The Helixator potential benefits
For a better urban life
Economic and social effects

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Abstract
The Helixator it’s a transportation device that adapted to the urban revolution of the 21st century.
Increasing the urban density build up area while reducing the amount of private cars in the city, creating an enormous challenge to the municipal authorities, challenge of mass transport.
Helixator meets this challenge by enabling mobile masses of pedestrians in three dimensions in continues flow while maximizing the efficiency and the economy activity of the municipal system.

The purpose of this document is to outline the benefits contributed to the Helixator, as an urban transportation system to urban economies, environments and societies.

This work is the first research showing the benefits of the helixator in densely populated urban areas.
This paper was accompanied by collecting, studying and analyzing large research material and we will gladly help any researcher who is interested.

1. Introduction
Initially initiated as part of a study in mechanical engineering, the first development objective of the Helixator was to produce a valid solution for realization Helical escalators. The Introduction of the Helixator technology article (Elevator World, September 2009) presented a geometrical study, explaining the usage and advantages of Helical geometries. The study included explanations regarding the variable geometries and acceleration option the technology holds and included, in addition, a comprehensive explanation of its key mode of operation, the core monorail solution. Once the solution was introduced, new opportunities emerged and the research was further expanded to the fields of architecture and urban transportation. In these fields, research was carried in order to find the optimal methods and solutions needed to successfully incorporate the Helixator technology into existing buildings and metropolitans.

Contemporary cities present great challenges for all transportation industries. The rapidly increasing demand for new forms of mobility creates opportunities for new environmental, economic and aesthetic solutions to emerge. The unique combination of today's computational strength, availability of tools and production methods, enables the construction of extremely sophisticated machines. By combining the ingenuity and inventiveness of the past with current methods, it is now possible to design and plan large architectural machines and their components down to the bolt level.

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The Helixator development had produced a variety of concepts for all subsystems and major components of the machine. Among them there are the innovative designs of the step chain, step surface, drive system and handrails with excellent dimensional stability. The technology was developed with the incorporation into the existing industry in mind, and the complete system requires the application of available existing technologies. All the methods and tools needed for the realization of the machine had been previously proved, and some had been used by the industry for many years.

Fig 1: The Helixator technology allows modification to a given situation; these images show the incorporation of the technology into a subway station and as part of a building. Image by Helixator

2. Background
Throughout history, humans have been striving to be in constant motion, a fluent movement without interference. History reveals that mankind strove to explore new horizons and created new opportunities through the development of new innovative transportation systems. The invention of the wheel allowed efficient freight transport, the construction of large sailing ships during the Renaissance led to the spread of new frontiers, the development of the elevator allowed the construction of skyscrapers and the introduction of the escalator made the massive use of subways possible, to name a few. Overcoming the existing barriers in order to streamline the process of movement had always led to new economic, environmental and social evolutions.

Modern society wishes to be in a constant flow, a fluent motion; one doesn’t like to stand in traffic, wait for the bus, find a parking spot or even to stand in crosswalk. Contemporary urban transportation systems are based primarily on a combination of motorized vehicles and pedestrians. Supported by transport infrastructures, which are in a constant state of overload, most major cities are now facing a state of constant traffic congestion, which results in a total lack of flow.

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In recent years we have witnessed a massive migration to the major cities along with a steady increase in human population. The United Nations and the US Census Bureau project estimate that the world population will increase from 6.8 billion today to about 9.2 billion by 2050, and that by the year 2030 approximately 60% of the world population will be living in cities. Growth in the cities’ population will increase the number of vehicle within a given city, in addition to an increase in the amount of pedestrian. Furthermore, it will increase the density of the built-up area, and thus the load on the transport infrastructure. As a result, changes in preferences of transportation will be reflected in the growing use of public transport, which will directly lead to increase in the number of pedestrian in the city. In addition, due to the increase in life expectancy, transportation solutions will be required to confront the increasing average age of pedestrian population.

The state of the transportation infrastructures in modern cities today indicates that there is a need for a new transportation system; an alternative system that will streamline and improve the urban transport system; a sustainable system that will allow continuous motion, conserve area and volume and reduce the negative health consequences that are associated with motorized vehicles.

The introduction of the Helixator solution can pave the way for the next revolution in urban transportation, as a better alternative and compatible to the existing systems as well as totally new usages.

