



LIGHTWEIGHT PORTABLE TRANSPORT TOOLS - AN OBJECTIVE COMPARISON CHART

Here is an attempt at providing the most rigorous, objective and accurate evaluative comparison of LPT (lightweight portable transport) gadgets to date (2020). They are rated as commuting tools using the Group Average Matrix Evaluation (GAME) system invented by the author (Luc). Transport tools are in the left column & factors (considerations) are on the top row. Each factor has a weighting (importance value) which is the average importance number given by participants. For example, participants saw the portability factor as important so gave it high importance numbers with an average of 8.6 (weighting). The top speed factor was seen as less important & the average is just 5.8 (weighting). For each factor a gadget is given an achievement score which is how well it performs in that factor area. For example, the Urmo with a handle gets a perfect achievement score of 10 for the portability factor because it's so light, small & can be pushed by the handle. The achievement score is multiplied by the weighting to produce a weighting x achievement score. So for the Urmo in portability it's 8.6 (weighting) x 10 (achievement score) = 86 (weighting x achievement score). The Overall

SCORE for each gadget is the sum total of all weighting x achievement scores.

factors (considerations)→	UP & DOWN CURBS (or other large obstacles & ledges)	MANUAL USE (rolling freely without motor - to save battery get exercise!)	VEHICLE CONTROL (precision of steering, ease of riding, stability on smooth surfaces & prevention of vehicle rolling off by itself)	RANGE (distance possible after full charge)	HANDY STORAGE (size, shape & folding - putting it under your seat, table or in the attic and so on)	PORTABILITY WEIGHT & HANDLING (walking around with it)	TOP SPEED (how fast it will go)	OFF-ROAD RIDING (rough ground, sand, dirt tracks, mud, grass & so on)	SMOOTHNESS ON NORMAL CITY SURFACE (Factors: Suspension with tire size & material)	TIRE SIZE (diameter)	TIRES MAINTENANCE (durability)	CHARGE TIME (lower weighting because info is highly variable)	MAX RIDER WEIGHT	LIGHTS	MOTOR (watts)	SIZE	
Participant 1	M	10	10	10	5	7	5	0	10	NA	9	5	0	0	NA	NA	
Participant 2	L	6	10	8	7	8	10	7	3	8	NA	4	3	1	2	NA	
Participant 3	D	5	5	8	8	8	9	8	3	9	NA	6	3	1	2	NA	
Participant 4	P	7	8	10	7	9	10	7	2	7	NA	6	3	1	1	NA	
Participant 5	J	2	8	10	4	4	7	2	3	5	NA	1	1	1	4	NA	
WEIGHTINGS (AVERAGE IMPORTANCE VALUES) (1 to 10) ☐ (1 = unimportant, 5 = average, 10 = highly important)		6	8.2	9.2	7.2	6.8	8.6	5.8	2.2	7.8	NA	5.2	3	0.8	1.8	NA	NA















