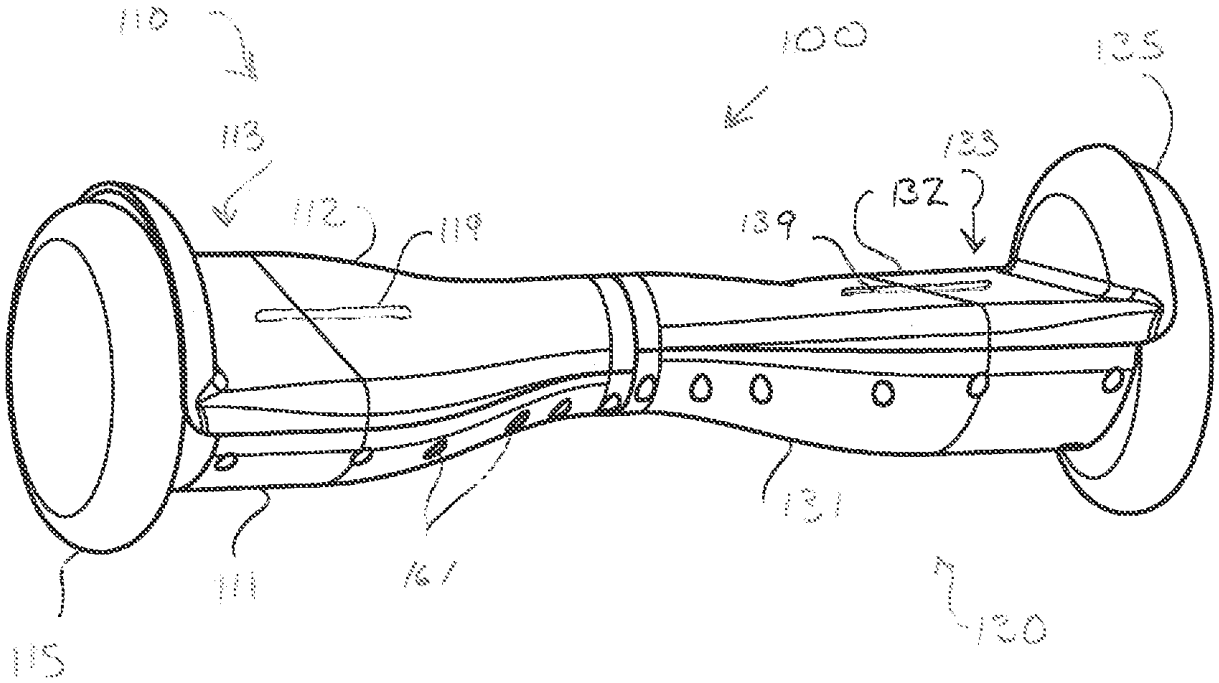
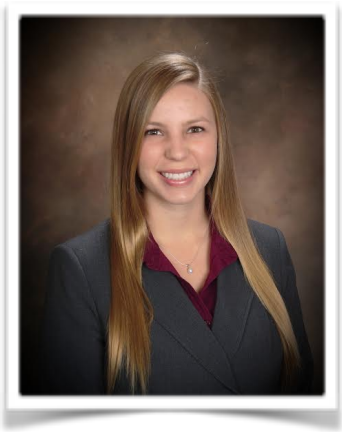
MINI INDUSTRY ANALYSIS REPORT



About the Authors

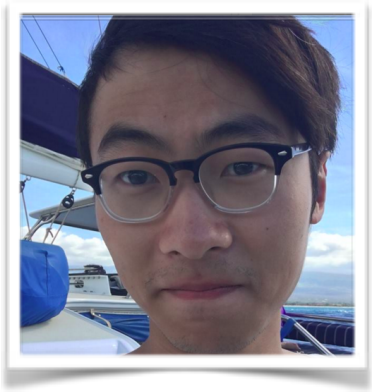


Raquel is a sophomore in the Marshall School of Business at the University of Southern California. She was raised in Orange County, California and is pursuing a career in management consulting upon graduation. She specializes in industry trend analysis, having worked for several non-profit organizations in image branding and market penetration campaigns. She will be working as an intern this summer as a Business Technology Analyst in Deloitte's Consulting practice and looks forward to her future career in the professional services industry.

