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MonicPRT

A High Capacity

Dual Mode Automated Mover System

MonicPRT is an automated with and without guideway or manually operated without guideway people and light goods mover system.

In comparison to a Train or Monorail system, its advantages are that whilst the system can transport the same amount of commuters despite each carriage being of a smaller capacity, it is a more efficient and effective system and lower in cost overall. Its other advantages are that is light weight that runs on guideways that are slimmer, more flexible, fast to implement and cheap to build. It's operational cost is low, key reason being as it is powered by normal electricity source. It is driven automatically on demand, 24/7 and direct point-to-point travel. The stations are very small and can be very close to each other in the guideway or stop anywhere without guideway for commuter convenience. The system is seamlessly scalable without right of way demand. Commuters can travel fast, safely, securely, comfortably, in privacy and affordable making it possible for car owners to switch riding to **MonicPRT** for work. It is disabled-friendly and environmentally sustainable.

MonicPRT system will save Governments billions of dollars and still be able to provide highly efficient and affordable transportation to the people. It is self-financing and return of investment is just 3 years. It is a very economical, sustainable transportation system.



Environmental Friendly and Sustainability

New transportation innovation has to consider renewable and non-polluting sources of energy for sustainability.

MonicPRT thus designs the car with external electric power source and a small battery to receive the re-generative energy from the motors when available.

The small battery also provides 30 minutes back up when there is interruption of external electricity supply.

Solar or Fuel cell could be used in **MonicPRT** but the technologies are still not mature yet. With consideration for a light weight car, use of external electric power source of 110 to 230 V AC, single phase is very ideal. No step up transformer is required, making implementation and maintenance easy, fast and at minimum cost.

The light weight of the car with 5 people or equivalent load weight makes the elevated guideway of 1.5 meters wide, which is considered slim and light. The column that supports the guideway will be small in diameter. This, together with the patent-pending design of tight angle turning, makes the layout of guideway very flexible as well as easy, fast and cheap to build. The elevated guideway can be built along existing narrow road and yet not blocking much sunlight.

The guideway is designed to be modular, like Lego pieces, so as to allow the pieces to be reused in relocation of guideway. This method will save costs and time to rebuild.

Our patent-pending tight angle turning design ensures congestion-free and scalable Stations, with aesthetic and flexible guideway following existing landscapes or a densely built-up area.



The best of **MonicPRT** is that the boarding/alighting stations can be built anywhere along the service guideway and very close to each other or anywhere out-of-guideway for the convenience of commuters. This makes the system like a lateral lift, moving people from block to block just as the normal lift is floor to floor in the block.

The cost of building the stations can be charged to the building owners if they like it to be at their building block, a great saving for the **MonicPRT** system operators.

MonicPRT again is unique as empty cars are NOT required to move continuously in the guideway. The patent-pending design allows the cars to park at right angle to the service guideway at the stations as long as there is no demand for it to be moved elsewhere.

The Car and Guideway specifications:

Car moves by 4 independent turning wheels with solid rubber tyre.

Car powered by 2 DC brushless permanent magnet motors.

Electric Power is collected from Guideway, 110 to 230 VAC 50-60 Hz single phase with battery backup for 30 minutes.

Car Length -- 2.5 meters Car Width -- 1.5 meters

Car Height: (from wheel in contact with guideway to the car cabin floor) 0.5 meters

:(from car cabin floor to cabin ceiling) 1.5 meters.

Car Speed: maximum 200kmph and maximum laden weight 1,000 kg

Car Seats: 3 to 5 people in front facing, with wheelchair option

6 to 8 people in two parallel side facing rows.

Car manual steering (optional) -- for off-the-guideway travel with restricted speed control (specified by regulator, maybe at 20Kmph) and limited to distance of 15 minutes from external charger source.

Guideway is electrified and is 1.5 meters wide, depth 0.5 meters and can be built with complete steel structure or reinforced concrete.

