the Chicago Bears home field, Solider Field. In addition to the Bears games, this field hosts events almost daily, ranging from weddings, soccer games, mega concerts and more.

This parking lot is also the heart of Chicago's historical Museum Campus, which is home to the Shedd Aquarium and Field Museum. The structure is built underground and hosts 4 levels with space for 2,500 cars. The roof of the parking lot is the second largest green roof in Chicago. The site provides a unique

challenge because Solider Field, including the parking lot, is the first LEED certified football stadium in the NFL. The site selection for our audit provided a unique challenge to provide new efficient technologies in a high traffic and already highly efficient structure. The proposed retrofits have the potential to provide a huge impact on energy usage for a site that services a large amount of the Chicago population. This iconic campus will benefit highly from our detailed research and proposal (which will be summarized here).

Lighting Retrofit:

During our investigation of the existing lighting system, we unfortunately were not able to track down the model numbers. This prevented us from being able to look up the manufacturer's specifications that could tell us the input wattages for each existing fixture. We know that the input wattages for lighting fixtures are almost always higher or lower than the sum of the bulb wattages.

However, for the purpose of our analysis we made the assumption that the existing fixture wattages are equal to the sum of their bulb wattages. Thus, after examining the existing lighting system for the garage we concluded that the total saving in energy cost would be around 55% of the original amount if LED light fixtures are implemented (see Lighting Retrofit Graph).

Solar Retrofit:

We proposed that an elevated solar panel structure be placed on the two ventilation exhaust areas located on the east and west sides of the garage. The system will connect directly to the grid for Soldier Field and the garage, so no batteries will be needed. We found the system to be economically viable if state and federal rebates and grants can be taken advantage of to the fullest extent. The system will have the added benefits of improving the garage's public image and giving the site more LEED points, possibly leading to an increased LEED rating.

EV Charging Station Retrofit:

The management team of the North Garage at the museum campus in Chicago has made great efforts in creating and maintaining an ecologically friendly and energy efficient structure. To this end, three electrical vehicle-charging stations have been installed in the north garage only for visitors attending events at Soldier Field and surrounding museums.

Our project plan was to analyze the existing conditions of the charging stations and propose improvements as necessary in order to increase the garage's energy efficiency. In turn, this has led us to the conclusion that a new EV charging station will raise the overall uptime of the charging system (see EV graph for a comparison against gas powered vehicles).

Thermal Retrofit:

The thermal team was dedicated to improving the efficiency of the HVAC system

in the Soldier Field North Parking Garage. The parking garage is a multi-tiered underground structure composed of precast concrete sections. Due to the nature of this construction and placement, the opportunity for natural ventilation was non-existent, necessitating the use of a forced air system. The HVAC system does not provide any space conditioning, as its only duty is to provide fresh air to the parking garage, and remove the air contaminated with vehicle exhaust. Our team concluded that the best course of action would be to install variable frequency drives, which would control the flow of the system more efficiently (rather than an always on or always off system, see Thermal Retrofit graph). IPRO Day: Our presentation and exhibit at this year's IPRO day won us top honors within our respected track (Track 2: Energy and Sustainability) and it is our hope to place within the top three for this year's NECA Green Energy Challenge in which the finalists are flown to Washington DC to present their work.

Project Team:

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Flash Game Review: 'Alice is Dead'

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COPY EDITOR

Alice is Dead is a series of three point-and-click, escape-the-room, horror/mystery flash games available to play on sites like Newgrounds. The inspiration and follow-through gives you this darker take on Alice In Wonderland: "You've arrived in Wonderland, that's good. Alice is dead, that's bad. You don't know who you are, that's the worst."

When the game starts, your first scene is Alice lying dead under the rabbit hole. You have to find clues to figure out exactly what happened, where the [silent] main character has amnesia. This game is not particularly difficult to figure out but there are many walkthroughs available online. This game has a wonderful ambiance and a sinister tone that continues through the game even past the plot twist at the end. I love a good twist! My favorite thing about this game--at least the first--is that almost every

single thing matters. There are plenty of areas that seem like empty spaces, but you'll soon find that even the walls talk.