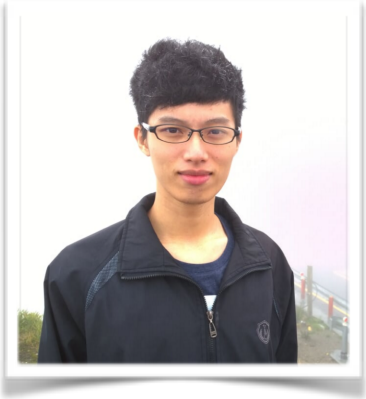
Marygail is a junior in the Marshall School of Business at the University of Southern California. She was born and raised in Westchester, New York and is pursuing a career in management consulting. Last summer, she gained experience in industry analysis at PricewaterhouseCoopers as a client strategy intern. She will continue her work at the firm this summer as a management consultant intern in the advisory practice.

Melanie is a senior in the Marshall School of Business at the University of Southern California. She was born in Buenos Aires, Argentina but spent most of her life growing up in Orange County, California. While studying Business Administration in college, she has had exposure to a lot to case studies and industry analyses. Outsides of the classroom setting, she has interned at Boeing in the Finance department. She was able to apply this knowledge and experience to this report to examine the hoverboard industry.

About the Authors



Sheng is a junior at University of Southern California Marshall School of Business, originally from Guangzhou, China. Currently pursuing a Bachelor of Science degree in Business Administration, Sheng is particularly qualified for this report because he is a double major in Mathematics and Economics. He brings a unique combination of disciplines to the analysis.



Jim (Huang, Chin-Hsun) is a senior in National Taiwan University majoring biochemical science and technology. He was born and raised in Tainan, Taiwan, and now studying in Taipei. He tried a startup relating to 3D-printed robot education in 2014, and knows the 3d printing industry in Taiwan today. Jim is qualified for this report because he is eager to learn different fields of knowledges.

Table of Contents

Logic Model and Process

Inputs	Outputs	Outcomes
Resources: - Articles - Journals - Lectures - Videos - Time People: - Team - Professors - Peers	Industry analysis Product growth and trend in market Government regulations Potential technological advancements Future use of product by consumers	Understand the sudden popularity of hoverboards in the United States Provide a comparison of product's performance in other countries Project what the future has in store for this product and whether it's success will continue Gauge a sense of where the industry is headed and when we can expect to see hoverboards that will actually float

Background	Goal	Effect	Output
Team members are from different cultures, campuses, and continents...but we are **UNITED** in our quest for knowledge	Our team will synthesize knowledge, information, and research to **LEARN WITH** and **FROM** each other about this market and industry	Cross-campus collaboration will lead to a **GREATER OUTPUT**, due to insightful perspectives and meaningful discussion	To create a mini-industry analysis report that will **ENGAGE** and **INFORM** readers about the current industry conditions

Product Description

History

A Chinese company created the first hoverboard in August 2014. It started gaining more buzz and attraction when the company brought the product out to China's largest trade show. Soon after, varying versions of this product became available on Alibaba as other companies began to replicate and manufacture this device[9].

History

Original Concept		
1989		The term "hoverboard" is originated from the movie *Back to the Future II*, 1989, starring Michael J. Fox.
Debate of Invention		
2013		A Chinese businessman Shane Chen bring his invention, called Hovertrax to U.S. on Kickstarter campaign. He claimed that his idea was copied by other manufacturer when it first appeared as Solowheel on *Happy Show* , a Chinese TV show.
2014.8		A Chinese company "Hangzhou CHIC Intelligent Technology Co., Ltd founded in 2013 and associated with Zhejiang University, announced its new product Smart S1, a self-balancing smart scooter.
Copycats in China		

