

South Korea - Seoul International School

Concept Explanation

"MetaPort" is a one-wheel transportation vehicle driven by harnessing pure and natural human metabolic processes. It incorporates the modern necessity for pure environmentalism with an attractive, sleek design for high speed, fast-paced transportation in day-to-day life.



Delving into a thorough explanation, the displayed vehicle is a prototype of the design. The vehicle is designed with a minimalist view of one wheel with an attached handle bar to minimize the energy expenditure during usage. The energy itself derives from a battery system attached to drive the wheel motor; however, it is futuristic and sustainable for its primary energy sources are not derived from nuclear or fossil fuel forces, but

from three primary metabolic energy sources: urinary waste, body heat, and movement.

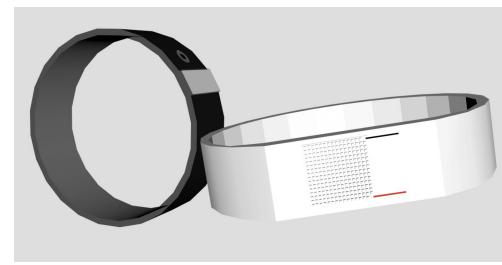
How will this energy be harvested?

Firstly, urinary waste, as Bristol Robotics Laboratory developmentally tested, can be converted to pure energy through microbial fuel cells (MFCs). Stacks of MFCs (MFC energy-harvesting unit) convert urinary waste through microorganism metabolism into electricity in a matter of minutes and is enough, in fact, to power a mobile phone with even half a cup of urine.¹ Yet this does need a laboratory setting, for Bristol BioEnergy Centre successfully tested the feasibility of urine fuel conversion in public restrooms.² Then instead of a half a cup of urine, we can harvest 1.5 to 2 L of urine a day--the estimated amount each human releases a day. By installing environmentally-friendly toilets that drain urine waste into MFCs for clean energy production, we can grassroots power with significant energy sources.

Secondly, body heat, as researchers at North Carolina State University developmentally tested, can be used to thermodynamically convert body heat to electricity with wearable thermodynamic generators (TEGs).³ This device will be inserted into the MetaPort bracelet.

Thirdly, movement, as researchers at Chongqing University of Technology found, can be harvested with permanent magnets inside

a bracelet, producing energy as the magnets move along with the user.⁴



How will heat and movement energy be collected?

Unique advanced bracelets that combine heat and magnetic field technology can be used to

simultaneously harvest both heat and movement energy, producing a secondary energy supply that is supplementary to the primary energy production from public urinal and toilet installations.

The energy from heat and movement will be stored in a chip attached to each bracelet. Users can purchase as many bracelets as they want, attaching them primarily to arm and leg areas that produce, typically, the most heat and movement energy. Each chip not only preserves the secondary supplemental energy, but also serves as an identification with a registered name and address for each user.

How will the MetaPort vehicles be charged and distributed?

There will be central rental spots near, initially, urban hotspots. Each rental spot will have six MetaPort vehicles hooked to a central digital locking, rental, and charging system. The locking and rental system will function with the chips from each unique bracelet. By placing chips from the bracelets into the digital input system, the individuals will be identified to ensure safe return of the MetaPort vehicles after rental expiration and the supplemental energy from the chips will be transferred to the charging system.

With regards to the rental system, a user inputs their bracelet chip(s) into the digital safekeeping system. After riding the vehicles and returning them to the system, the users will be able to take back their chips. With the vehicle returned, the machine will display how many hours the user has ridden for, charging based on hourly rental rates, which are elaborated upon in financials.

With regards to the charging system, with energy from both public urinals and toilets as well as supplemental energy from the chips, it will continuously recharge attached scooters for long-term use.

What about safety?

In the case that energy runs out, the MetaPort vehicle has both dual electric and manual functions. The electric function is movement run off of energy, where the pedals on the sides of the vehicle lock and are used for rest. The manual function loosens the pedals and allows the MetaPort vehicle to be pedaled, akin to a bicycle, ensuring that energy loss will not incapacitate the vehicle's movement.

In the case that individuals do not return the MetaPort vehicle after 24 hours after checkout, an alert will go out to our officials. Each vehicle will have a built-in GPS that allows it to be tracked and found in the case it is lost or not returned.

In short, MetaPorts are transformative, environmentally sustainable vehicles that will only continue to develop and expand for our business to thrive. With growth and success will come more development and distribution for the vehicle, landmarking it as a hallmark of modern, revolutionary vehicles.

¹ <http://www.brl.ac.uk/brlinthenews/urinepower.aspx>

² <https://www.digitaltrends.com/home/pee-power-this-toilet-generates-electricity-from-urine/>

³ <https://news.ncsu.edu/2016/09/wearable-teg-heat-harvesting>

⁴ <https://phys.org/news/2017-07-energy-harvesting-bracelet-power-wearable-electronics.html>

Marketing Strategy

MetaPort, an innovative approach to eco-friendly transportation, will primarily appeal to the target market of the growing urban youth and professional market. According to The Center for Generational Kinetics, the post-millennial generation is officially denoted the “fastest growing generation of employees, customers, and trendsetters.”⁵ Additionally, up to 40% of current urban teenagers and professionals named environmental sustainability as their chief concern, ahead of even inequality, unemployment, and terrorism, among others.⁶ This growing target market displays the clear positive future for the product, appealing to the younger generation with environmental conservation and sleek, advanced technology.

