CONNECTED PARKS
Fun at the Finger Tips

By Prodapt Solutions

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OVERVIEW

With increasing number of people visiting the amusement and entertainment parks, especially during holidays, the parks should have the ability to manage thousands of guests quickly and efficiently, thus reducing the wait time for guests to get the ticket, enjoy their ride, get food, and improve the park's overall operational efficiency.

There is a potential need for an IoT-enabled smart park management solution, which scales exponentially to provide a tremendous improvement in serving the guests. IoT solutions can enhance the guest experience as well as uncover opportunities for improved efficiency. During off-season, using analytics, visitors can be offered with loyalty programs based on various criteria, thus improving the customer base.

The current revenue trend of amusement parks is as given below, and this sector is expected to grow exponentially with IoT enablement. The disposable income of US households grew from $11,000 dollars to over $13,190 dollars in five years from 2009 to 2014.

The current revenue trend of amusement parks is as given below, and this sector is expected to grow exponentially with M2M enablement.

Revenue of amusement parks (NAICS 71311) in the United States from 2009 to 2014 (in billion U.S. dollars)

This statistic displays annual revenue figures of amusement parks in the Unite States from 2009 to 2014. In 2009. the revenue of amusement parks in the U.S. ranged at approximately 12 billion U.S. dollars.
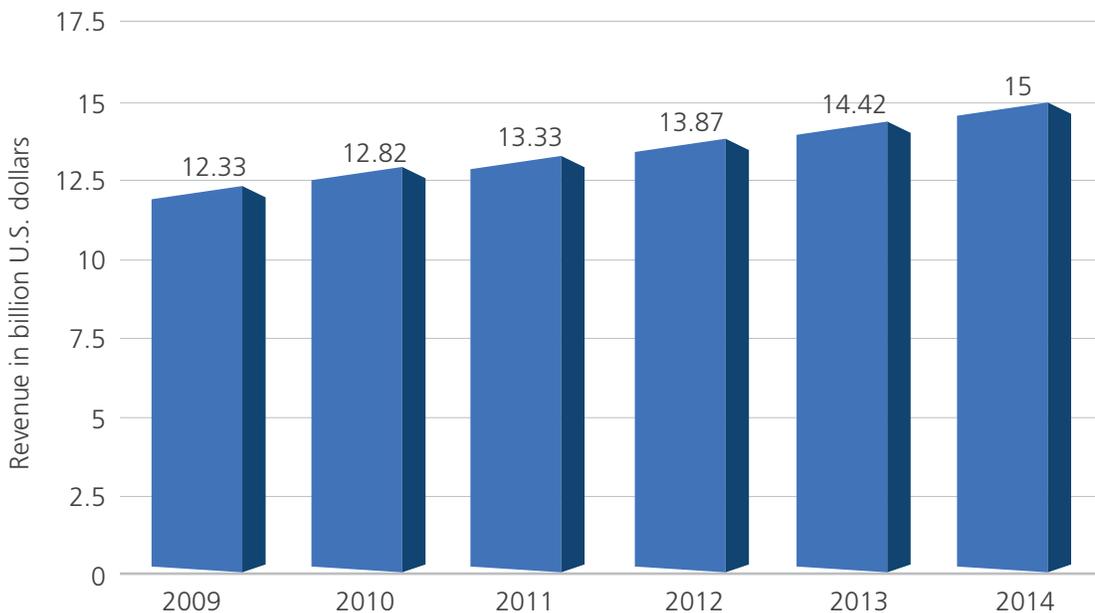

Figure 1: Revenue trend of amusement parks in USA

With smartphones and wearables, each person walks aroundwith a variety of sensors and beacons that throw off signals. This gives anopportunity to create an environment that reacts to those signals from entry zone, ride zone and other areas of the park in a highly personalized way for abetter customer experience.

The ecosystem of an entertainment park covers various M2M industry verticals.

VISITOR MANAGEMENT

- On the mobile app, guide the park visitors with the schedule of their favorite events with recent reviews from other visitors
- Suggest the order of events and shows
- Suggest relaxation after a few heavy rides (like the 4D/5D movie rides) and get energized for more rides
- Suggest more thrilling movies or rides, based on post-ride feedback from visitors

With the usage of smartphones and wearables, each person will walk around with a variety of sensors and beacons that throw off signals.