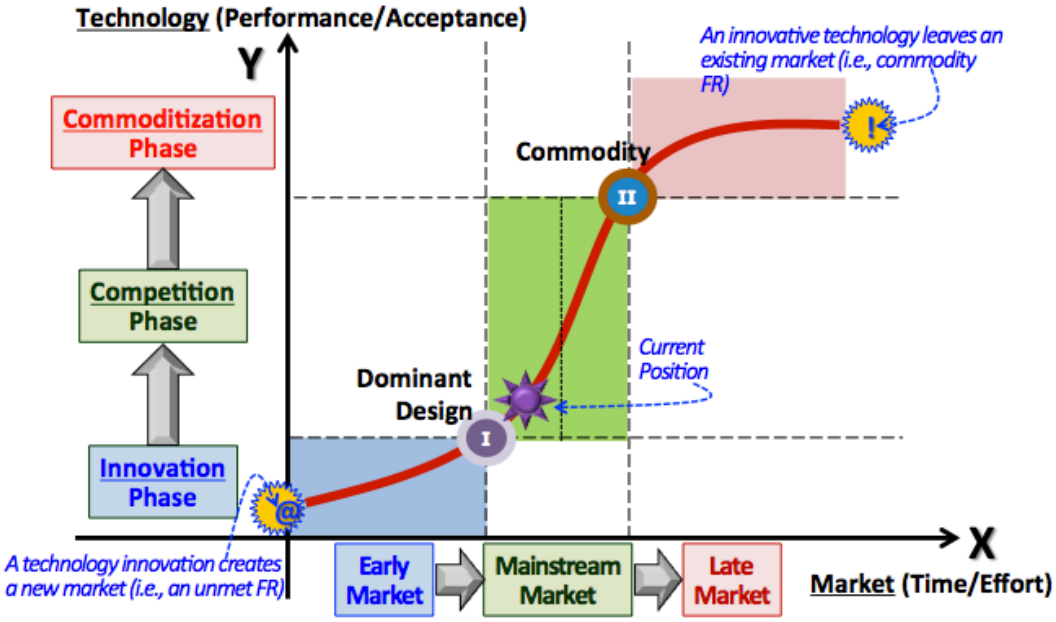
2015.6		By June 2015, more than five manufacturer produce some copycats with a variety of flaws or features, which is a common phenomenon in the manufacturing industry in China.
Popularity in Western countries		
2015	Chris Brown, Nick Jonas, Zedd, Soulja Boy, Kendall Jenner, Justin Bieber JR Smith, Nicki Minaj, Wiz Khalifa, Nina Agdal, David Ortiz, Karim Benzema, and Skrillex	Some celebrities (especially in entertainment field) have been tweeted, Instagrammed, or Youtubed themselves with the vehicle in a couple of months.
2015	Airboard, Cyboard, Esway, Future Foot, Galactic Wheels, Hovertrax, IO HAWK Monorover, Oxboard, Phunkee Duck Roadrunner, Soar Board, Swagway, SwegWay, XiaoMi	Major distributors in the world today

Not only were Chinese companies hopping onto producing this product, but also tons of American companies started to put the hoverboard into production. Thanks to several American celebrities who have been sighted on this new ride, the hoverboard has quickly gained popularity among American consumers. On American college campuses, it is becoming more common to see these electric hoverboards being used by students as a means of transportation to get to class.