Transport Gadgets

	Walkcar	up no, d no	no*	OK	12/16k*	Tiny	2.8kg*	10/16kmph*	Unsuitable	No suspension	very small	1 hour	120kg	None		33cm wide	
	Achievement scores 1 to 10⇒	0	0	5	1	9.5	9.5	2	1	1	10	9	10	0		10 890cm³	
	Weighting x Achievement ⇒	0	0	46	7.2	64.6	81.7	11.6	2.2	7.8	52	27	8	0			
	Overall Score ⇒	308.1 Fits into your backpack like a laptop computer! Smooth surfaces only. The device stops when you step off - an important safety feature. Easy to learn.															
	Iota Trax	up hop, d roll	no	OK	13k	V. small*	6.8kg	12kmph	OK	No suspension	20cm	Pneumatic	40 minutes	81 kg	Front*	100w	17.8 cm width
	Achievement scores 1 to 10⇒	7	0	5	1	9	9	1	5	4	0	9.5	5	7		?	
	Weighting x Achievement ⇒	42	0	46	7.2	61.2	77.4	5.8	11	31.2	0	28.5	4.8	12.6			
	Overall Score ⇒	327.7 Similar to the electric wheels (eucs) but easier to learn, more compact and slower. The option of stepping off to the sides is an advantage over the Urmo.															
	XR	up 'flick', d roll	no	Limited	20-30k	medium	12.5kg	30kmph	OK	No suspension	29cm	Pneumatic	1 hour	125kg	Both	750w	Size: 23x29x76 cm
	Achievement scores 1 to 10⇒	3.5	0	4	6	7.5	2.5	7.5	6.5	4.5	0	9	10	10		50 692cm³	
	Weighting x Achievement ⇒	21	0	36.8	43.2	51	21.5	43.5	14.3	35.1	0	27	8	18			
	Overall Score ⇒	319.4 Perhaps it's 'cool' & 'fun' were included this would win. (See 'Onewheel VERSUS euc' video by Jimmy Chang)															
	no handle	up no, d roll	no	Limited	20k	V. small	7kg	15kmph	OK	No suspension	over 30cm	Solid	2 hours	120kg	Yes	2x900w	Folded size: 18x33.5x34cm
	Achievement scores 1 to 10⇒	5	0	4	3	9	8	2.5	6	4	10	7	10	3		20 502cm³	
	Weighting x Achievement ⇒	30	0	36.8	21.6	61.2	68.8	14.5	13.2	31.2	52	21	8	5.4			
	Overall Score ⇒	363.7 Automatically folds up in two seconds when picked up! The prototype was a little noisy but later models hopefully quieter. This may well be the future.															
	with optional handle	up & d step	no	Good	20k	V. small	7.7kg	15kmph	OK	No suspension	over 30cm	Solid	2 hours	120kg	Yes	2x900w	Folded size: 18x33.5x34cm
	Achievement scores 1 to 10⇒	10	0	8	3	8	10	2.5	6	4	10	7	10	3		20 502cm³	
	Weighting x Achievement ⇒	60	0	73.6	21.6	54.4	86	14.5	13.2	31.2	52	21	8	5.4			
	Overall Score ⇒	440.9 Handle helps to step up curbs, gives more control adding to safety & may be a way to transport boxes or other large items. One handed is fine. Good for police, airport workers, postal workers & for guided tours.															

Electric Wheels (ewheels) (aka: "Electric Unicycles" or Eucs): Good off-road, unsafe on slippery or smooth surfaces. Never ever push to max speed (not safe).

	V8 (Solowheel) Glide 3	up hop/step, d roll/step	no	Limited	45-50k	Small	13.8kg	30kmph	Good	No suspension	40 cm	Pneumatic	4-5 hours	120kg	Both	800w	53x46x15cm
	Achievement scores 1 to 10⇒	10	0	4	3.5	9.5	8.5	7.5	9	6	0	2	10	10		36 570cm³	
	Weighting x Achievement ⇒	48	0	36.8	68.4	57.8	73.1	43.5	19.8	46.8	0	6	8	18			
	Overall Score ⇒	426.2 One of the most popular ewheels as of 2020. Motor switches off automatically when lifted and has retractable handle. A wheel from the inventor of ewheels, hoverboards & the Iota trax: Shane Chen of Inventist.															
	16S	up hop/step, d roll/step	no	Limited	70k	Small	17.5kg	35kmph	Good	No suspension	41.7 cm	Pneumatic	about 6 hours	110kg	Both	1200w	50.6x46.3x19.6cm
	Achievement scores 1 to 10⇒	7	0	4	10	8	7	9	9	6	0	0	9	10		45 918cm³	
	Weighting x Achievement ⇒	42	0	36.8	72	54.4	60.2	52.2	19.8	46.8	0	0	7.2	18			
	Overall Score ⇒	409.4 Very highly rated wheel & a good size for beginners. Good replacement for a car if you live out in the open country with rough terrain. Kingsong s series are known to be among the safest of ewheels.															

Scooters: Often the best choice for commuting thanks to the handles which allow more control & convenience - you can even hang bags off the handles.

