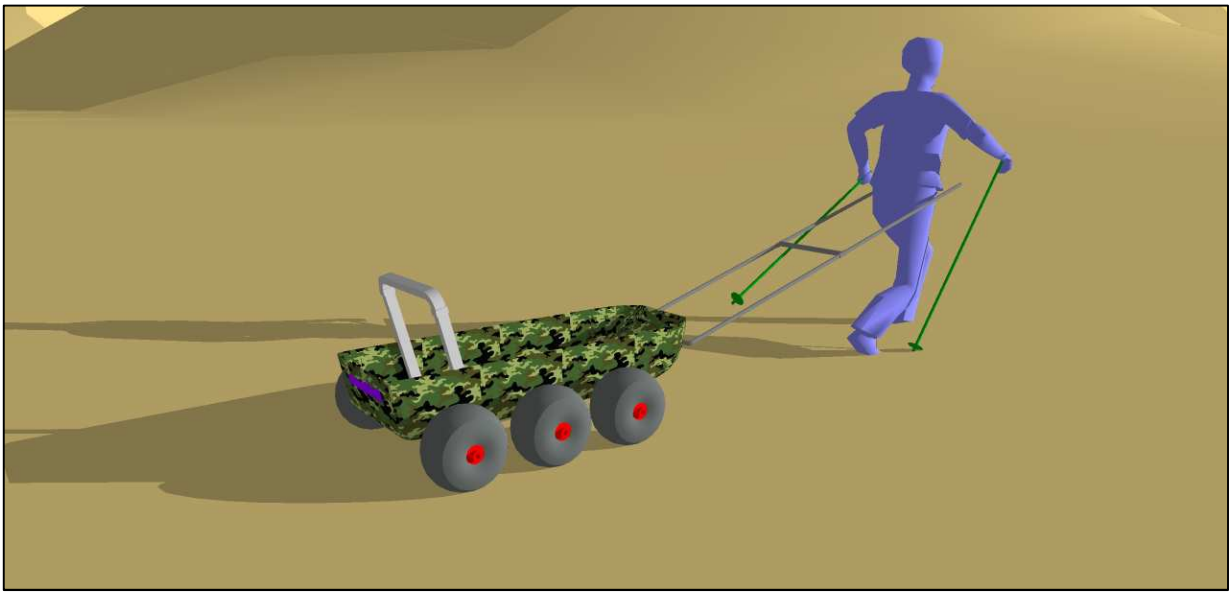
PROJECT DESIGN & DESCRIPTION

ARMADILLO II: THE MAN HAULED ALL TERRA CART



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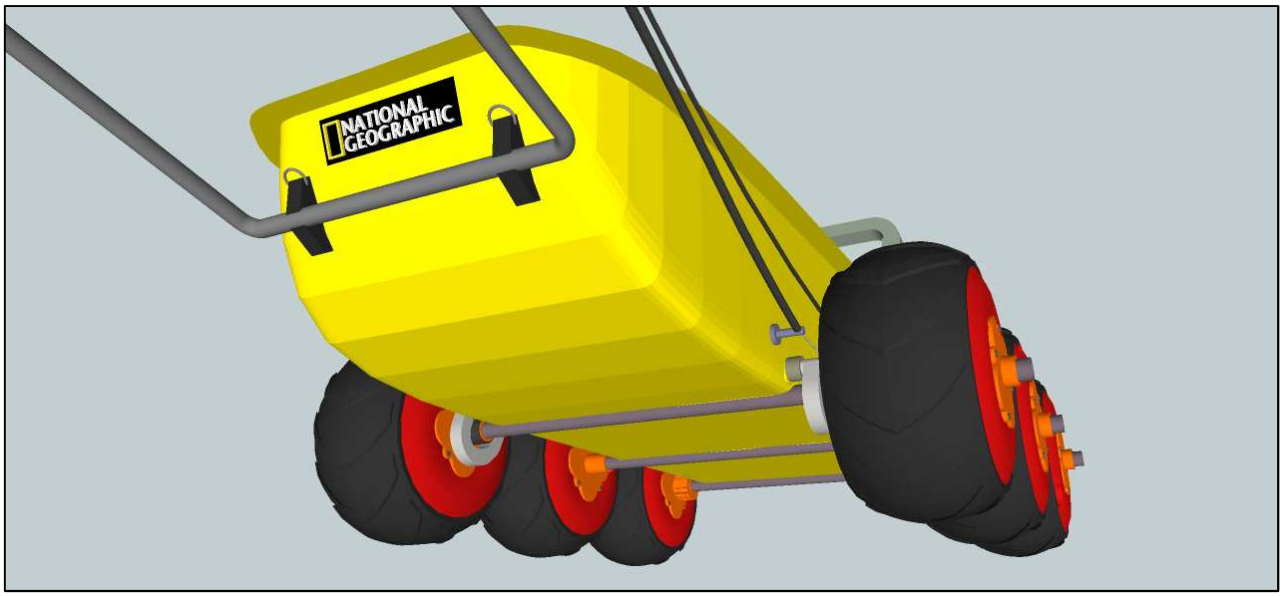
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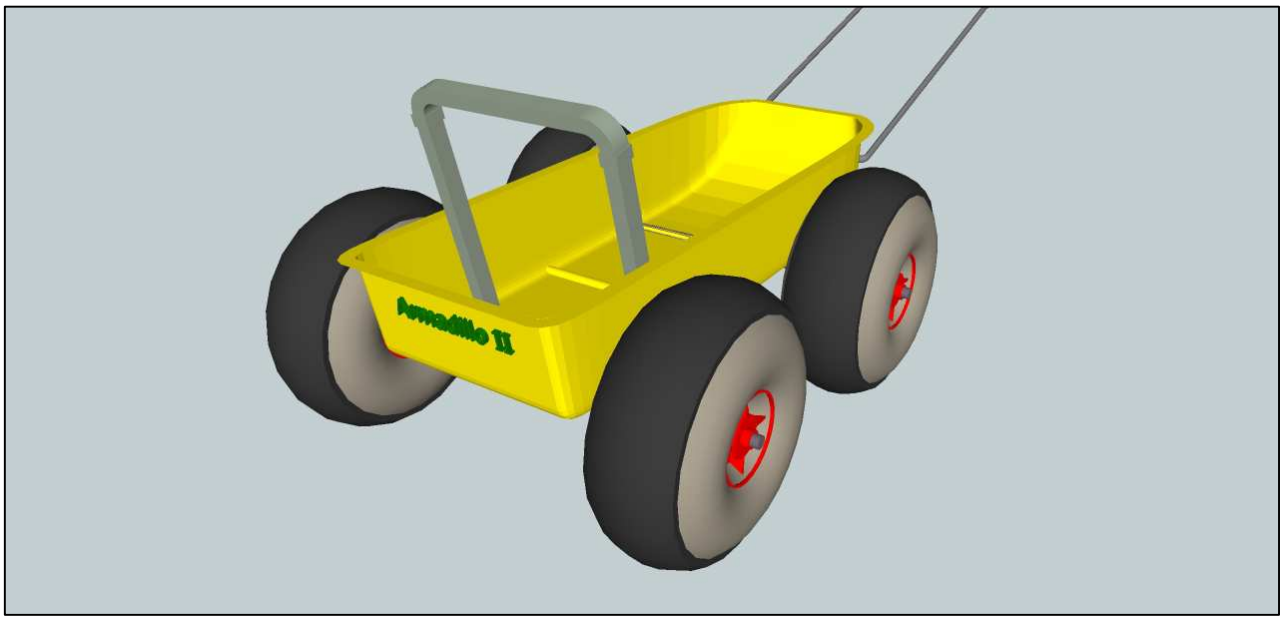