An animated video of **MonicPRT** system is available on the website <http://www.MonicPRT.com>



MonicPRT System Estimated Capacity, Cost and Revenue

Based on a 15 Km elevated guideway in a spread out network, 40 Stations, 200 cars will require 4 control systems and 1.5 years for installations. The System can begin operation and carry passengers when the first 1 km guideway and 3 stations are built.

The Capacity is shown on the table below:

System Capacity Projection	
Expected capacity for the system	
No. of trip per car hour based on average 60kph and 10 km distance	6 trips
No of passengers per car trip	5 passengers
Passengers per car hour	30 passengers
Passengers per hour for the system of 200 cars	6,000 passengers
Or per day of 20 hours operation	120,000 passengers
Expected capacity for the station	
One Berth at station per minute	1 car
No. of Passengers per Berth hour	300 passengers
No. of Passengers per Station of 6 Berths per hour	1,800 passengers
No. of Passengers for 40 Stations per hour	72,000 passengers
Or per day of 20 hours operation	1,440,000 passengers
Expected Maximum Capacity at 90kmph guideway speed	
No. of car in 1 km of guideway per minute (25 meters spacing)	40 cars
Max No. of car in 15 Km long guideway system at one instance	600 cars
Max No. of car flow in one hour at 25 meters spacing = 3,600 cars	18,000 passengers
Max No. of car flow in one hour at 20 meters spacing = 4,500 cars	22,500 passengers
Max No. of car flow in one hour at 15 meters spacing = 6,000 cars	30,000 passengers
Max No. of car flow in one hour at 10 meters spacing = 9,000 cars	45,000 passengers
At 70 Km/h, 10 meters spacing = 7000 cars	35,000 passengers
At 60 Km/h, 7 meters spacing = 8,500 cars	42,500 passengers

The expected capacity based on 200 cars is 120,000 passengers per day, and can be scaled up to reach the maximum capacity with more cars or increase guideway speed or reduced headway.



Unit Cost Estimate

Personal Rapid Transit having small cars and slim light guideway is much cheaper and faster to build. The break down of costs is as shown in the Unit Cost Estimation Table below:

Unit Cost Estimation Table		
Items	Price in SGD (Singapore Dollar)	Remarks
Passengers Car	50,000 per car includes security devices, control and communication, air-con/heater	Can be configured for 5 to 8 passengers. Limited by weight.
Elevated Guideway	5,000,000 per Km lane include electric power strips where possible and guideway communication with cars and control station.	Subject to local material and labor costs and site conditions for all civil works.
On Ground Guideway	5,300,000 per Km lane include electric power strips where possible and guideway communication with cars and control station.	More works involving soil treatment to ensure smooth pathway for the cars.
Under Ground Guideway	28,000,000 per Km lane include electric power strips where possible and guideway communication with cars and control station.	Excavation can be cut and open type. Tunnel cross section is about 3.5 metres diameter.
Elevated Station	500,000 per station with 6 berths, includes communication and control	Below the station platform can have kiosk for rent.
On Ground Station	500,000 per station with 6 berths, includes communication and control	
Under Ground Station	5,000,000 per station with 6 berths, includes communication and control	
Land Acquisition	Depends on location. Minimum land and no-right-of -way are required for guideway.	
System Control and Software	6,500,000 per system control of maximum 300 cars or 10 Stations - maximum 6 berths per station or each 10Km length of guideway, includes central control monitors, 1 x server, 1 x shallow server for back up. Building cost not included.	Requires yearly lease and maintenance. Cost is SGD650,000 per system per year, includes software upgrade, re-routing programming, and general related service support.
Pre-Implementation Study	400,000 per month exclude travel, living and other work related expenses for 2 specialists minimum.	
Project Management	600,000 per month exclude travel, living and other work related expenses for 1 project manager and 2 project engineers.	