Market Analysis

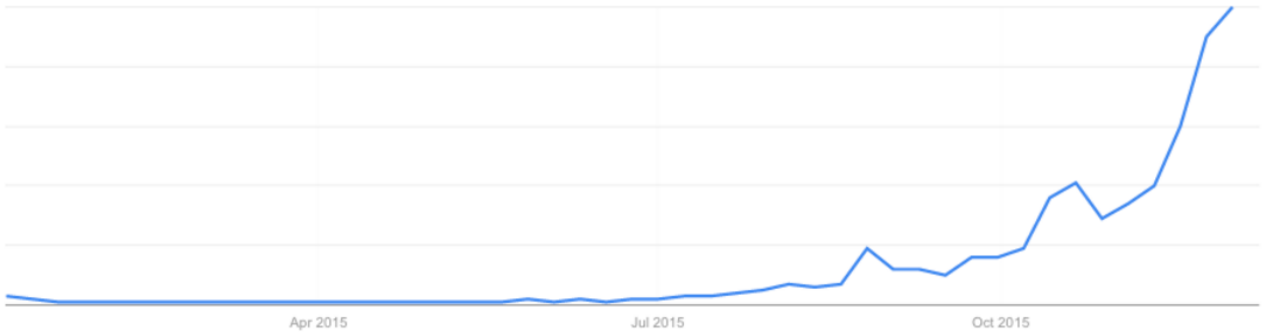
Industry/S-Curve

The electric hoverboard does not come at a cheap price and currently sells for anywhere between $600 and $1800. Despite the high prices, these self-balancing scooters are flying off the shelves and are predicted to be one of the most popular holiday gifts[4]. Because of the recent rise of the product, it is still hard to identify some general statistics for the industry. When placing this product on the S-curve, it is just past the point of dominant design where the market is expanding at an incredibly fast pace and the competition is getting tougher. There have been other designs of motorized transportation devices that have been introduced to the market such as the motorized unicycle that has two pedals sticking out of a motorized wheel. The electric hoverboard that has two wheels set on the side of a flat platform for the rider to stand on is the design that has taken off and seen the most success. This design is largely based off of the Segway structure, which is why the product is often referred to as the "hands free Segway." Because this product is basically branching off of another, it is not entering a Blue Ocean market, which would have been the case if the hoverboard was completely original and addressing new needs and requirements.



Our group believes that the market of the product is entering the mainstream stage because the market possesses several crucial characteristics of a mainstream market. First of all, the market has reached a dominant design, which marks the beginning of a mainstream market. Most electric self-balancing scooters are nearly identical. They may have some slight differences in terms of insignificant details, such as black rubber bands on the wheel arches or include extra features like a Bluetooth speaker, but most products are essentially using the same components. The similarity in terms of design signals that the whole market has reached a dominant design that will become the industry standard for the product. Furthermore,

2015 Hoverboard Trend



https://www.google.com/trends/explore#q=hoverboards&date=1%2F2015%2012m&cmpt=q&tz=Etc%2FGMT%2B8

Geographic Breakdown

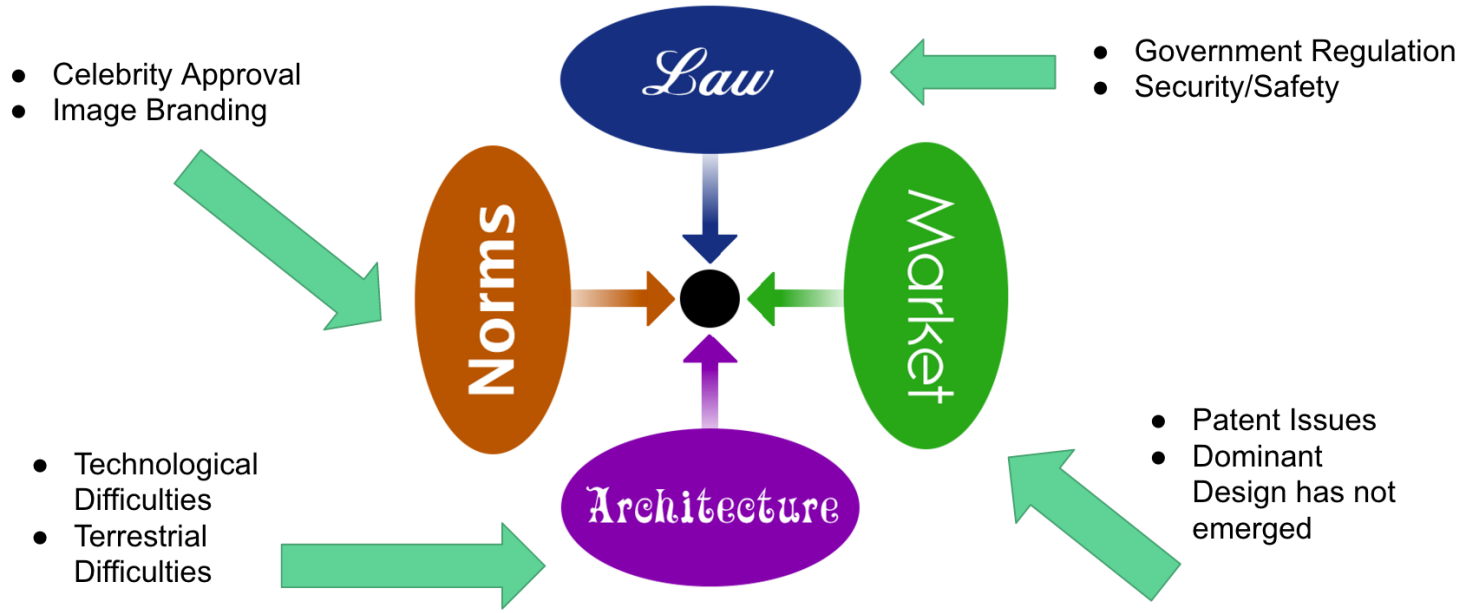
https://www.google.com/trends/explore#q=hoverboards&date=1%2F2015%2012m&cmpt=q&tz=Etc%2FGMT%2B8