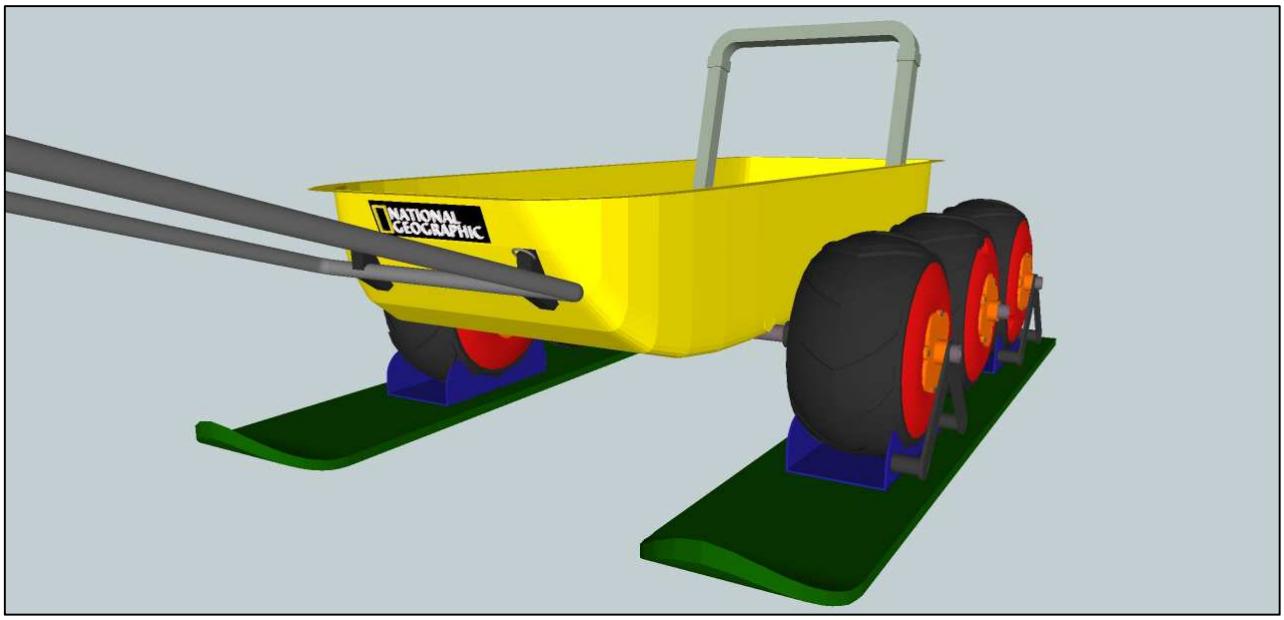
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