Estimated Cost and Revenue for MonicPRT System

Estimated Project Cost		
Items	Duration/Quantity	Price in SGD
System layout and planning	3 months	1,200,000
Project Management	18 months	10,800,000
Cars	200 units	10,000,000
Elevated Guideway	15km	75,000,000
Elevated Station with 6 berths	40 stations	20,000,000
System Control	4 systems	26,000,000
Miscellaneous cost	1 lot	5,900,000
Total		148,900,000

Estimated Revenue and Cost of Operational based in Singapore for 100,000 passengers per day or 5 passengers per trip.

Revenue and Cost of Operation		
Items	Rates in SGD	Per Passenger
Revenue		
Expected fare	Fare per trip	0.800
Cost of Operation		
Car electricity cost	3kva per 10 minutes trip @ SGD0.22 per kvah	0.022
Cars amortization	10 years for SGD10,000,000	0.027
Cars maintenance	SGD400 per car month	0.027
Guideway and System Control amortization	40 years period for SGD113,000,000	0.077
Software lease & maintenance	2,600,000 per year	0.071
Stations amortization	40 years period for SGD20,000,000 Some may be paid by the building owners.	0.014
100 staffs	SGD400,000 per month salary cost	0.133
Other overheads includes interests	SGD1,000,000 per month	0.333
Total cost		0.704
Net		
Per day fare collection	SGD80,000	
Per day cost	SGD70,400	
Per day net	SGD9,600	