Outlook Regulatory Environment

The product has proven to be largely successful, especially in the States within the last couple of months as shown through the trend graph pulled from Google Trends. However, it is hard to say what the future has in store for this industry. Because of the lack of cheaper alternatives to this product, it will be difficult for the product to become a commodity. Not only is the price a problem, but also there are several substitutes like bicycles and skateboards that consumers can turn to. On top of these factors, government regulations are slowly starting to be set in place to ban people from riding the hoverboards on public roads. For example, Australia has set a fine of up to $458 USD because of safety concerns such as unstable brakes and the absence of warning lights[2]. Britain[5] and New York City[6] have also set similar restrictions on the use of these self-balancing scooters. The sales of these products continue to soar for now, but it is hard to say what the future will look like if their use

continues to be banned in public spaces. These government regulations being enforced will be further discussed in the Government Regulations section of this report.

Industry Constraints



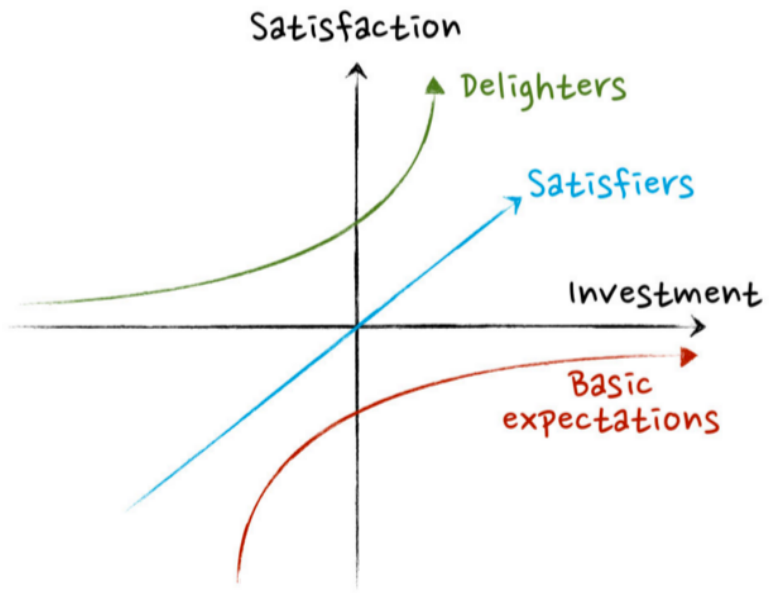
Architecture:

Currently, the hoverboard is constrained by some technological components. As of mid-December, all of the United States' major airlines have banned the transportation of hoverboards on their flights. They claim that the high-lithium powered batteries are unsafe and unstable on flights. Furthermore, the power of these batteries exceeds government limits for air travel. This certainly provides a major roadblock in the self-balancing scooter industry, for this airline restriction makes the product seem unsafe—not just on planes, but everywhere.