Graphics 9/10: the graphics are extremely well done, I could imagine playing this as a computer game off a DVD. There is a constant grainy look that adds to the mysterious feel of the game, and the arrows that take you left and right are shaped like hearts or spades, and the characters are drawn in a way that brings out the more sinister tone of this series. I believe this game has the best art of any flash game I have played so far, even if it isn't in my favorite style.

Game Play 7/10: Well, I gave it a 7 because it's only clicking, but you will probably disagree if you like these games, so definitely go ahead if you enjoy them. In terms of game play elements, there are the standard item combinations and different, not necessarily obvious uses for things. I have played many point and click games, so I probably saw a few more things coming than I should have. Either way, it's well done enough

to earn 7 even if there aren't any timed or skill testing sections.

Story 8/10: This is a mixed bag. A lot of people were unsatisfied with the ultimate conclusion of this game, including me. They left a lot of information up to the player's imagination, and there is a question everyone asked from the very first game that was not ever answered. The ending was also very abrupt, which many did not enjoy. I agreed with the creator in this respect, the world of the game is prone to abrupt endings, to end another way might actually have felt odd. Lastly, the author says he is going to write a sort of mini-wiki about the questions that were unanswered, so there is that, if you think it is worth it.

Sound 8/10: There are no huge musical scores in this game. There seems to be one or two insanely creepy tracks per game that follow you around. In the first, there is a slightly-too-happy "Hush hush hush, here comes the boogymen" song that gets louder as you approach a certain

area. The sound add dramatically to the atmosphere of the game, so even though I didn't think the music itself was great, I gave this an 8. Hey! That rhymes.

Trophies and everything else: Trophies are available in some of the games and may or may not be extremely difficult to figure out or achieve (one is purely luck based), getting all of them ensures that you have had experienced everything the game has to offer, which I think is a great way to do trophies. There are a few Easter eggs in this game, for the most part, if you think it's odd that something is in the room with you, you should try doing things to it; however, nearer to the end, some things are not explored.

I think this series is worth playing if you enjoy Alice in Wonderland with a twist, dark themes, escape the room games or point and click games. If you don't like endings that don't wrap everything into a nice package, you might want to steer clear, or better yet, only play the first game. Have fun guys!

Flash Game Review: 'Relive Your Life'

Kristal Copeland

COPY EDITOR

The last in this flash game review series for the semester brings you "Relive Your Life."

Relive Your Life is an odd adventure game where you experience the life of your character from a sperm in an egg, all the way through to adulthood. You do this by via quick time events that range from tapping "x" to typing a long string of characters. Your first mission will be the "Battle of the Sexes" where you pick your gender. You would think there are two options, but there is a very interesting third option that occurs if you try, and fail, to remain male.

Following this first choice, every event you play drastically changes the story line in usually unexpected ways. You can save or doom the entire world, uncover white house conspiracies, become a super villain, and even a Time Lord, but I highly doubt you'll expect the paths that take you in those directions. Overall, there are 28 endings and 32 medals to win.

Graphics 6/10: the graphics are a bit odd, but not horrible. The game is cartoonish and colourful.

Gameplay 6/10: All of the game play is

made of quick time events, immediately before they happen you'll get a warning that tells you approximately what you have to do, but sometimes that can be vague. After you have beaten the game at least once, you get a redo button, and a skip button. Both of these are very useful if you are attempting to get everything done, but they make it a bit more obvious that the games are not randomized in any way.

Story 8/10: This definitely depends on the person, but I enjoy starting off as a kid and suddenly having everything in my life change because I decided to eat a piece of candy that turned out to be a teleporter (not a real game element.) Seeing how the situation can spiral out of control because you did [or failed to do] something is the best aspect of this game.

Sound 7/10: Well, there is very little music, but the narrator speaks in rhyme and has a sarcastic streak. While he looks a bit off, he sounds great, and I enjoyed his descriptions.

If you're the type of person who likes to get all the endings, this game will entertain you for a while. The sheer amount of endings and trophies to earn will delight any collectors, but aside from the story, the individual pieces do not stand out.



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