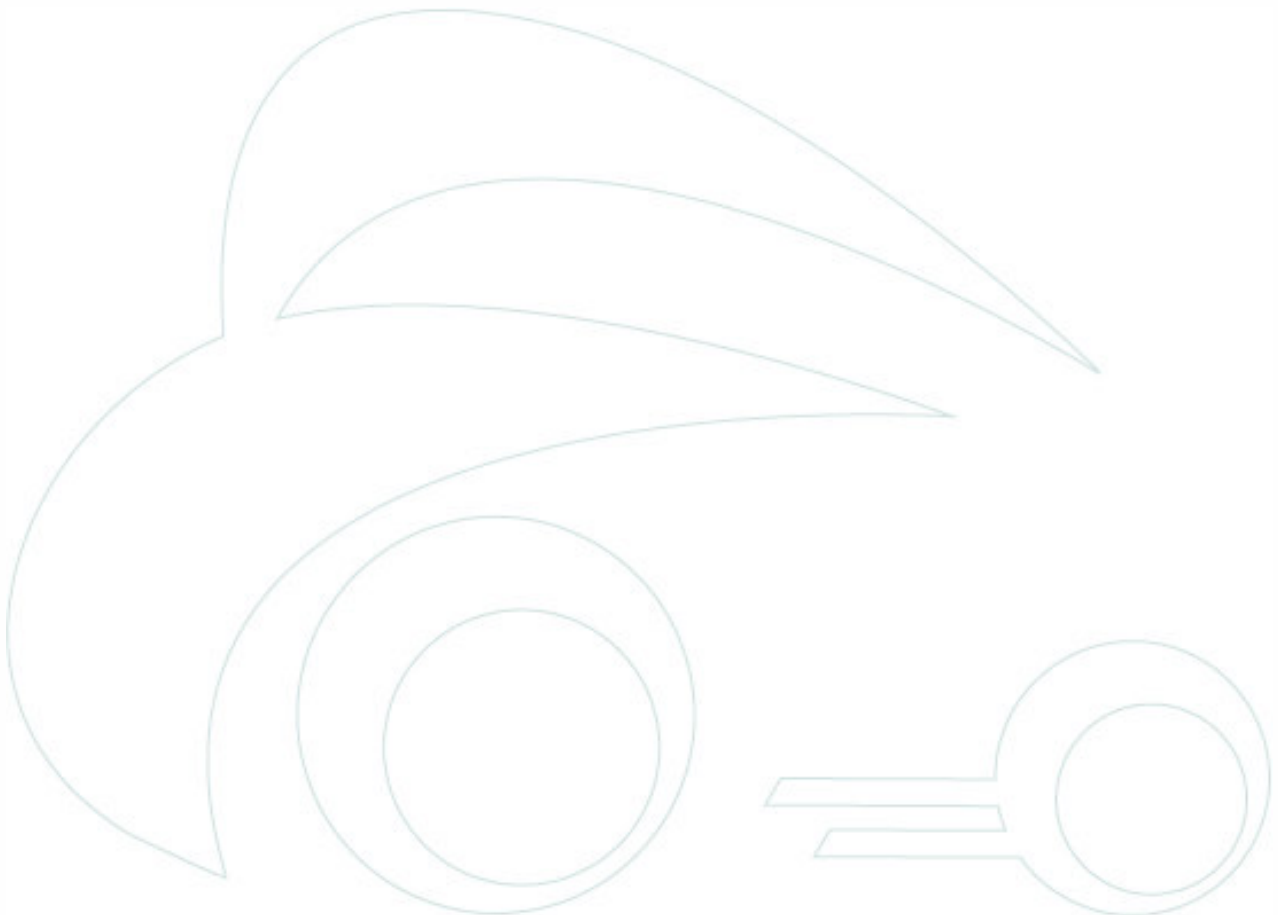


Please note that these are rough estimated figures; bank interests on project loans, daily passenger figures, various fare rates, labour and electricity charge rates, government tax and many external factors are not constant and will vary.

The car assumes to carry 5 passengers, travels 5 Km plus another 5Km for empty car to return.

These figures, show that the **MonicPRT** innovative transportation system is a self-financing, seamlessly scalable, environment friendly, and sustainable transportation for governments and affordable, comfortable, safe, secure and convenience for commuters. It is definitely a very good alternative for private car commuting.

The operational costs can be further reduced if the amortization increases to 60 years or the owner of the complex pays for the guideway built within their premises.



Comparison to Monorail and Metro systems

Estimated Construction cost:

MonicPRT average cost is SGD 10m per km based on the above calculation.

Monorail average cost is SGD 25m per km

Metro average cost is SGD 80m per km

(Source of the Monorail and Metro figures is from MMC Metrail website

<http://www.metrail.com/news/delhi/delhinewline240305.html>)

MonicPRT is much cheaper because of the following cost savings;

1. Very little land acquisition required.
2. No large station buildings required.
3. No need for a large depot. Can use multi-storey car park if depot is required.
4. Light Guideway costs lesser.
5. Shorter construction time.
6. Small car requires less manpower and time for testing and commissioning.
7. No power transformation rooms required.
8. Seamless additional branch or extension.

MonicPRT is more efficient and profitable;

1. More wide spread of stations for commuters convenience.
2. More passengers because it is very user friendly.
3. No unnecessary movement of empty cars in the guideway.
4. Car consumes much less power.
5. No stopping in between stations, direct point-to-point travel.
6. Car moves as fast as normal street car that are on non-congested traffic.
7. Available anytime on-demand, no scheduled time.
8. Less operational costs.