3. The advantages provided by the Helixator
The Helixator integration into an urban transport system will provide an effective and sustainable 3D transportation which will help overcome the challenges of the 21st century.

**Helixator data (for helical layouts)**
- Savings in an area of up to 4.5 times compares to traditional escalators
- Estimated maximum capacity of 12,000 p.p.h (people per hour)
- Estimated speed of 4-5 km/h
- Five to ten times p.p.h capacity compared to elevators at the same space consumption

3.1 Increasing the efficiency of urban transportation system
Starting from the middle of the 20th century, a rapid growth in urban population has been registered all over the world. This growth has diverse, direct and indirect consequences that effect people in their daily lives. This development can be observed in the increasing dense built-up areas and the steadily rising number of vehicles in the cities which inevitably causes traffic congestion. The Helixator has the ability to integrate into the existing urban transportation system and optimize it.
Using the Helixator, two points can be three dimensionally connected by extending a straight line between them. As a result, the urban traffic flow will significantly improve a fact that will bring to a reform in individual's preferences and attitudes towards the manner of transport within the city.

By introducing the Helixator to a major intersection, crowded with pedestrians and vehicles will double space; on the one hand, pedestrians will be able to cross the intersection quickly and safely above the traffic, on the other, vehicles will be able to continue on the road with no interference.

Further more, the Helixator can provide synchronization between busses, sub trains, trams and pedestrians. Such a development is in accordance with government policies, as it will reduce the amount of privet vehicles within the overloaded cities by providing an efficient public transportation system.

Fig 2: Time square New York. The Helixator increases the efficiency of urban transportation by allowing pedestrians to cross the street above traffic while eliminating waiting time and interferences. Image by Helixator

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3.2 Increasing productivity
One of the most effective ways to support economic development is to improve transportation system efficiency while reducing the resources, such as money, time, land, risk, etc. that are required for a given level of accessibility (Tod Litman, 2010)

Adding the Helixator to the urban transportation system will increase productivity and lead directly to an increase in economic activity. In fact, the Helixator allows maintaining a continuous movement and shape in three dimensions, while overcoming geographical barriers. Continuous flow means saving time; for example, saving a few minutes' time of arrival of each employer will greatly increase the annual output by a large percentage.

The Helixator can connect skyscrapers directly to metro stations and by doing so, allows transporting people 5-10 times more efficiently than with an elevator. Applying Helixator routes all over the city, in an average speed of 1 Meter per second, will bring to a significant change in transport preferences in highly dense cities.

3.3 Reducing traffic accidents Various studies indicate that the cost of accidents is enormous. These costs are derived from deaths, reduced productivity of the injured, a drop in living standards of the victim, traffic delays as a result of the accident, directing national budgets, etc.

In addition, several studies of insurance data indicate that almost 80% of traffic accidents happen on urban roads. In the state of Alabama, for example, 72% of car crashes occur in urban areas. (http://www.watsongraffeo.com/alabama-car-accident-statistics)

The financial impact of road/car accidents is so high that each year it amounts to several percent of the GDP of a given country.

For example: According to the U.S. Department of Transportation report (The Economic Impact of Motor Vehicle Crashes 2000) published by the National Highway Traffic Administration (NHTA), it is estimated that the cost of all Types of traffic accidents in the U.S. in the year 2000 amounts to 231 billion U.S. Dollar, about 2.7% of GDP and equals 820 U.S. dollar Per capita.

The Helixator provides the opportunity to mobile masses of people above traffic, in an environmentally friendly manner in a continuous motion. Using the Helixator will reduce time of arrival at a destination, which will in turn lead to a change in transport preferences. Reducing the amount of private vehicles in the cities will reduce the total amount of accidents and will save many lives. Achieving this will allow channeling funds and resources to other needs.

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3.4 Urban renewal
Urban renewal is a program of land redevelopment in areas of moderate to high density urban land use. Urban renewal projects are usually executed in urban or industrial centers, which were active in their past but faded for various reasons, with the intention of turning them back into lively urban centers. One of the key factors to the success of such a project is the introduction of an efficient transportation system, as a convenient transport system encourages development. The Helixator’s flexibility allows suitting all the route area and therefore can be an engine to leverage urban renewal.