Market:

Although there is a fairly rough idea of the physical design of the hoverboard, a dominant design has still not yet been reached. This is because the market is still trying to decide on what the main functional requirement of the product will be to satisfy the customer needs. Will it be used as a toy or gadget? Or will it be used solely for efficient transportation? Since the market for this product is still so new, it will take time for the producers to select a dominant design in order to move forward. However, time is not the only constraint. Government regulation of the product will also determine what the functional requirements will be. With the trends we've seen in the fall of 2015, we believe that the government is in strong opposition to the hoverboard product. If governments and other regulatory institutions continue to set up roadblocks at every curve, then we will expect the functional requirement to become a toy for pleasure. On the other hand, if the regulatory constraints on the product lessen, we may see possibility for the emergence of the hoverboard as a mode of transportation.

Understanding the Industry: The Kano Model



Since the product is in the innovation phase of the S-Curve, there are still very few basic expectations to be met. As of right now, there is one seemingly emerging expectation: get a person from point A to point B. However, as the market for this product expands and a dominant design is reached, we can expect to see more basic expectations emerge, such as: level of balance, customization and personalization of the hoverboard, and ease of charging. These basic expectations, and more, will emerge as the industry progresses; however, in the mean time, the product seems to satisfy and delight consumers due to the sheer image of looking cool and experiencing something new. We expect the levels of satisfaction and delight to decrease unless other exciting features are added to the product, for we believe that the features that delight and excite right now will eventually become basic expectations.

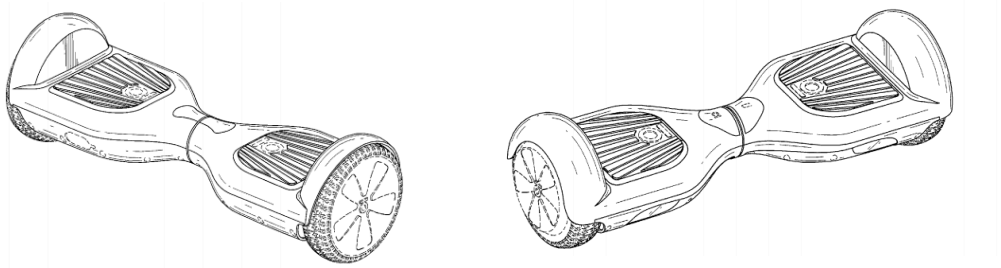
Patent Analysis

Through the use of sources like Creative Commons or the US Patent and Trademark Office (USPTO), not much information about this product could be found. Despite the lack of information about the electric self-balancing scooter, when we searched "hoverboard," we were able to come across a few patents that had been filed, but these were in reference to the original concept of a hoverboard that magnetically levitates the person on the board. The list we found through this method are listed here:

PAT. NO.	Title
9,148,077	Magnetic levitation of a stationary or moving object
9,126,487	Hoverboard which generates magnetic lift to carry a person
8,965,048	Heuristic motion detection methods and systems for interactive applications
7,156,594	Device, system, and method for restraining planar objects

Due to the limited information we came across through the "hoverboard" search term, we decided to specify our search to "self-balancing vehicle," which ended up drawing in much more results. From the results that came up, two patents aligned exactly with the product we are discussing in this report as proven through the images that were attached to the patents:

D738,256 Self-balancing vehicle
D737,723 Self-balancing vehicle



Aside from these two sources, Google Patents was also used to search up more patent information about the self-balancing scooter. Several patents came up that also matched the description of the product (Application Numbers CN204601572U, CN201610202U, CN201914376U). They were all translated from Chinese, which makes sense given the fact that the idea was developed and first put into production in China before making it over to the United States. Although images were not attached to these patents, the descriptions provided clearly explained what kind of product the patent was discussing.