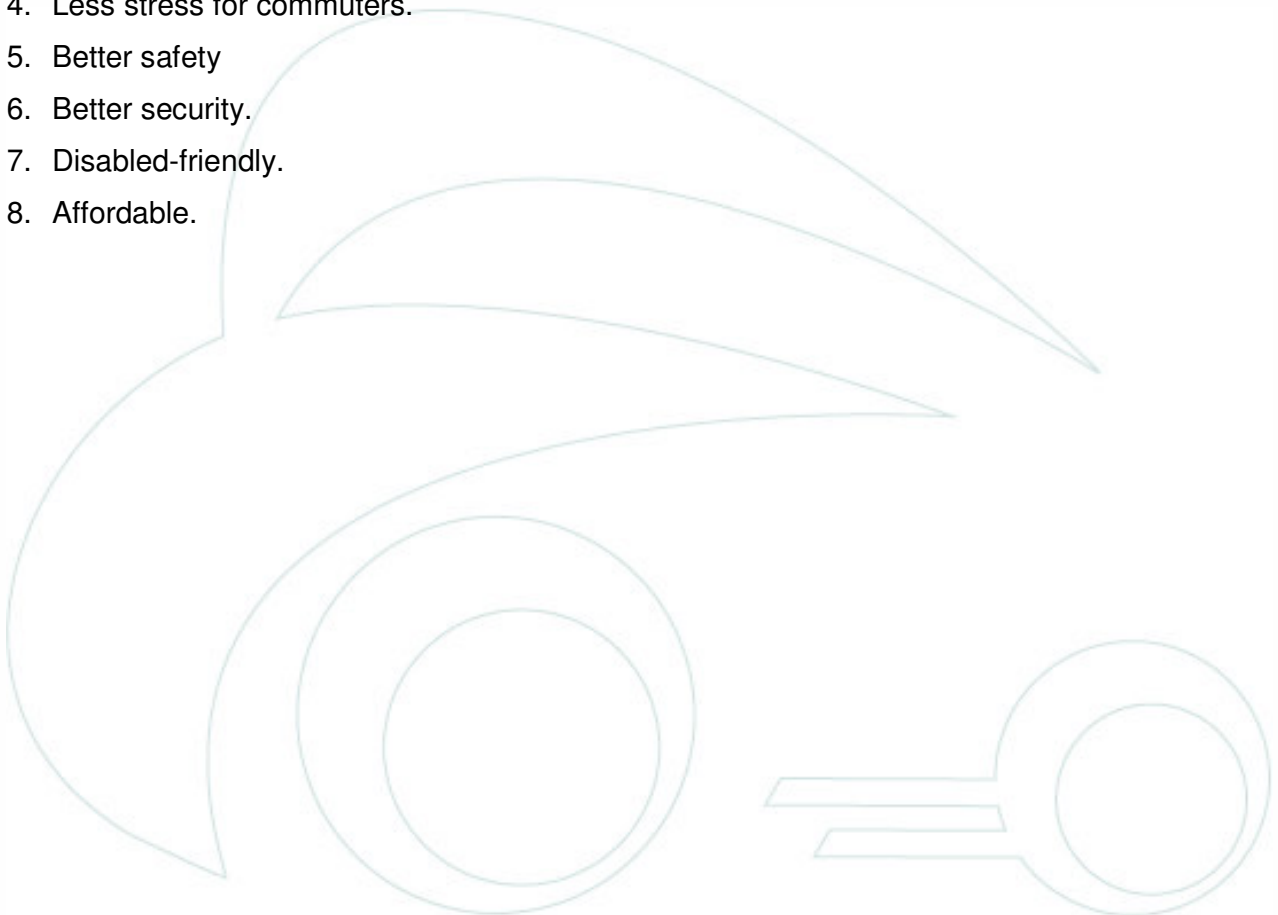


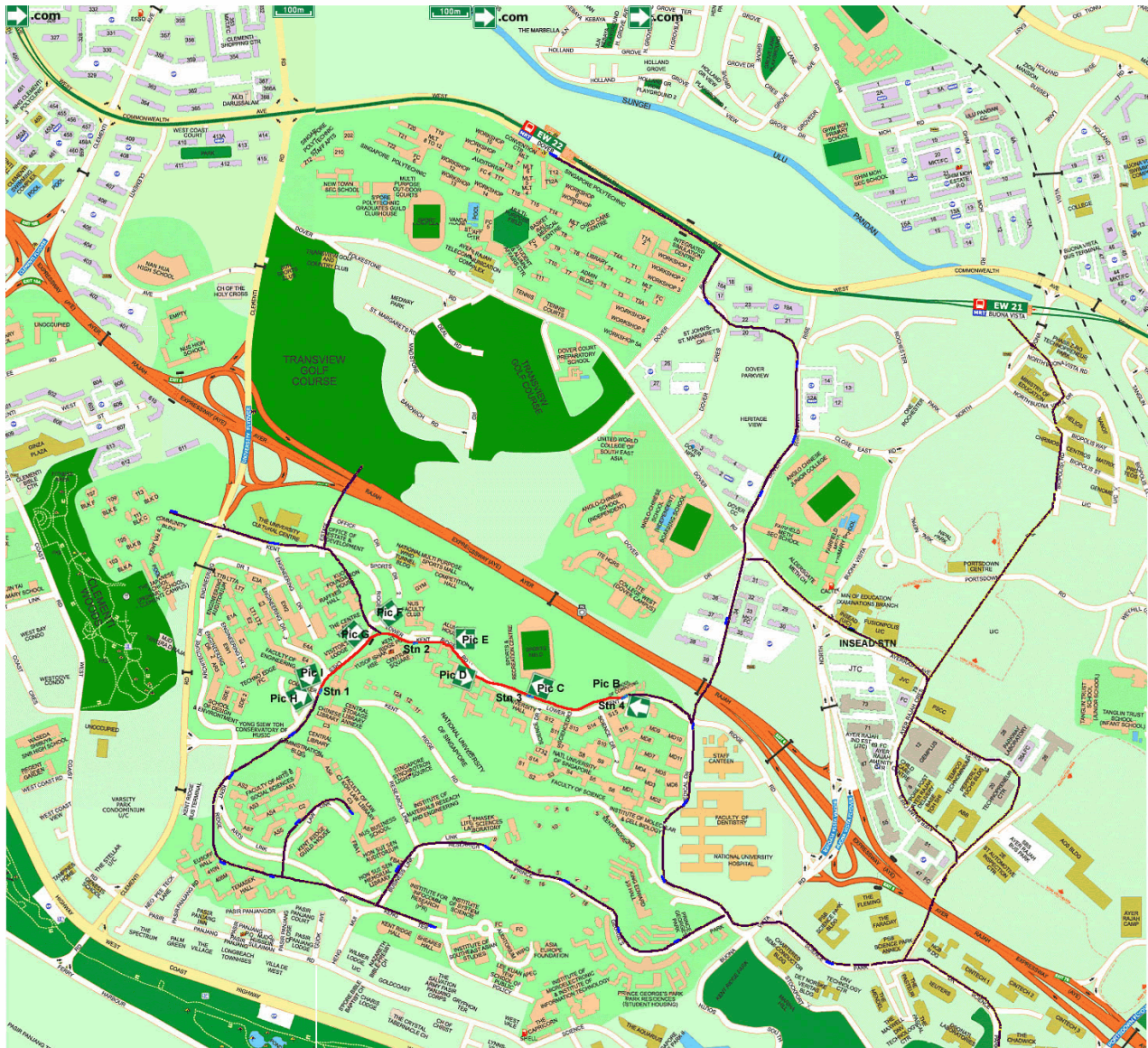
MonicPRT patent pending “Tight Angle Turning” advantages;

1. Allows very flexible guideway.
2. Allows seamless additional of berths in existing Station
3. Allows compact station.
4. Allow stations to be very close to commuters like in every block of building.
5. Allows cars to wait at station without blocking guideway.
6. Allows car to have front access for full utilization of the car space.
7. Allows very good ergonomics with all five passengers sit facing front.
8. Allows people and goods to move in and out easily.

Social Benefits – Social Equity for all people

1. No more rushing for buses, trains, or taxis.
2. All commuters will have seat, no standing.
3. Save a lot of traveling time.
4. Less stress for commuters.
5. Better safety
6. Better security.
7. Disabled-friendly.
8. Affordable.





Picture 1 – The proposed implementation of a full **MonicPRT** System in NUS Campus and the surroundings. The red line indicates the proposed test-bedding guideway of 1 Km and the purple lines are the proposed extended commercial guideway with coverage over NUH, Science Park 1 and 2, one-north Park, Dover Road HDB Estate and Schools.

The **MonicPRT** System will benefit NUS students and people living or working around the area with a seamless connection with MRT.

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