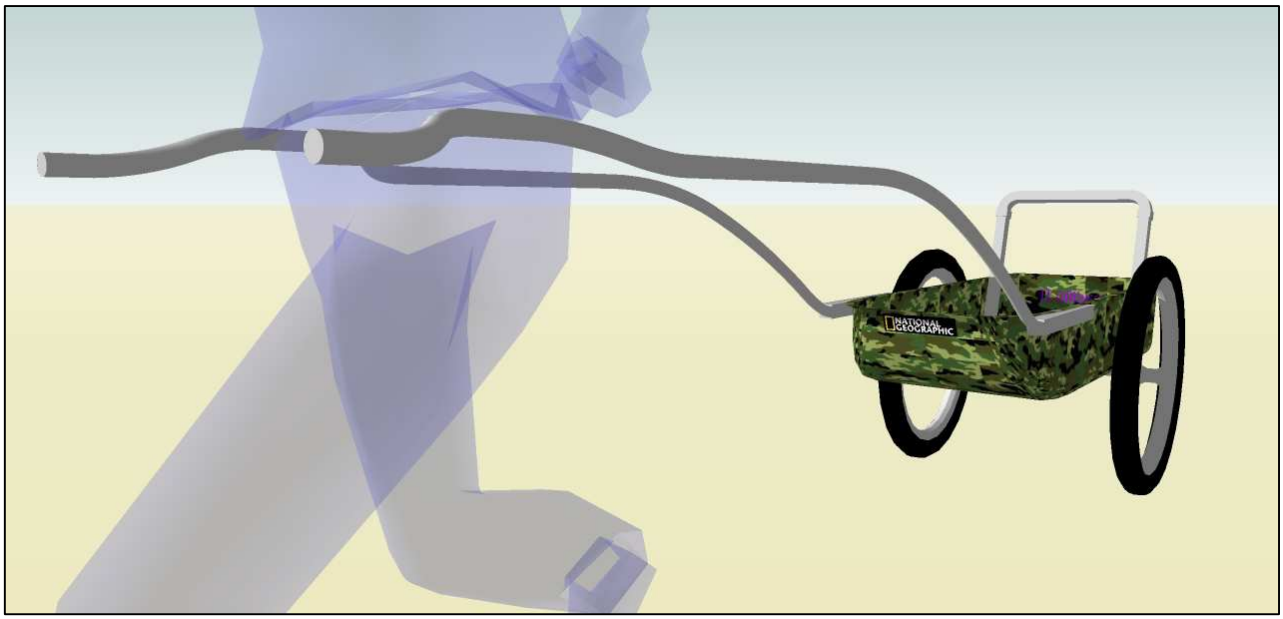
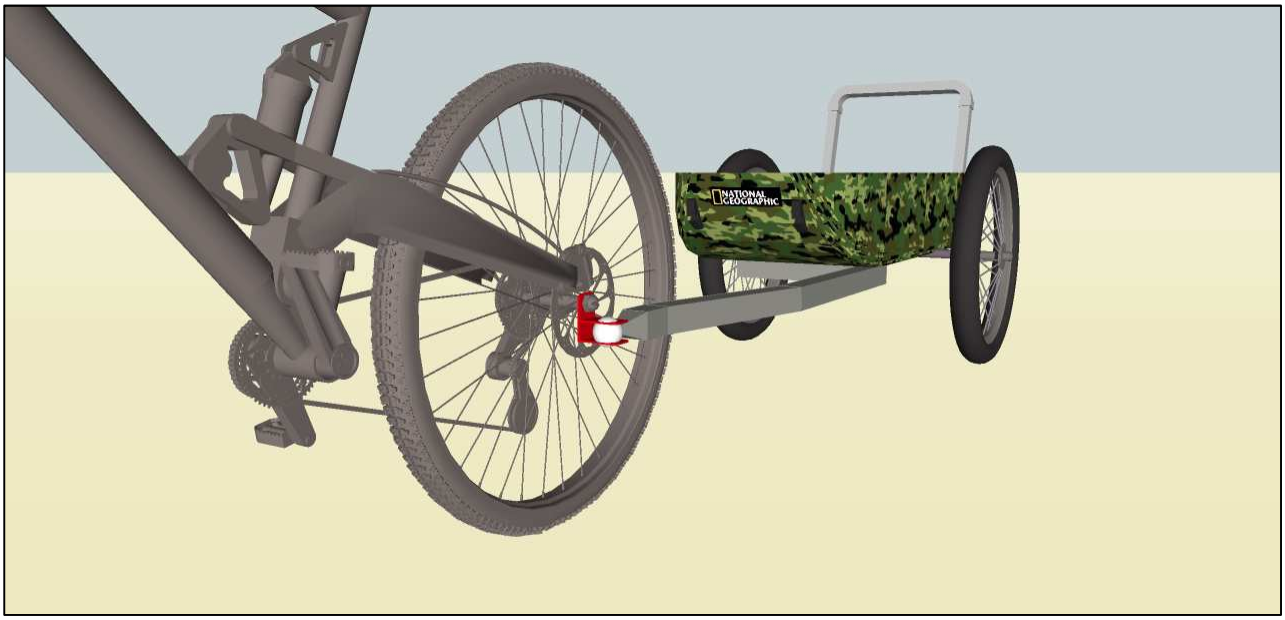
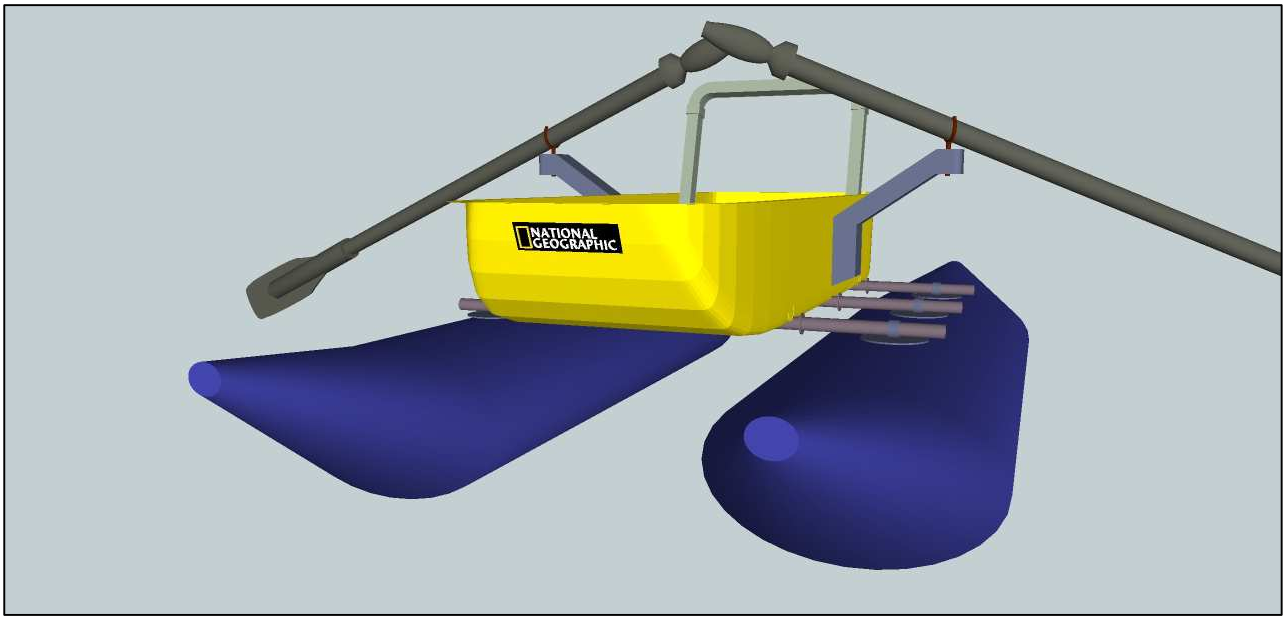






