**To:** Professor Martin, EDD 104, Section 61

**From:** Billy Kidd

**Date:** February 17, 2018

**Re:** Research Paper – First Draft

**Design Statement:**

Design a Park Information system to gather information and distribute it to interactive interfaces throughout the park.

**Introduction:**

Over the past few years, theme parks have begun implementing new information systems to replace the old, outdated systems of kiosks and paper maps. However, most current systems are not built to accommodate the increasingly tech-savvy customer base. Designing a system that seamlessly integrates new wireless technology into the theme park is crucial in today’s internet-driven world. This allows customers to access park information and use it to optimize their theme park experience. One of the main components of our new system will be real-time data, which means customers will up to date on anything that occurs within the park. If a particular ride has a malfunction and suddenly closes, customers will be updated and know not to waste their time walking over to that ride. One of the most important factors customers consider when choosing where to go in a theme park is wait time. This system will provide real-time wait time data. This paper addresses methods of wait time tracking, the applications of wait time tracking, and how it can be utilized to maximize customer happiness.

**Methods of Wait Time Tracking:**

Theme parks have been attempting to track attraction wait times for decades. However, until recently, their methods have been quite flawed and archaic. As recently as 2006, Disney utilized a card system to track wait times. This system consisted of the following: First, an employee hands a card stamped with the current time to a customer as they enter the line for a ride. Once that customer reaches the front of the line, another employee takes the card and notes the current time. The difference between these two times is taken to be the wait time for said ride (Disney World’s, 2006, p. 101) There are numerous flaws with this procedure. Customers may forget to hand back the time card until after the ride, which will greatly increase the recorded wait time. Employees may not mark the times correctly, which would also distort the wait time data. This method is inefficient and outdated, and would often lead to inaccurate wait time measurements.

More recent techniques of wait time tracking are vastly superior to Disney’s old card system. One such technique is the use of a mobile device given to the customer by the park. The location of each device is tracked using GPS and then sent back to the park’s central server (Brown, Kappes, and Marks, 2013, p. 100). This allows the park to gather real-time information on the whereabouts of customers, as well as the paths they took to and from certain attractions.

A similar method is the application of a radio-frequency identification (RFID) system. Upon entering the theme park, customers are given a wristband with an RFID tag embedded into it. Each RFID tag contains a unique electronic product code (EPC). The entrance and exit of each attraction contain RFID readers, which record the EPC and time (Tsai, 2012, p. 100). This method is very effective and accurate in recording the wait time for each ride, and this has been applied in theme parks such as Legoland.

Another approach to track wait times is to apply a human mobility model. This can be used to model the movements of customers through the theme park in relation to certain attractions. A human mobility model was developed by Solmaz, Akbas, and Turgut, and they found that the modeling of a theme park consists of two sub-models, the theme park model and the visitor model. The theme park model is comprised of five central phases: Fractal Points, Clusters, Attractions and Noise Points, Landmarks, and Theme Park Mapping, (Solmaz, Akbas, and Turgut, 2015, p. 100).

The first step is the generation of fractal points, which is a distribution of points that represent customer locations. The second phase is clustering, in which the areas of highest fractal point density are grouped into clusters. In this scenario, a cluster would represent the group of people gathering around a certain ride. Next, these clusters and fractal points are categorized as “attractions” or “noise points.” Attractions are the clusters; therefore, they are the most popular rides. Each attraction is then assessed based on a set of fractal point attributes, and assigned a weight and a queue. The weighting for each attraction is based solely on the number of fractal points within its cluster. The more people that are waiting for that ride, the more it matters. On the other hand, queue designation takes into consideration fractal point number, location and attraction type. For example, large and medium-sized rides are assigned a M/D/n queue, which means that the ride has a constant service time. On the other hand, a M/M/1 queue would be applied to a restaurant, as service times vary for each set of customers. Noise points are the fractal points that are not included in any clusters, and are all assigned a weight of one. These are considered locations where customers spend less time than they would at an attraction. The fourth segment of this procedure is the creation of landmarks. Landmarks are generated by randomly distributing customers to attractions and noise points according to their specific weights. Finally, the theme park map is complete by adding in walking trails and roads between landmarks, (Solmaz, Akbas, and Turgut, 2015, p. 100).