Competition

In today's market for the hoverboard, competition is cut throat and is overfilled with competitors. Some of the companies in this industry include PhunkeeDuck, IO Hawk, Hover Boost, Swagway scooter, AirBoard, Airwheel, Drifting Board, MonoRover R2, Muzeli, Monsterwheel, Hyperwalk, eRover, and Smart Balance Wheel. Because a dominant design has been established, a lot of these companies have been trying to differentiate themselves apart by setting a lower price point. Unfortunately, some issues have come up with these cheaper versions, as there have been instances where the product would overheat and burst into flames[1]. Beating out these smaller competitors, companies like PhunkeeDuck and IO Hawk have been dominating the market with the help of celebrities who have made appearances riding these electric devices[3]. Celebrities like Kendall Jenner and Justin Bieber have posted videos of themselves riding PhunkeeDuck and IO Hawk hoverboards around on their social media accounts. J.R. Smith, a basketball player on the Cleveland Cavaliers, has also been sighted riding a PhunkeeDunk into the arena prior to an NBA final game[7]. This free marketing has immensely helped the two companies solidify a dominant and stable position in the market.

Furthermore, the companies in the market compete by developing products with better performance. The intense competition in this arena has forced companies to innovate and come up with advanced features that benefit the customers. Some of these include a farther travel distance with the help of a longer lasting battery source and waterproof features that make the product more reliable and efficient. The signs of hyper competition are not obvious as the customers are still trying to make the most use of the product. There is no certain standard as to determine whether a performance has exceeded the requirement of the customers. The large number of companies might be signs that future competition in the market will become more extreme and the market is quickly approaching the 'red ocean'.

Another issue that has been blowing up with the intensifying competition is in regards to the patents. Because of the unclear origination of this product idea, companies have been getting involved in an endless number of legal fights over holding the rights to the production of this item[13]. It is very difficult to say who came first and who has the right to continue manufacturing and who does not, but as mentioned in the previous "Patent Analysis" section, there are not many records of patents on file that can quickly resolve this dispute.

Restrictions

Government Regulation

The government regulation and backlash that hoverboards face around the world vary dramatically. However, as a general rule of thumb, most governments do not approve of the product. New York City has gone so far as to ban hoverboards in public areas[10]. New York City Police officers have been instructed to deliver a hefty fine of $200 to anyone riding a hoverboard "because they are motor vehicles that can't be registered" with City Hall. The government's issue with these devices does not stem solely from their inability to be regulated; they also stem from a desire to keep New Yorkers healthy and to reduce traffic on sidewalks. The law, in New York City's case, is being used for reasons other than what officials have publicly stated.

New York City isn't the only government to place restrictions on the hoverboard. Great Britain has outlawed the use of hoverboards in public areas, claiming that they are "too unsafe to ride on the road, but too dangerous to ride on the pavement"[5]. The hoverboards are banned from riding on pavement under Britain's Highway Act of 1835, and even under Scotland's Roads Act of 1984.

If governments have not addressed the legality and restrictions on hoverboard yet, they will be forced to very soon. Most government regulation policies were created decades before this technology came to life, and as a result, most will need to take another look at the policies that have dictated the restrictions on modern, innovative motorized vehicles.

Cultural Acceptance

Hoverboards are seen as the epitome of innovation and the essence of high-class status. They "are being used by the right people, and seem to have little stigma attached" to their usage, claims Alex Kantrowitz, senior technology reporter for BuzzFeed News[12]. John Legend, Kendall Jenner, Wiz Khalifa, Jamie Foxx, Usain Bolt, Justin Bieber, and Chris Brown are only few of the many cultural icons that have seen—and even endorsed—hoverboards. Hoverboards have attracted wide attention in the athletic realm with athletes opting to use hoverboards as a signal of status, helping to build their own brand image. The acceptance of hoverboards is increasing among millennials as these significant cultural icons and celebrities increase the usage of hoverboards.

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