Summary

Introduction

What is the Armadillo II? It is a man hauled cart for every type of terrain: land, water and snow are its preferred habitats. It was designed keeping in mind different users, different environments and different applications. Here are its innovative features!

1. Environment

When on land different wheel assemblies can be chosen: 2, 4 or 6 wheels according to kind of terrain that has to be crossed.

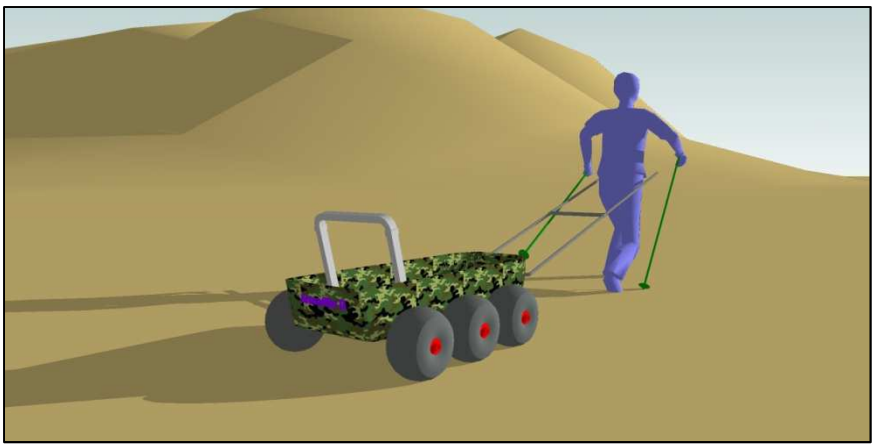


Figure 1 – The Armadillo II on the sand dunes.

When on the snow the wheels are removed and it can be used like a traditional pulka.

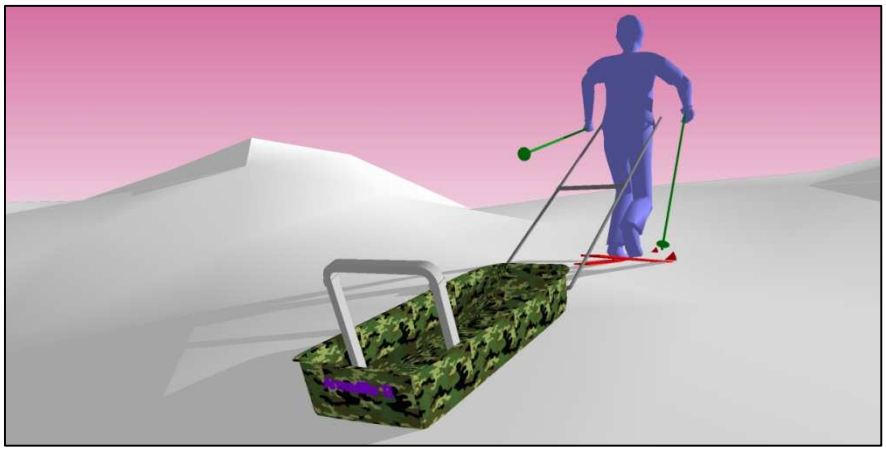


Figure 2 – The Armadillo on the snow used like a "traditional" pulka.

Also the water is not a problem for this cart: the frame is more like a hull of a boat with a flat bottom.

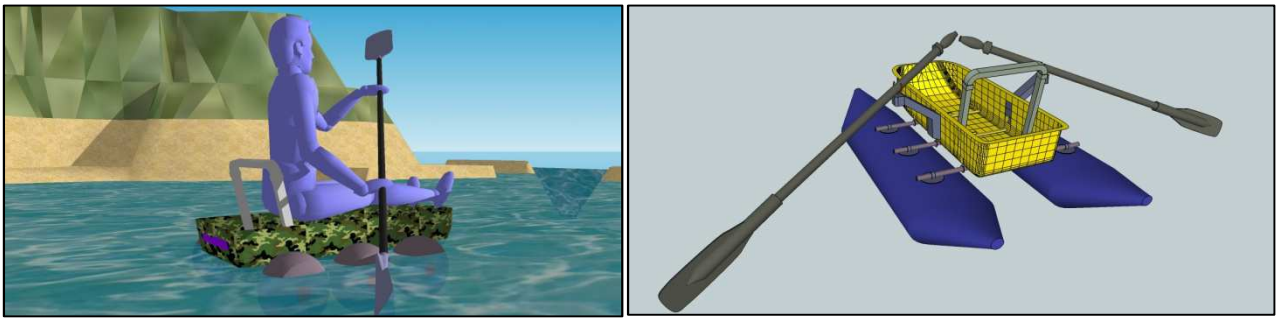


Figure 3 – On the water. Left: buoyancy provided by the hull and the wheels; right: buoyancy provided by inflatable pontoons.

2. Wheel assemblies

The Armadillo comes with different wheel assemblies often associated with different ways of hauling the cart.

2.1. Six wheels

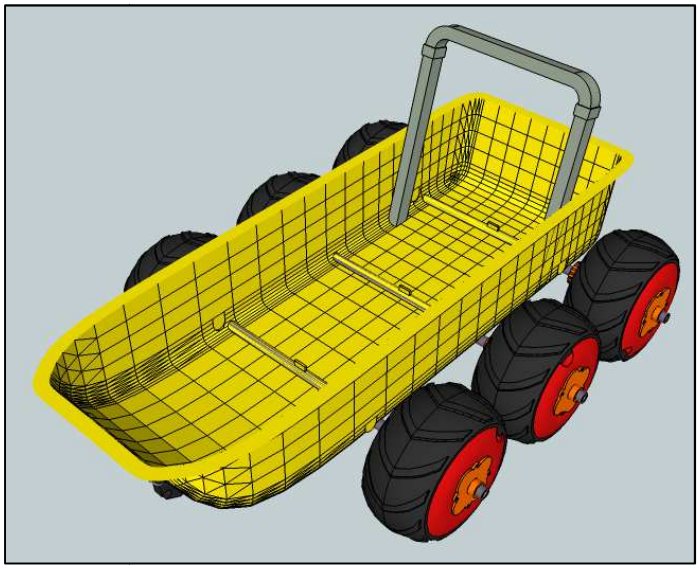


Figure 4 – The Armadillo with six wheels of 30 cm (11.8”) in diameter.