Urban renewal projects often involve increasing the population density of the area. In many cases, renewable areas don’t comply with today's facilities’ standards and requirements. The establishment of a new transportation infrastructure and/or the expansion of the existing one are required. The costs of such projects are enormous.

The Helixator offers a mass transit system that can be connected to existing infrastructure. Upgrading the existing system, rather than replacing it, will save time and money and contribute in many ways to the process of renewal. Effective transportation system will encourage the migration of artists, entrepreneurs and young population in to the area, which is an important step in establishing an urban rehabilitation projects. For these reason Helixator can be a useful tool for entrepreneurs.

Another suitable application of the Helixator is the, so called, vertical city. The vertical cities or hyper buildings are large scale complexes that are designed to function as cities, a dynamic unit that provide all of men needs. In such a complex, the Helixator can contribute to continue flow within the building and to the freedom of design. Many vertical cities are currently in a planning process, and they are being designed to give a solution for the growing urban population. The Helixator system, combined with an elevator system is the transport device that the entrepreneur needs for the perfection of such vertical city.
3.5 New underground station
When building a new underground station it is imperative to reduce the quantity of material excavated in the building process. Stations are usually built in busy city centers, where every cubic meter of material is logistically complicated and expensive to transport to and from the building site. The amount of built concrete within the tunnels directly affects the costs of building the stations due to the need to built and transport it. It is important to note that standards require every newly built station to have at least one elevator shaft for disabled passengers. In this case the usage of helical escalators requires only widening the elevator shaft in order to accommodate escalators and elevators within it.

Fig 3. Shows the benefit of using Helical escalators in order to reduce the amount of excavated material in the access tunnels to the station.

Image by Helixator
3.6 The Uses of the Helixator in shopping centers at high building density

In 1950, 30% of the world's population lived in cities by 2000 this fraction grew to 47% and it is predicted to rise to 60 percent by the year 2030 (http://data.worldbank.org)

Population growth leads to increased commercial activity and thus to an increase in the amount of commercial space needed. Since costs are growing due to surface density of construction, creativity is needed in order to keep trading centers profitable. Commercial centers’ attraction forces will increase economic activity within. Land prices will rise due to the high density and the increasing demand for space. Reducing the gross non-producing areas, in order to increase income-generating areas will become an even more important issue as the prices per land/space units inflate. Helixator, with its unique technology, can significantly decrease escalator space by up to 4.5 times and a territory enables the non-yielding savings.

In fact, Helixator provides excellent solution for dealing with increasing urbanization problems and entrepreneurial profit.

Fig 4: Helixator helical layout provide the option to minimized the escalators space by 4.5 times

Image by Helixator
3.7. Social advantage
Researches show that there is a direct link between the existence of a reliable efficient transportation system in a living community and positive social and social economic changes within that community. The introduction of the Helixator as a transportation device to communities in third world countries and developing countries can therefore improve the standards of living. As shown in the image below, the Helixator can be constructed to link the inner streets of slams and favelas to bus stations and sub train stations.

Using the Helixator technology for short routes, ranging between 40-100 meters in lengths, can allow a connection between two points in a straight line, making a clear and fast mobility of passengers from the inner street to the main road and/or transport centers possible. The Helixator will therefore contribute to the accessibility of transport for all, a target that was made a priority by the U.N and the World Bank.

Incorporating the Helixator system into the transportation network of cities in third world countries will provide for an accessible transportation. The Helixator provides the opportunity to move fluently and freely while overcoming geographical obstacles. A development that will ensure the prevention of reproduction of class on the one hand and development on the other.

Providing an accessible and efficient transportation system is essential to any given society, many authorities are seeking ways to prevent direct and indirect consequences causing by poverty.

Fig 5: Helixator routs (marked in red) connecting to bus stations along the road to the inner streets of the Rochina favela at Rio de Janeiro, home to approximately 250,000 people.

Image by Helixator

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3.8 Environmental advantage

A good transportation system eases the access to employment, education, markets, leisure facilities and other services, and therefore plays a key role in the economy. Unfortunately, road users still generate excessive costs to themselves, other individuals and society by causing noise, pollution and accidents. The challenge is to promote healthy and sustainable transportation alternatives in order to prevent or reduce the negative effects of transportation habits on human health.