	EcoReco	XS	up & d step	OK?	Good	21k	small	7.7kg	21kmph	OK	Front suspension	16cm(F) 12.7cm(I)	Solid	4.5 hours	100kg	Front	?	Folded size: 104x25x15cm
	Achievement scores 1 to 10⇒	9	8	9	3	8.5	10	4.5	4	3.5	10	2	8	7	39 000cm³			
	Weighting x Achievement ⇒	54	65.6	82.8	21.6	57.8	86	26.1	8.8	27.3	52	6	6.4	12.6				
	Overall Score ⇒	507	Seems like a good balance of portability and other factors. Not the smoothest of rides though.															
	ET-WOW	Booster GT	up & d step	OK	Good	40k	medium	11.9kg	40kmph	OK	Front & back	20cm	Solid	4-5 hours	100kg	Both	?	Folded size: 97x33x14cm 44 814cm³
	Achievement scores 1 to 10⇒	7.5	7.5	9	8	8	10	6	7	10	2	8	10					
	Weighting x Achievement ⇒	45	61.5	82.8	57.6	54.4	51.6	58	13.2	54.6	52	6	6.4	18				
	Overall Score ⇒	561.1	Remarkable speed and range without being too heavy, and reputed to be very smooth to ride. Very expensive and as with other electric scooters not completely waterproof, so don't get caught in heavy rain!															
	Gotrax	G1 Glider Folding	up & d step	OK?	Good	14k	medium	9kg	26kmph	Unsuitable	No suspension	14cm	Solid	3 hours	100kg	Front	250w	Folded size: 100x36.7x15.9cm 59 200cm³
	Achievement scores 1 to 10⇒	9	7.5	9	2	7.5	9.5	6	2	1	10	5	8	7				
	Weighting x Achievement ⇒	54	61.5	82.8	14.4	51	81.7	34.8	4.4	7.8	52	15	6.4	12.6				
	Overall Score ⇒	478.4	Budget scooter - very quick but not good on rough terrain. Extremely portable and storable because folds very well.															
	KUGOO	S1	up & d step	OK	Good	25-30k	medium	11kg	30kmph	OK	Front & back	20cm	Solid	4 hours	120kg	Both	350w	Folded size: 96x21x33cm 66 528cm³
	Achievement scores 1 to 10⇒	8	7	9	6	7	8	7.5	6	6	10	3	10	10				
	Weighting x Achievement ⇒	48	57.4	82.8	43.2	47.6	68.8	43.5	13.2	46.8	52	9	8	18				
	Overall Score ⇒	538.3	Very much like the Zoom Stryder but much cheaper with less range.															
	KUGOO	S1 PRO	up & d step	OK	Good	25-30k	medium	11kg	30kmph	OK	Front & back	20cm	honeycomb	4 hours	120kg	Both	350w	Folded size: 96x21x33cm 66 528cm³
	Achievement scores 1 to 10⇒	8	7	9	6	7	8	7.5	6	6	10	3	10	10				
	Weighting x Achievement ⇒	48	57.4	82.8	43.2	47.6	68.8	43.5	13.2	46.8	52	9	8	18				
	Overall Score ⇒	538.3	The Kugoo pro version is very similar to the Kugoo S1 but adds a little more range and includes some upgrades.															
	Micro	Falcon	up & d step	OK	Good	10k	medium	7.9kg	25kmph	Unsuitable	No suspension	16cm(F) 12.5cm(I)	Solid	1 hour	100kg	3 brake lights	500w	Folded size: 78x50x15cm 58 500cm³
	Achievement scores 1 to 10⇒	9	9	9	9.25	1	7.5	9.5	6	3	2.5	3	9	8	3			
	Weighting x Achievement ⇒	54	73.8	85.1	7.2	51	81.7	34.8	6.6	19.5	52	27	6.4	5.4				
	Overall Score ⇒	504.5	Kick assisted motor allows change between manual & electric modes. Unique twist grip throttle, various ride modes & cruise control. Fast, portable & well built with excellent customer service from the Micro team.															
	Micro	flex deluxe	up & d step	OK	Good	NA	v. small	4.85kg	(NA)	Unsuitable	Flexi board	20cm	Solid	0 hours	100kg	None	NA	Folded size: 64x11x22cm 15 488cm³
	Achievement scores 1 to 10⇒	10	10	8	0	9.5	10	0	3	4	10	10	8	0				
	Weighting x Achievement ⇒	60	82	73.6	0	64.6	86	0	6.6	31.2	52	30	6.4	0				
	Overall Score ⇒	492.4	My current mode of transport & the only non-electric tool in this table. The low deck helps when scooting. This would likely win if money & time spent on charging, price & carbon footprint were included factors.															