The six wheel assembly is an all purpose setup especially thought for steep terrains with small to medium obstacles or in situations where a big tire surface is requested like sand or snowy terrains in order to “float” better on the terrain itself. The wheels, with a diameter of 30 cm (11.8”) were completely re-designed and are made essentially of three parts:

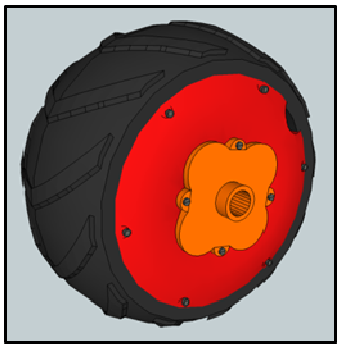


Figure 5 – The 30 cm (11.8”) diameter wheel.

a) a central hub made of fiberglass reinforced plastic (a lightweight aluminum hub is being designed too);

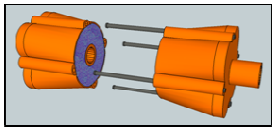


Figure 6 – The central hub

b) a rim also made of fiberglass reinforced plastic and filled with medium density foam;

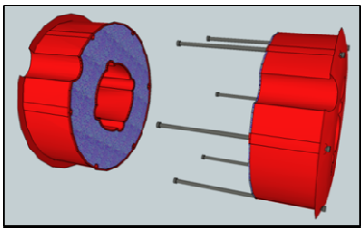


Figure 7 – The rim with the medium density foam core

c) an outer rubber tread with different engravings.

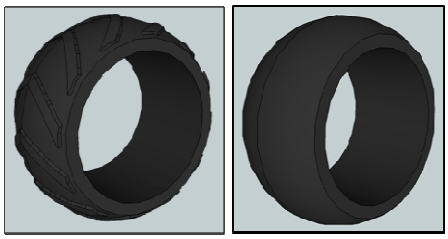


Figure 8 – Left: "Tractor Boy" tread; right: "Fat Boy" tread.

2.2.Four wheels

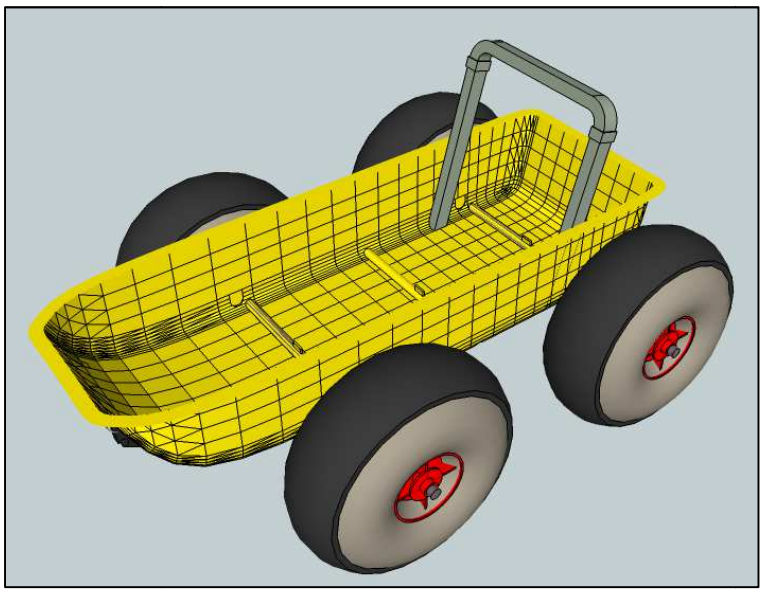


Figura 9 – The Armadillo with four "Big Mama" wheels.

This wheel assembly is for very soft terrains and/or with big obstacles. The wheels have a diameter of 50 cm (19.7") in order to have a clearance of 25 cm (9.9") under the hull. The tires are pneumatic ones and may be a commercial product like the wheels produced by http://www.wheeleez.com/ reinforced with an outer rubber tread (or a Kevlar fabric).

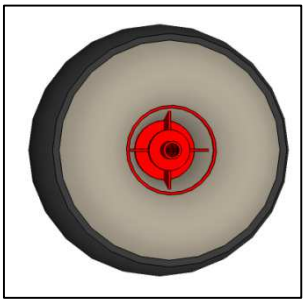


Figure 10 – "Big Mama" wheel with a diameter of 50 cm (19.8").

2.3. Two wheels

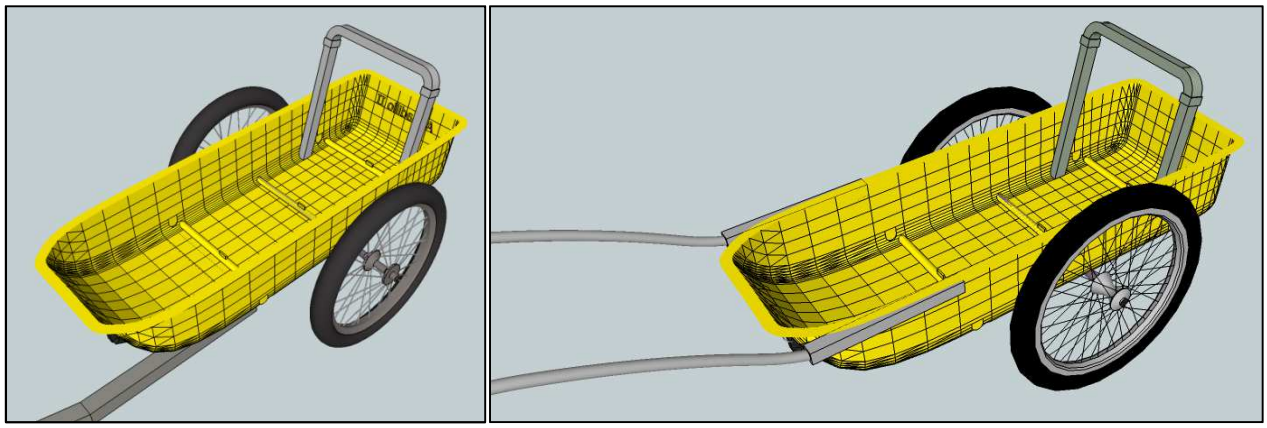


Figure 11 – Left: with two 20” wheels when used as a bike cart; right: with two 26” mountain bike wheels when used like a “rickshaw”.