SAFETY AND SECURITY

- Increased Security: Family members can track each others' locations with wearables.
- Early warning for emergency detection using sensors

MEDICAL EMERGENCY

- Immediate medical attention to park visitors at the click of a button

LOCATION BASED SERVICE

- Beacons present in the restaurants can suggest the available menus to customers, without having to enter the restaurant
- Any sale in an upcoming shop or nearby special live shows can be advertised to visitors using indoor positioning

INTELLIGENT POINT OF SALE

Smart Ticketing, Food and Beverages

- Customers can get tickets and make choices based on instant information, such as wait time for each rides, crowd, and duration of each ride

- Integrated billing systems inside the park for restaurants and other shops

ENERGY MANAGEMENT

Efficient use of lights in the park by switching them on or off based on the environment (such as day and night) and people's presence

TERMINOLOGY: ACRONYMS AND ABBREVIATIONS

#	Term	Definition
1	IoT	Internet of Things
2	M2M	Machine to Machine
3	Beacon	Device for signaling and guiding

Table 1: Terminology

STAKEHOLDERS

- **Park Visitors**: Customers who visit the park get to effectively utilize their time and get a better experience

- **Park Management**
  - **Park Staff:** Employees of the park can offer better service to the park visitors and efficiently utilize their time.

  - **Park Admin:** The park management can have increased revenue, better usage of resources and ensure visitors' safety.

  - **Retail Stores:** Stores including restaurants inside the park can improve their sales by timely advertisements.

DEVICE REQUIREMENTS

Device	Platform	Technology
Wearable	Android	Java
Wearable	iOS	Objective C & Swift
Beacons	---	Bluetooth

Table 2: Device Requirements

WEARABLES GUIDE FOR ENTERTAINMENT PARK

Smart wearable manufacturers have already recognized the shift from wearable "technology" to "wearable" technology where focus is shifting from the technology to the "wearability" of the product. The future of wearables is simple – more stylish, more inconspicuous, more accurate, more convenient, and more accessible. A possible list of available wearable sensors is below.

Smart Wristbands
Smart health and fitness tracker location tracker, heart rate tracker, sleep tracker, and more

Smart Helmets
Measures air temperature, forecasts weather, navigate using GPS, track hear rate, blood pressure, and oxygen saturation

Smart Goggles
Smart Health and Fitness Tracker with GPS Heart Rate Track Sleep Tracking and more

Smart Jewellery
Captures 90% of the day-to-day activity

WEARABLE DEVICES

Smart Headphones
Listen to music while monitoring fitness

Smart Shoes
Measures how hard you exercise, how fast you walk: A virtual coach that will push you to improve your performance

Smart Socks
Measures foot pressure for exercising, improves performance, reduces risk of injuries, and reduces time to recover

Smart Shirt
Measure blood pressure, heart rate, monitor RR Intervals, heart rate recovery and heart rate variability (HRV), breathing rate and volume
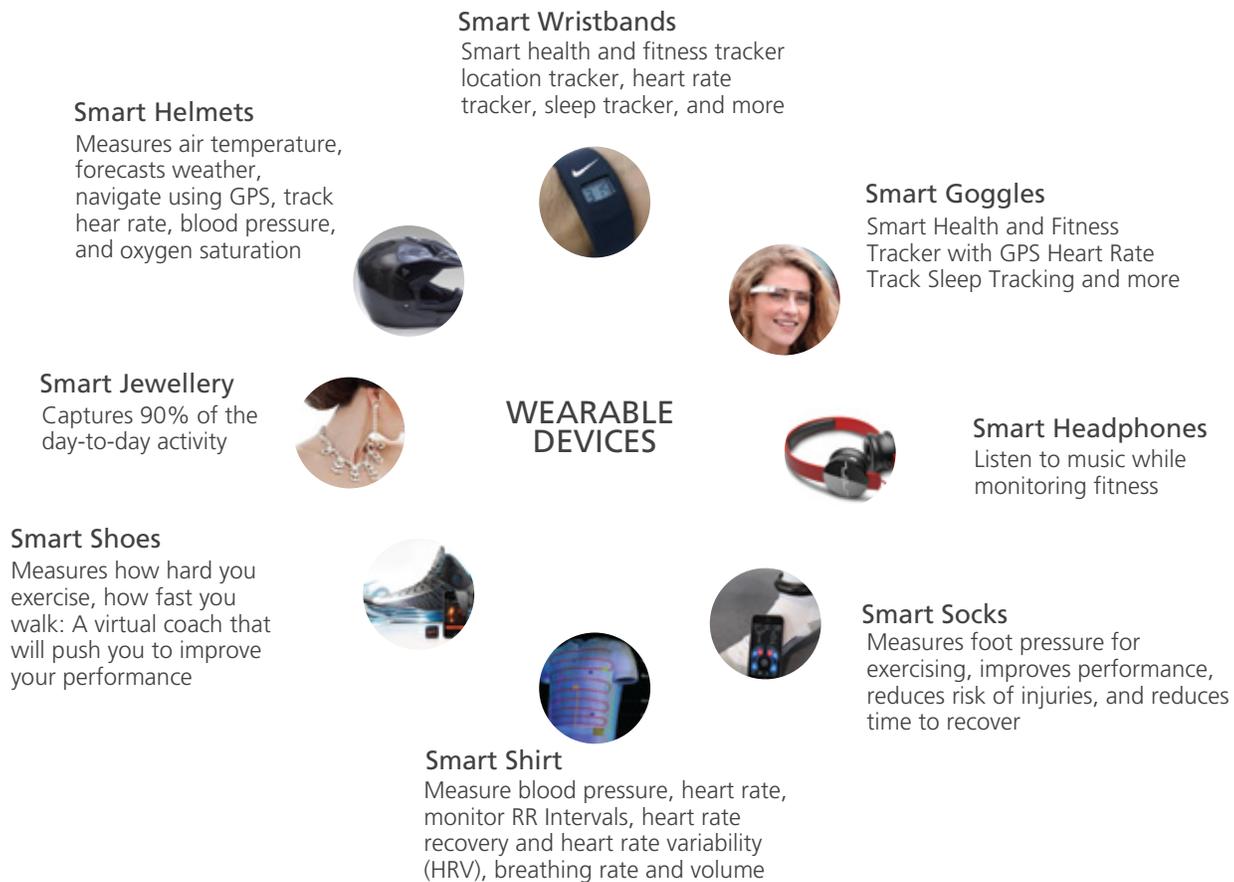
Figure 2: Wearables and Features