( WHO regional publications. European series; No. 89 )

The steady growth of metropolitans creates great challenges. As a direct consequence, we witness a growth in the number of transport users, which in turn has a tremendous impact on both health and environment. This growth creates the need for additional transport infrastructure. The increase in the total amount of vehicles within the city has a staggering affect on human health and urban environment. One of the ways to prevent the negative affects of transport on the urban environment is to create a sustainable public transportation system that combines different kinds of transportation means in order to optimize the city’s mobility. Such an optimization is essential to both the economy and the society.
The Helixator system, with its flexibility, its three dimensionality and its ability to confine to a small surface area, is suitable for further integration into urban development, while minimizing the damage to urban nature and reducing the negative consequences on health. Furthermore, integration of the Helixator into an existing public transport system will create a sustainable continues mobility and will tackle the need for creating a transportation alternative that preserves the environment and the human health, while preserving and developing economic activity.

The Helixator gives the opportunity to mobile masses of people above the traffic or natural treasures.

Fig 7: The Helixator allows continuous movement over a river with minimum impact on the environment

Beyond the Health, ecological and psychological benefits of maintaining the treasures of urban nature, the Helixator will allow a substantial saving in government funds. These funds are often wasted on dealing with the implications of building a new road infrastructure and dealing with the congestion that is caused by motorized vehicles within the city. These implications include air pollution, illness and costs of nature rehabilitation among others.
3.9 Energy Efficiency

Energy efficiency is one of the most important parameters in choosing means of transportation. In growing economies, which strongly depend on an efficient transportation system, a significant importance is given to the amount of total energy consumption. However, the growing demand for energy becomes increasingly problematic as the fossil energy reserves are dwindling. As a result, we witness a constant rise in energy prices. Creating energy-efficient systems is therefore one of modern society’s most urgent needs. For this reason, governments today are seeking new methods to reduce energy consumption.

Measuring the energy efficiency of transportation systems is problematic. Over the years a number of models for this measurement were developed. One of these models is the Litter per Kilometer model. According to this model, comparing the energy efficiency of various transportation means is done by converting different measurement units, for example, 1 liter of gasoline is equal to 30,000 B.T.U or 31,578 K.J.

The weight factor affecting the highest energy efficiency is a correlation between transport capacity and load. When this is intelligently exploited the ability and capacity of the system is best utilized.

Because different transport types use different fuels, the index "km per litter" is a relatively reliable measure of schematic. It is used to compare the energy required for the operation of various transportation means. It does so by converting the energy required into an index energy required to convert the various transportation means the energy inherent in one liter of fuel, as an index author in common course, relatively easy to grasp. Based on the energy consumption of an escalator the helixator energy consumption at full capacity (12,000 p.p.h) is about 130 km per liter, assuming that the helixator use 50% less energy than escalator the energy consumption will be about 260 km per litter, to compare the energy consumption of a suburban railway is about 20 km per liter and a bus at full capacity is about 100 km per liter.

Using the Helixator not only increases the efficiency of urban transportation system but also significantly reduces the amount of total energy used for movement. This ability is considered nowadays a standard requirement by the authorities and entrepreneurs alike.

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Final
Integrating the Helixator into the existing urban transportation system enables the reduction of costs associated with traffic congestion, crashes, energy imports and pollution. Additionally, it can improve the accessibility of an area with underdeveloped economic potential. Finally, the Helixator can allow energy conservation and pollution emission reductions.
As an Entrepreneurial tool, the Helixator allows for more freedom of Design, and makes the reduction of non profitable areas in commercial center and open air development projects possible. Conservation of space, in a world of high density cities, with high real-estate cost, is a significant factor for entrepreneurs. Above all, the construction of the Helixator allows a substantial reduction in construction waste. In terms of economic benefits, the Helixator can serve as a catalyst for the development of various projects.

Ultimately, the benefits that the Helixator provides comply with the goals that the U.N., the World Bank and non-governmental policy institutes have set.

As the first published paper on the economic, environment and social effects of the Helical solution it is far from being completed and its main purpose is to stimulate an ongoing discussion by the industry, academy, urban designers, architects and the public on the pros & cons of the Helixator solution.

The Helixator team is encouraging any organizations and individuals to take part in this discussion to help us make a better urban live.

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