To expand the overall attention and publication of our MetaPorts, we plan to initiate strategic marketing strategies. **First**, we plan to identify the most populous sites in South Korea (i.e. central parks, amusement parks) to garner a wide customer base for vehicle rental and bracelet purchase income. **Second**, we plan to decorate nearby populous public restroom stalls with environmentally-friendly messages, encouraging them to use our MFC-modified urinals and toilets for sustainable energy production and waste removal. With an aesthetically trendy appearance and a distinctive experience (i.e. encouraging and thankful messages for contributing to environmental sustainability), more users will be incentivized to use our sustainable urinals and toilets. **Third**, we plan to input flashy, noticeable advertisements into environmental magazines and local bus and subway stops to garner public attention with ease. **Lastly**, we hope to establish collaborative relations with South Korean NGOs that share a common goal of prioritizing our Earth’s sustainability and health. Akin to Greenpeace, we will request assistance to promote and further develop our innovative means of transportation and associated alternative energy supplies; ultimately, appealing to countless conservation enthusiasts (a wide variety of whom are the young generation), enriching our MetaPort team brand image.

Financial Plan

Initially, MetaPorts will be tested in 10 test locations in South Korea centered around urban hotspots – Gangnam, Itaewon, Garosu-Gil, and other highly populated Korean cities. These 10 locations have been selected due to their high percentage of the younger proportion of the population, as well as their frequent foot traffic. With each installation of the MFC energy-harvesting unit in public bathrooms, costing an estimated \$600 according to the Bristol Bioenergy Center, a total of 10 test locations will come up the sum of \$6,000. We will also be installing 6 MetaPorts in each test location, each costing an estimated \$100. A total of 60 MetaPorts will be tested, coming up at \$6,000. Furthermore, an engineer will be maintaining and fixing them every month, who will be hired for \$2,000 each month.

Our revenue will primarily come from hourly rental fees. With a reasonably priced fee based on Citibike’s daily rental prices as well as the cost of an individual MetaPort, we placed the hourly rental fee at \$6.

We estimate that there will be around 30 hours of MetaPort use per day in the first quarter, although this number will increase exponentially once we employ the aforementioned marketing

strategies, breaking the 1,000 hour daily usage in the beginning of the first quarter of the second year.

Furthermore, each new customer will pay for a bracelet that will allow them to charge their MetaPort. With each RFID identification chip costing an estimated \$1 in terms of production according to a paper published by two MIT students⁷ and the energy-harvesting unit within the bracelet costing an estimated \$25 to produce, we will price each MetaPort bracelet at \$40. With an estimated customer base of 100 total users in the first quarter, we expect this number to grow exponentially, taking into consideration the various marketing and sales strategies we plan to employ.

Time	2018Q1	2018Q2	2018Q3	2018Q4	2019Q1	2019Q2
Revenue						
Rental fees	Rental fees	22,320	29,909	40,078	53,704	71,964
Bracelet sales	Total Sales	1500	2000	3750	4250	4500
Total Revenue		23,820	31,909	43,828	57,954	76,464
Costs (\$)						
Installation	MFC Energy-Harvesting Unit	\$6,000	\$6,000	9000	9000	12000
	Metaports	6,000	6,000	9000	9000	12000
Maintenence	Maintenance	8,000	8,000	8000	8000	8000
Marketing Strategy	Bathroom Renovation	3000	3000	6000	6000	12000
Total Cost		\$23,000	\$23,000	\$32,000	\$32,000	\$44,000
Net Income		\$820	\$8,909	\$11,828	\$25,954	\$32,464
						\$56,931

Figure 1. Financial projections for MetaPort⁸

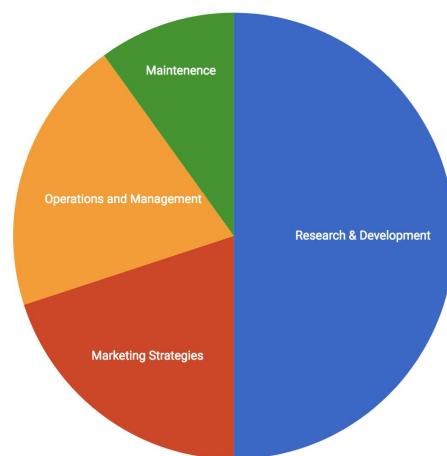


Figure 2. Budget plan chart

Funding

To ensure maximum funding potential for our MetaPorts, the detailed costs of which are broken down in financials, we will be employing a wide variety of fundraising campaigns and strategies.

Firstly, the MetaPort team will advertise our product and sustainability mission on leading grassroots crowdfunding websites (i.e. GoFundMe, Kickstarter, Indiegogo). These websites, responsible for billions in startup support each year, will provide a venue for the younger generation to discover our missions and goals, garnering a wide range of funding.

Secondly, the MetaPort team will strategically implement connections with South Korean international schools that contain well-funded and connected environmental organizations, including “Global Issues Network”, that would be more than willing to provide funding for a sustainable, environmentally friendly mission.

Thirdly, the MetaPort team, after furthering research and development, will draw in early and late stage investors. Among methods of garnering investors is gaining publicity and popularity, and appealing to both non-business, as well as business, investors.

⁵ <http://genhq.com/gen-z-2017/>

⁶ <http://www.masdar.ae/en/media/detail/generation-z-wants-more-action-for-a-sustainable-future-reveals-global-rese>

⁷ <https://pdfs.semanticscholar.org/55c1/5f73074e02032042a5bb2a1be4d49027e45>

⁸ <https://dailyhover.com/report-global-e-mobility-market-set-to-reach-62-2-billion-in-2025/>