	Segway	Ninebot ES2	up & d step	OK?	Good	25k	large	12.5kg	25kmph	OK	Front & back	20cm	Solid	3.5 hours	100kg	Both	300w	Folded size: 113x43x40cm 194 360cm³
	Achievement scores 1 to 10⇒	8	6.5	9	4	0	1	6	6	6	10	4	8	10				
	Weighting x Achievement ⇒	48	53.3	82.8	28.8	0	8.6	34.8	13.2	46.8	52	12	6.4	18				
	Overall Score ⇒	404.7	One of the top of the range scooters with numerous features. Add a battery to turn it into the ES4 (heavier but faster with greater range). Not compact when folded because the folding hinge is set too high.															
	SoFlow	Air Aluminum	up & d step	OK	Good	18k	small	7.7kg	24kmph	Unsuitable	Front suspension	V. small	Solid	2 to 3 hours	100kg	Both	250w	Folded size: 99x14x20cm 27 720cm³
	Achievement scores 1 to 10⇒	9	8	9	3	9	10	5.5	3	3	10	6	8	10				
	Weighting x Achievement ⇒	54	65.6	82.8	21.6	61.2	86	31.9	6.6	23.4	52	18	6.4	18				
	Overall Score ⇒	527.5	An ugly scooter in my opinion because the deck is high up and not even with ground with a tiny wheel. But folds beautifully (hinge lower down = compact folding)															
	Voyager	Proton	up & d step	OK?	Good	16k	medium	9kg	24kmph	OK	Front suspension	Small	Solid	Up to 4 hours	100kg	Front	250w	Folded size: 99x20x46cm 91 080cm³
	Achievement scores 1 to 10⇒	9	7.5	9	2	5.5	7.5	5.5	4	3.5	10	3	8	7				
	Weighting x Achievement ⇒	54	61.5	82.8	14.4	37.4	64.5	31.9	8.8	27.3	52	9	6.4	12.6				
	Overall Score ⇒	462.6	A cheap lightweight scooter.															
	Xiaomi	MI M365	up & d step	OK	Good	30k	large	12kg	25kmph	OK	No suspension	22cm	Pneumatic	5 hours	100kg	Both	250w	Folded size: 108x43x49cm 227 566cm³
	Achievement scores 1 to 10⇒	8	6.5	9	6	0	1	6	4	4	0	1	8	10				
	Weighting x Achievement ⇒	48	53.3	82.8	43.2	0	8.6	34.8	8.8	31.2	0	3	6.4	18				
	Overall Score ⇒	338.1	The famous classic scooter used by companies like Bird (US) & Lime (UK). No suspension but air filled tyres help. Despite the low score this scooter provides one of the very best riding experiences.															
	Zinc	S1 Pro	up & d step	OK	Good	8k	small	7.7kg	24kmph	OK	Front suspension	15.4cm(F) 14cm(I)	Solid	2 hours	90kg	None	?	Folded size: 81x42x29cm 30 618cm³
	Achievement scores 1 to 10⇒	9	8	9	0.5	8.5	10	5.5	4	3.5	10	7	7	0				
	Weighting x Achievement ⇒	54	65.6	82.8	3.6	57.8	86	31.9	8.8	27.3	52	21	5.6	0				
	Overall Score ⇒	496.4	Rebranded version of the Megawheels S1 (aka Indi S1). Build quality not the best, would love a bigger front wheel with mud guard but a good option & cheap = less worry. Small wheels yet fairly smooth.															
	Zoom	Stryder EX	up & d step	OK	Good	30-35k	medium	11kg	30kmph	OK	Front & back	19cm	Solid	2 to 3 hours	110kg	Both	600w	Folded size: 95x15x33cm 47 737.5cm³
	Achievement scores 1 to 10⇒	8	7	9	7	8	9	7.5	5	5.5	10	6	9	10				
	Weighting x Achievement ⇒	48	57.4	82.8	50.4	54.4	77.4	43.5	11	42.9	52	18	7.2	18				
	Overall Score ⇒	563	Excellent range of functions & known to be extremely durable. Handles fold in for easy storage. Accelerator & brake switches are fiddly but you can use Eco mode & cruise control for a smoother ride.															
	Zoom	Stryder Pro	up & d step	OK	Good	35-40k	medium	12kg	35kmph	OK	Front & back	19cm	Solid	3 hours	110kg	Both	750w	Folded size: 95x15x33cm 47 737.5cm³
	Achievement scores 1 to 10⇒	8	6.5	9	8	8	8.5	9	5	5.5	10	5	9	10				
	Weighting x Achievement ⇒	48	53.3	82.8	57.6	54.4	73.1	52.2	11	42.9	52	15	7.2	18				
	Overall Score ⇒	567.5	Same as Zoom Stryder Ex but heavier, more powerful with greater speed & range as well as lights.															