Taking advantage of the robust software ecosystem (such as iOS and Android) and open connectivity standards (such as Wi-Fi, Bluetooth, GPS and RFID), a smartphone can be paired with a range of wearable technologies. It is expected that there will be 10-times increase in the number of wearables over the next three to four years.

Selection of Wearables for Entertainment Park

According to Survey Sample International, the most preferred wearables are wrist-bound.

Preferred Body Parts for Wearables

Contacts
20%

Hat
20%

Glasses
55%

Headband
19%

Armband
40%

Coat
26%

Wristband
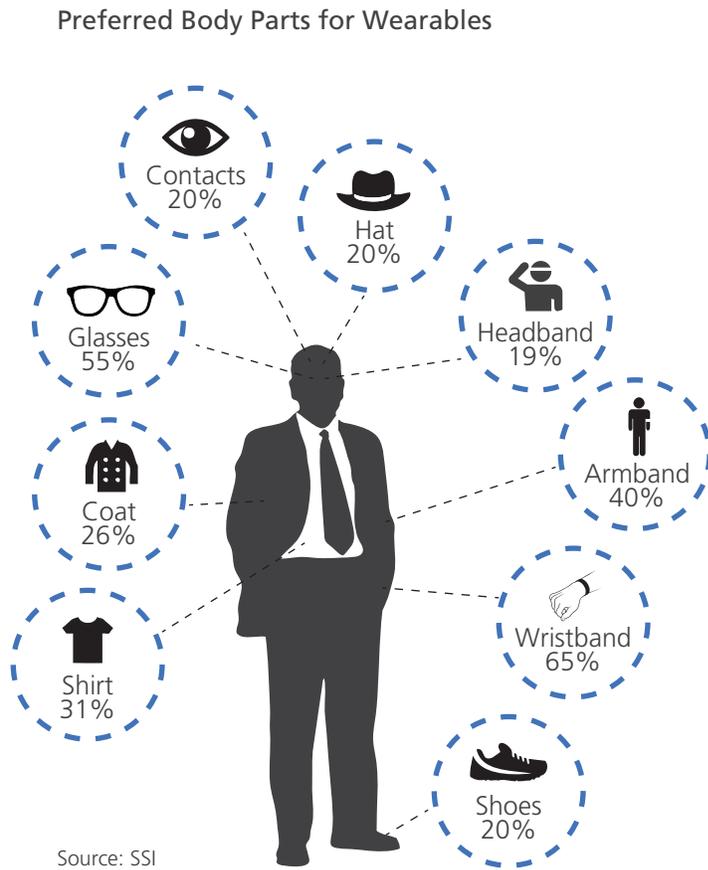65%

Shirt
31%

Shoes
20%

Source: SSI

Figure 3: Preference for Wearables

Here is a comparison on popular wrist wearables for connected parks applicable for both indoors and outdoors.

