“Personal Rapid Transit via Magnetic Levitation”

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Today’s land-based public transport

- Buses, trains, light rail: Large containers with many people in each. Why?
- Footprint, ... and?
- The need for a driver!
- Instead computer control => many small pods, ...
- ... an automated public transport “taxi”
Fundamental Problem of Rail & Buses

Riders Have to Change Modes, Wait For Departures and Stop At EVERY Stop on the Route
Personal Rapid Transit (PRT) is:

- Small Automated Personal Vehicles
- Dedicated Guideways
- On-Demand Access at Off-Line Stations
- Non-Stop, Point-to-Point Service
You ride non-stop in a personal vehicle traveling on a guideway “lane” anywhere in the network.
Background & people

- Doug Malewicki, inventor (patent 1992)
- Richard Post et al (Inductrack, at LLNL)
- Firm: Unimodal, California
- Recent cooperation agr. with NASA
- Only one demo prototype built
- Global network of enthusiasts (incl. me from 2006 onwards)
It is 8 o'clock on Monday morning and Botboy nudges Lohhla awake for work. He irons her solar-panelled shirt … A personal health monitor … warns that her hormone levels are going to make for a trying few days.

Meet Lohhla: a 28-year-old "knowledge miner" living in a vertical village in inner Sydney in 2050. … Lohhla's lifestyle assistant, a sophisticated android she calls Botboy, takes care of such mundane tasks as the laundry, cleaning and ordering meals … Household robots will be common, and will respond to being asked, for example, to cook a "North Indian curry, fairly spicy, and preferably not based on lamb, by 5.30pm". …

The senior principal research scientist at CSIRO's Division of Sustainable Ecosystems, Barney Foran, says Lohhla will walk or cycle to work, or take a "personal rapid transporter - a hydrogen-powered, plastic bubble that seats three and zooms through the city on an aerial monorail". The world in which Lohhla lives may seem fantastical but scientists and futurists say this is what life in 2050 could be like for an affluent, highly educated, self-employed urbanite …
USA: First Generation PRT

Morgantown, West Virginia

Operated by West Virginia University for over 30 years and to this day is primary mode of service for students, faculty and staff.

8.7 mile system

Over 63 million passengers since 1972. Handles 15,000 people per day with a peak of 30,000.

Unblemished safety record. No serious accidents.

Availability rate above 98.5%.
Second Generation PRT

Worldwide Personal Rapid Transit Development

**Second Generation**

ULTRA (United Kingdom)
Government funded demonstration system in development

POS CO (Korea)
Government funded demonstration system in development in Sweden

RUF (Denmark)
In development

MAIT (Germany)
In development

Coaster (Austria)
Demonstration in development

SkyWeb-Taxi2000 (Minnesota, USA)
In development

Low Speed
*Up to 30 mph*

Small Scale
*Local Circulators Only*

High Maintenance
*Uses wheels*

Over 1000 lbs.
*Uses larger vehicles*
Second Generation PRT Close-Up

ULTRA System

Heathrow Airport, U.K. Deployment
Operational in 2011 (?)
Next Generation PRT

SkyTran

High Speed
Up to 150 mph

Scalable Networks
Local, Regional, National Service

Low Maintenance
Uses maglev instead of wheels

Under 1000 lbs.
Uses aerodynamic vehicles
Maglev concept: “Inductrack”

- Electrodynamic suspension vs EMS
- Repulsion, not attraction as in Transrapid
- Inherently stable, cheap, 25 mm gap
Maglev concept: “Inductrack”

Figure 2. The test cart in motion levitated above the test track. The Halbach arrays can be seen beneath the cart and suspended from its sides. These arrays generate a magnetic field that induces, from the motion of the car, currents in the coils contained in the track, lifting and centering the cart above the track.
SkyTran Off-Line Portal

You Board At The Departure Portal

Extra Vehicles Waiting For You On The Off Line Guideway

You Exit At The Arrival Portal

Acceleration Lane Switches You Onto Non Stop Guideway

High Speed Non Stop Guideway

Deceleration Lane

ON-RAMP SWITCH

BOARD

NON-STOP GUIDEWAY

EXIT

OFF-RAMP SWITCH
- Max. 14,400 pph (2 passengers at 0.5 sec spacing ≈ 3-lane highway one direction (?))
- Plus goods transport! (big potential)
Why Does SkyTran Carry Only Two People?

Average Number of Auto Passengers = 1.2 (?)

SkyTran Is Designed For Rule Not the Exception

Larger Vehicles Used For Infrequent Larger Capacities
Increase Overall System Size, Weight & Cost

Metro lines
Heavy concrete work, costly, difficult to install, and visually obtrusive

SkyTran
Lightweight, low cost, quick to install, and visually unobtrusive
Size Matters

*Transrapid*

> $150 Million Per Mile

*SkyTran PRT*

$15 Million Per Mile
Size Matters

Passive MagLev Provides A Compact Suspension for Linear Synchronous Motors (LSM) Propulsion.

Small MagLev & LSM Combo Provides Extreme Energy Efficiency

Only one moving part - very little maintenance
Energy consumption (estimate)

- At 240 km/h: approx. 100Wh/km from grid
- Oslo – Trondheim 500 km, approx. 48 kWh
- With two persons in pod, close to 50 Wh per person and km ~= high speed rail (TGV)
SkyTran is the only surface transportation technology that can be powered 100% by solar photovoltaics.
Low Cost, Mass Produced Modular Components

Small
Personalized
Vehicles

Inexpensive
Portals

Lightweight
Guideways

Standard Utility Pole
Supports

*Apply Henry Ford’s 100 Year Old Principles of Mass Production*
Easy Access Getting In and Out of the Vehicle
SkyTran Disappears into the Cityscape

No expensive, destructive right-of-way acquisitions required, just easements on existing sidewalks

Nonstop Guideway

Parked vehicles waiting for you

Boarding portal
Scale Comparison of Visual Pollution

- Elevated Light Rail
- ETC Monorail
- Intermediate Monorail

- Taxi 2000 (SkyWeb Express)
- Micro Rail
- ULTra
- SkyTran
Thank you!