factors (considerations)→

UP & DOWN CURBS (or other large obstacles & ledges)	MANUAL USE (rolling freely without motor - save battery & get exercise)	VEHICLE CONTROL (precision of steering, ease of riding, stability on smooth surfaces & prevention of vehicle rolling off by itself)	RANGE (distance possible after full charge)	HANDY STORAGE (size, shape & folding - putting it under your seat, table or in the attic and so on) Overall cubic cm (width x height x length) when	PORTABILITY WEIGHT & HANDLING (walking around with it)	TOP SPEED (how fast it will go)	OFF-ROAD RIDING (rough ground, sand, dirt tracks, mud, grass & so on)	SMOOTHNESS ON NORMAL CITY SURFACE (Factors: Suspension with tire size & material)	TIRE SIZE (diameter)	TIRES MAINTENANCE (durability)	CHARGE TIME (lower weighting because info is highly variable)	MAX RIDER WEIGHT	LIGHTS	MOTOR SIZE (see portability)
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Explanations of achievement scores →

Step up = 5 points or Hop up = 3 points	Naturally self-balancing without motor (e.g scooters) = 10 points	Handles 4 (or other way of holding onto device)	10 to 50	Less than:	If easily pushable then 3 points but	10 to 40	Suspension + 2	Suspension = 4		Solid tires = 10 (require less maintenance, while pneumatic tires may well need replacing)	30 minutes to 5 hours		Front (shining) = 7	
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Limitations of this research: 1. The achievement scores are based on standards & formulas (shown right) which may need improving or adjusting. 2. The transport tools shown are just some of my favourites or those I believe may perform well as commuting tools. Other tools may be included in future which may well outperform those listed here. 3. Factors not included are build quality, rider comfort, aesthetics, price, max incline, acceleration, stopping distance, electricity cost, maintenance, width space required on pavement, waterproofing, carbon footprint & customer service of seller. These are either too variable, subjective, hard to measure or there was a lack of information. Areas where precise data was not acquired are marked with asterisk(*). If you see any mistakes please let us know!

Step down = 5 or Roll or hop down = 3	Motor -1 point (flow resistance) but kick assist =+1 point added Heavier = minus points	Two wheels = 1 (two wheels in line of travel = 1 Wide (over 5 cm) front wheel = 0.25 Wide back wheel (over 5 cm) = 0.25 Tread on front wheel = 0.75 Tread on back wheel = 0.25 (tread is more important) Auto motor switch off when rider dismounts = 2	10 = 1 14 = 2 18 = 3 22 = 4 26 = 5 30 = 6 34 = 7 38 = 8 42 = 8.5 46 = 9.5	10 000cm ³ =10 20 000cm ³ =9.5 30 000cm ³ =9 40 000cm ³ =8.5 50 000cm ³ =8 60 000cm ³ =7.5 70 000cm ³ =7 80 000cm ³ =6.5 90 000cm ³ =6 100 000cm ³ =5.5	Over 7kgs - 1 Over 10 kgs - 2 Over 13kgs - 3 Over 16 kgs - 4 Over 19 kgs - 4 Over 22kgs - 4 Over 25kgs - 4 Over 28kgs - 4 Over 31kgs - 4 Over 34kgs - 4 Over 37kgs - 4 Over 40kph may be unhelpful or dangerous for such small devices	10 = 1 13 = 2 16 = 3 19 = 4 22 = 5 25 = 6 28 = 7 31 = 8 34 = 9 37 = 10	Tire size 10cm = 2 20cm = 4 30cm = 6 40cm = 8 Single wheel = 1	Pneumatic tires = 2 Tire size 10cm = 1 20cm = 2 30cm = 3 40cm = 4 Soft tires = 1 Flexible deck = 2		30 mins = 10 1 hour = 9 1.5 hours = 8 2 hours = 7 2.5 hours = 6 3 hours = 5 3.5 hours = 4 4 hours = 3 4.5 hours = 2 5 hours = 1	120kg = 10 110kg = 9 100kg = 8 90kg = 7 80 kg = 6 70 kg = 5 60 kg = 4 50 kg = 3 40 kg = 2 30 kg = 1	Reflective or brake light = 3	
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