Wearable device	Technology	Connectivity	Key Features	Form factor	Considerations
Apple Watch	iOS	Wi-Fi / Bluetooth	* Water resistance * Integration with the iPhone, iPad, and Mac * Biometric recognition * Wireless charging * Slim and light design	1.3-inch and 1.5-inch screens	Visitors having Apple Watch can take advantage of the smart park solution.
Smart watch and Smart Bracelet	Android	Wi-Fi / Bluetooth	**Samsung:** The watch's 300mAh battery is enough for a day's use. It's not only a compass, gyroscope, accelerom-eter, but also a heart rate monitor **Moto:** weighs about 63 grams	1.63-inch, 320x320	Any smartwatch can be enabled for the smart park solution.
Wrist band	iOS/Android	RFID BLE	* Water resistance * Long battery life * Unobtrusive (rugged) * Less expensive * Slim and light design * Heart rate monitor built in	30mm long, 25mm wide and 0.5mm thick	1. Wide variety of options with different functionalities available 2. Available at lower costs for bulk procurement for parks 3. Parks can decide on the type ofwrist band basedon their use cases

Table 3: Comparison of Wearables for an Entertainment Park

The functionality available with different wearables and related customer experiences are listed below:

Functionality	Customer Experience	Considerations
Access Management	Single wearable acting as * Ticket * Room key * Ride pass For both indoors and outdoors	Water-resistant wearables enable seamless connectivity

Functionality	Customer Experience	Considerations
Safety and Security	* Find the missing child * Visitors can remotely monitor their pets left in the pet zone, while enjoying the rides * Geofence to notify if any of the visitors crosses a restricted area or danger zone	Park to provide an area for pet care
Location Tracking	* Find the restaurants in the vicinity * Get intimated about in-park entertainment and promotions	NA
Activity Monitoring	* Monitoring the health, pulse rate, and heartbeat of the visitor while on a ride	Available only with certain wearable devices
Ewallet	* Integrated billing system inside the park for restaurants and other shops using the wearable without any hassles of reaching for credit cards or wallets	Need to have a secure integration to avoid any fraud

Table 4: Functionality and Customer Experience

A flood of new wristbands are emerging such as Disney World's Magic Band, which stores guest information and acts as ticket, room key, ride pass, and many more. Technology will no longer be an add-on to our lives, but become a seamless, integrated part that helps us stay connected and be more effective, efficient, and aware of ourselves.

PROPOSED SOLUTION

Figure 4: Prodapt's Proposed Solution

Prodapt's **Connected Parks** Solution could be deployed easily on the cloud.

Park staff and visitors' mobile app will receive notifications and alerts from the Prodapt's solution

Beacons will provide the information to the mobile app through Bluetooth signals

BENEFITS

Park Management

- Operational efficiency by minimizing human errors

- Improved safety and security for customers

- Improved marketing and advertisements revenues

- Increased sales for shops inside the park

- Increased revenue for the park through customer loyalty programs

- Enhanced customer experience and satisfaction

- Efficient usage of park's resources

Park Visitors – Customers

- Easy registration and management for park visitors instead of waiting in queue

- Improved safety and security

- Save park visitors' valuable time by timely and contextual notifications

- Better decision making by park visitors.

- Using a single wearable for all activities inside the park including payments, makes life easy for the park visitors

CONSIDERATIONS

The entire solution being dependent on the wearable, there is a need toensure that the wearable is always on.

It is predicted that the growth for many leading consumer electronic suppliers in 2015 will be remarkable owing to wireless charging of wearable electronic devices.