The Armadillo can be also used like a bike cart or hauled in a rickshaw style. For the bike assembly two 20” wheels are used, as a rickshaw two 26” mountain bike wheels with over dimensioned (see http://surlybikes.com/parts/lou_4point8) tires are mounted.

3. The Axle system

The axles are made of marine grade alloy with a diameter of 2.54 mm (1”) and are self centering.

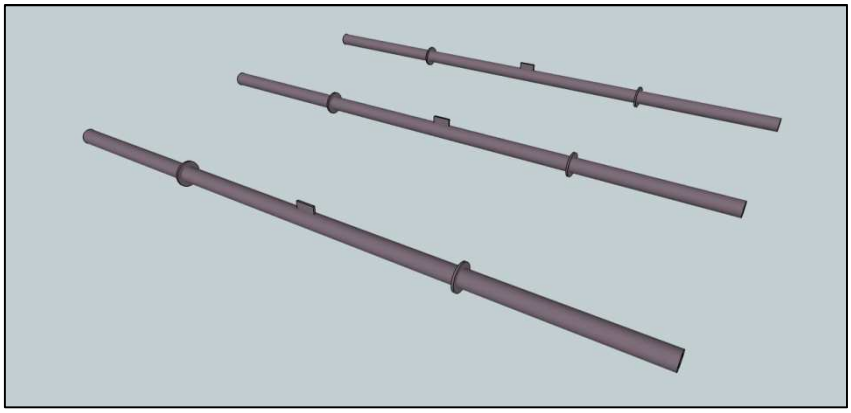


Figure 12 – The axle system.

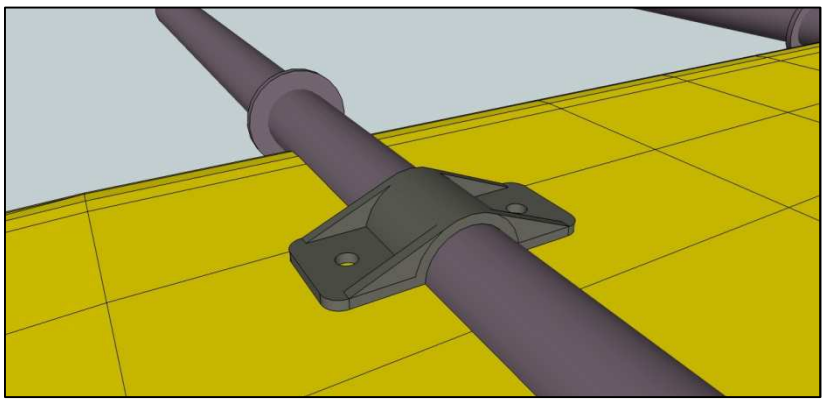


Figure 13 – The axle fixing system: 3 stainless steel fixers for each axis are used.

For the rickshaw hauling system steel hubs are screwed to the alloy axis and are made like the “Lefty” wheel attachment of the Cannondale bikes (http://www.cannondale.com/innovation/lefty_headshok/).

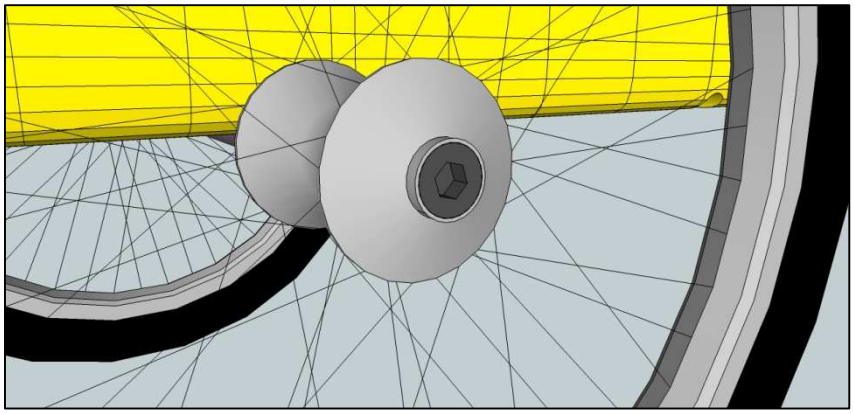


Figure 14 – “Lefty” like attachment for the mountain bike wheels.

When used as bike cart a quick release system is used like those of other bike carts (e. g. : http://www.burley.com/home/bur/page_37_14/quick_release_axle_assembly_for_16_and_20_wheels.html).

4. Hauling methods

As said before the type of wheel assembly influences also the way the Armadillo is hauled. Basically four ways are possible:

4.1. Rigid pulka-style shafts

This is the most “classic” system: there is no need to design new ones, shafts like the ones of Fjelpulken may be used (http://fjellpulken.no/tilbeh/art-702-forst-helt-pulkdrag.html).

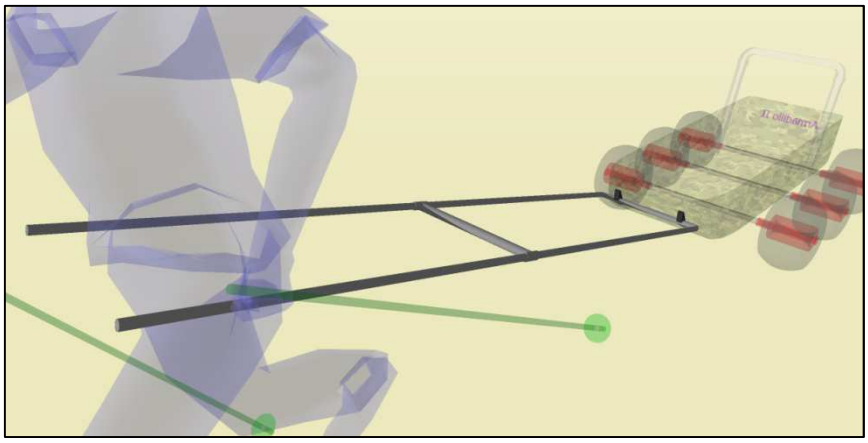


Figure 15 – Rigid fiberglass/aluminium shafts.