Once the theme park model is complete, the visitor model can be produced. The visitor model encompasses distinct visitor states which classify what the customer is currently doing. These states categorize whether a customer is waiting in line, on a ride, or walking between attractions. The actions of customers are governed by a Least Action Trip Planning (LATP) algorithm, which means customers choose their next destination based on what attraction or noise point is closest to their current location. As Solmaz and associates concluded, “These two sub-models are combined into the overall human mobility model in which simulations are run to track wait times,” (Solmaz, Akbas, and Turgut, 2015, p. 100).

**Applications of Wait Time Tracking/Impact on Customer Satisfaction:**

Through the use of wait time tracking, theme parks can ultimately increase their profits and provide their customer base with a memorable park experience. Wait time tracking allows the theme park to decide if a certain ride needs to be altered. For example, if wait times for a popular ride are getting extremely long, the park may decide to increase the capacity of the ride, allowing more people on to the ride each turn. On the other hand, management may notice that a certain ride isn’t enticing customers. They may use this data to justify closing that attraction and replacing it with something new that will draw in the customers. Data on customer distributions and wait times are also helpful in determining optimal placement of different attractions. Changing attraction locations may be beneficial in drawing customers to normally unpopular rides.

Allocation of park resources can also be impacted by wait time tracking. The cause of long lines may be due to not having enough employees working at a certain ride. By examining the wait times for rides across the theme park, management can redistribute workers as they see fit. Another feature of theme parks that can be impacted by wait time tracking is transportation. If wait times in a specific area of the theme park are abnormally high, an alteration to the park transport systems may aid in more evenly dispersing customers.

Wait time tracking can be utilized to enhance the customer theme park experience in a variety of ways. First and foremost, customers can see the current wait times for all attractions. This can prevent customers becoming disgruntled with long lines. As Xu indicates, “if wait times exceed a customer’s expectations, they may leave and show no interest in coming back,” (Xu, 2014, p. 99). Rather than wasting time waiting for one singular ride, wait time tracking allows customers to plan their day in the most time efficient manner possible. Instead of waiting on line for an hour and missing out on multiple rides, customers can always go to the attraction with the shortest wait times. This is especially helpful for the larger rides. For example, in Six Flags Great Adventure, one of the most popular attractions is Kingda Ka. Wait times for Kingda Ka, especially on weekends, can climb over an hour. Wait time tracking data would illustrate the ideal time to ride Kingda Ka based on when the shortest wait time would be. Furthermore, the use of wait time tracking may lead customers to try rides they normally never would have.

Theme parks and their customers both benefit from the utilization of wait time tracking. Customers are able to get on more rides and spend less time waiting on lines. Parks are able to optimize their ride locations, transportation systems, and employee distributions. Customers will have a better experience at the park, which will keep them coming back. This ultimately leads to an increase in profit for the park, and an increase in customer satisfaction.

**Conclusions:**

These articles on wait time tracking have exponentially increased my knowledge of wait time tracking. I learned about different methods of wait time tracking, which include GPS tracking, RFID systems, and human mobility models. Each technique has benefits and downsides, yet all are good options for our prospective wait time tracking system. I also learned how these methods can be applied to a theme park setting, and their impact on customer satisfaction. Wait time tracking assists the theme park in determining optimal ride placement and resource allocation. It also enhances the overall park experience for customers by cutting down wait times and help them plan out their day.

**Recommendations:**

My heightened understanding of wait time tracking will help our team to formulate a solution to our design statement. Based on reading and analyzing these articles, I would make the following recommendations for our project: We should utilize either a GPS tracking system or RFID system as our method of wait time tracking. Although human mobility modeling is an excellent option for wait time tracking, we do not have the resources nor programming knowledge to enact such a model. However, GPS or RFID are two exceptional options. I believe if we base our design around a mobile application that users can download onto their smartphone, we should use a GPS tracking method. If we choose to enact a wristband based system, we should employ an RFID system. No matter which of the two previously mentioned options we choose, it is absolutely vital that we integrate a wait time tracking system into our design. Incorporation of a wait time tracking system will greatly increase the quality of information distributed by our park information system.

**References**

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