Global revenue forecast for wireless charging in wearable technology
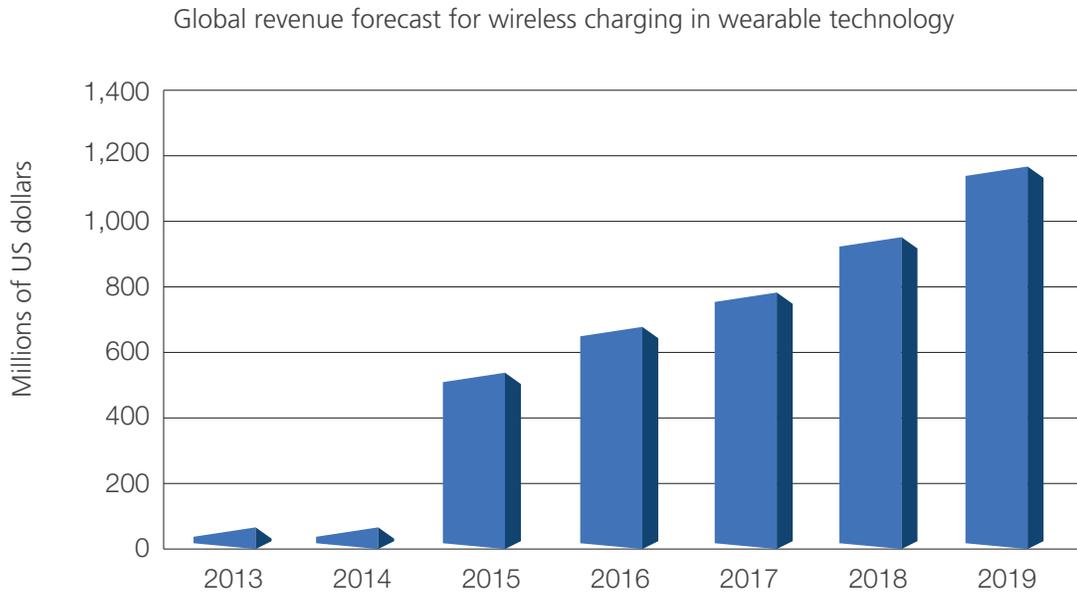

Figure 5: Wireless Charging in Wearable Technology

According to recent reports, future wearables could last for decades per charge. Besides, wearables could be charged from the human body.

These factors are to be considered while choosing the type and make of wearables. Wearable technology is evolving and will have its own challenges.

With respect to beacons, different makes offer different options such as battery life of up to 6 months and then a battery change, and some of them allow only replacement of the beacon after the battery is exhausted. Therefore, it would be a challenge to select the most suitable beacon for park owners and communication service providers to address based on their need.

Data connectivity within the park, both indoor and outdoor, has to be considered for the solution deployment.

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APPENDIX

Sample Use Cases

Actors
- Entertainment Park – Place
- Wearables and Smartphones - Devices
- Chris's Family – Chris (father), Maria (wife), Tina and Marks (kids) - Visitors
- Park Staff - Employees
- Prodapt's Connected Parks Solution – IoT Platform

Pre-Conditions
- Beacons are installed in the entertainment park and the beacon data is configured in Prodapt's Connected Parks solution
- Prodapt's Connected Parks mobile app has been installed in the visitors' smartphones.
- Communication exists between entertainment park's centralized system for the rides and shows and Prodapt's Connected Parks solution
- The entertainment park sells wearable wrist bands to the visitors for better customer experience
- Chris has downloaded the park's mobile app on his smartphone and has been provided with a login for the mobile app upon purchase of the tickets
- Chris has purchased wearables for each of his family members.
- Chris has configured those wearables device information in the mobile app.

Use Case 1: Visitor Experience Management

- Chris and his family reached the park, collected and configured the wearables for the family.
- Chris has created the wish list for his rides and entered height information of his kids in mobile app.
- The mobile app provided the list the rides nearest to his location, with a current wait time for all rides along with a mark stating one ride was not allowed for his kids and 2 rides were in his wish list.
- Chris and his family saved lot of time and family members were fully energetic to roam around the entertainment park.

Use Case 2: Find a Missing Child

- Chris received a notification in his mobile app for a water show to be started in 10 minutes at 20m distance.
- Chris & his family enjoyed the water show and started to move ahead towards the restaurant.
- Chris realized Tina was missing and he immediately tracked her location in his mobile app, which gave the map of where Tina was, from her wearable.
- Chris moved to the plotted location, where he found Tina and brought her back to the restaurant.

Use Case 3: Medical Emergency

- Chris received notification about the roller coaster ride in the nearest location.
- Chris requested for medical first aid SOS request as Marks was not feeling good after the roller coaster ride.
- Park staff received the SOS alert requested by Chris along with the nearby beacon location.
- Park staff immediately reached Chris's location in the crowded park and provided the required medical support.

Use Case 4: In-Park Promotions

- Chris walked towards the restaurant and received entire combo offers notifications in his mobile app.
- Chris decided on the order even before entering the restaurant; the family enjoyed their soulful evening snack.
- Chris walked towards the shopping zone, received the promotional offers going on in the nearby shops and the coupon codes to use for discounts.
- Chris used the coupons to get the discounts on his shopping and had a very nice shopping experience.

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