4.2. Ropes

The Armadillo can be also pulled using nylon ropes. In this case it has to be considered the use of the breaking system (see further).

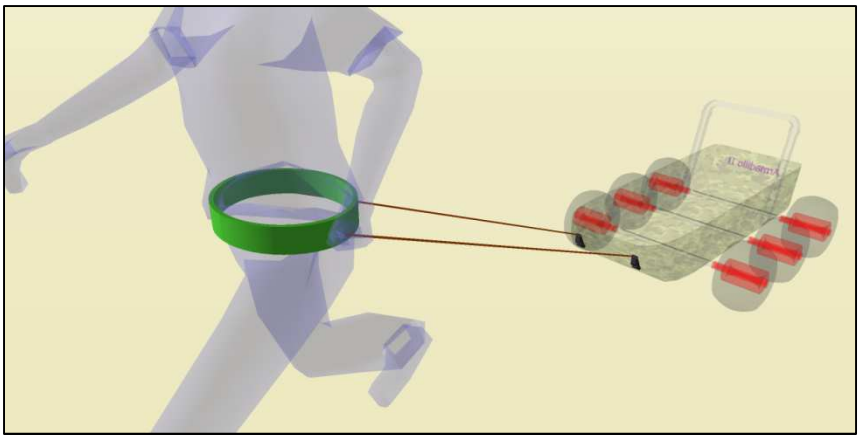


Figure 16 – Hauling the cart with nylon ropes

4.3. Rigid rickshaw bars

When hauling the Armadillo as a rickshaw special rigid aluminium bars have to be used. They can be disassembled in two parts (using clamps similar to the bike seatpost clamps) and have a special curvature in the hip zone in order to fit different body builds.

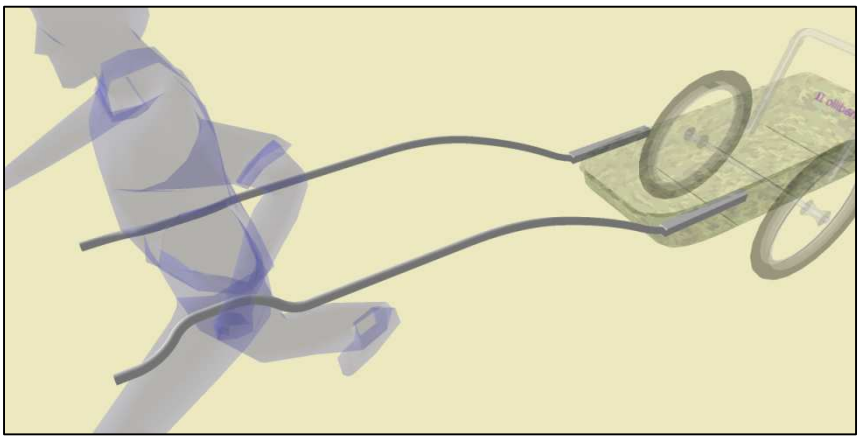


Figure 17 – The rickshaw bars

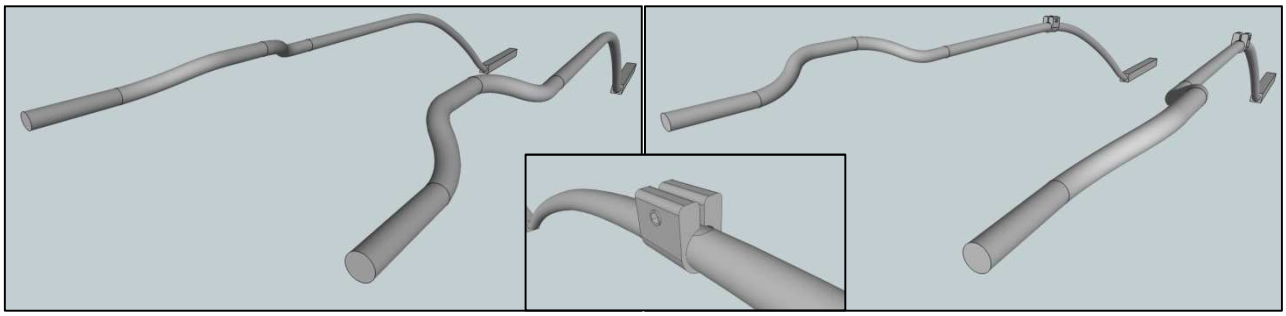


Figure 18 – The rickshaw bars in two different positions to fit different bodies and the clamp used to join the two parts.

4.4. Bike bar

The last way is a special bar designed for using the Armadillo as a bike cart.

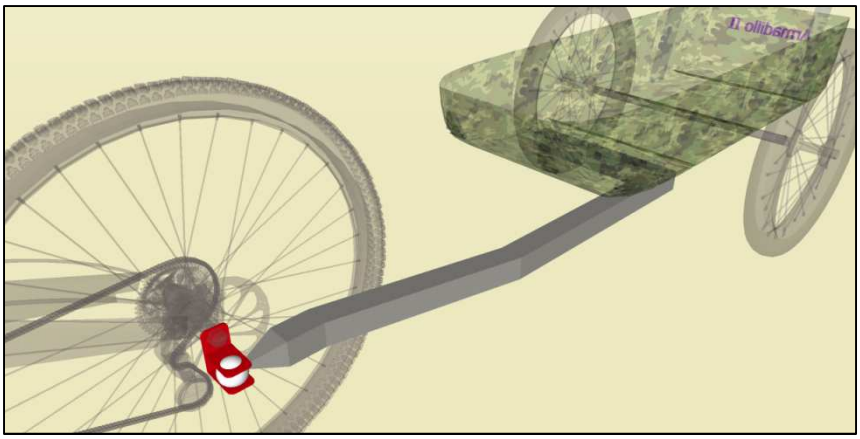


Figure 19 – the bike cart bar.

4.5.Harness and quick release system

Commercial harnesses may be used like those used for hauling snow pulkas (e.g.: http://fjellpulken.no/tilbeh/art-711-ekspedisjonssele.html) . A quick release system has to be designed in order to disengage oneself as fast as possible from the cart in dangerous situations like as wild animal attacks or the cart rolling away on steep slopes pulling a person with it in dangerous positions.

5. Full control system

On challenging terrains with steep slopes it could be easy to lose the control of the cart. To avoid this problem here at Nomadic Systems a full control system was designed for descending or ascending slopes of different steepness.

5.1.U-Breaks

On the front wheels a pair of U-breaks provide the possibility of controlling the Armadillo while descending steep slopes even if the cart is hauled with ropes. The levers that action a bike braking wire can be mounted on the walking poles, on the rigid hauling bar or directly attached on the hauling harness.

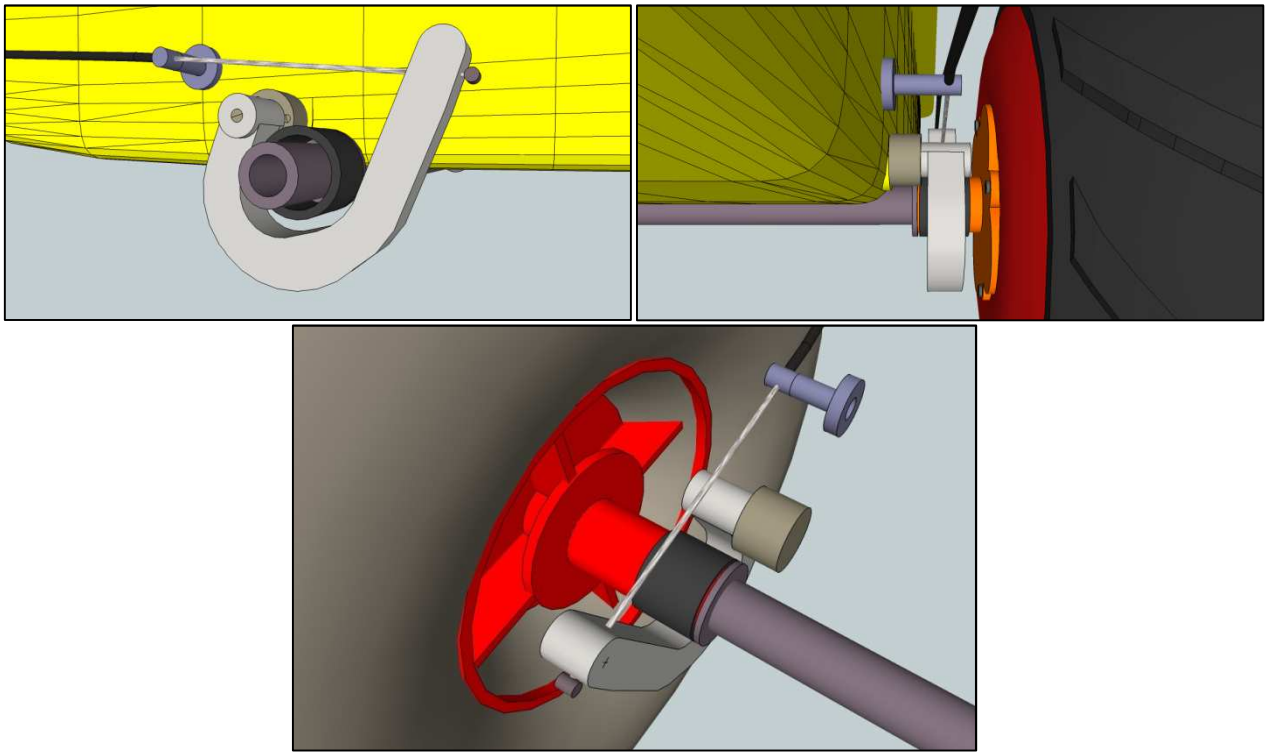


Figure 20 – U-Break system

The break acts directly on a rubber cylinder that is integral with an extension of the hub: each front wheel is controlled separately.

5.2. Anti roll-back system (ARBS)

This system is designed to avoid the Armadillo from rolling back when ascending on steep slopes. The system can be engaged or disengaged directly from a small lever located on the main break lever; the toothed wheel is integral with an extension of the rear wheel hub.

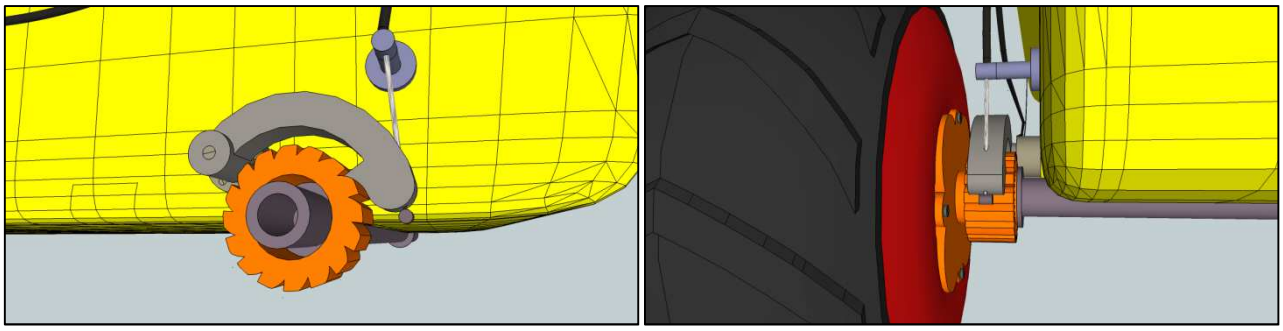


Figure 21 – The Anti-roll back system.

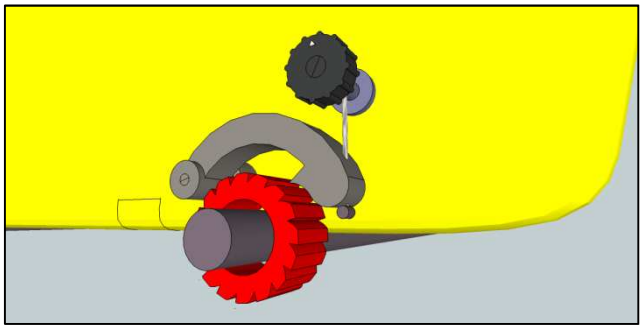


Figure 22 – ARBS with engagement system directly mounted on the hull.

5.3. Control levers

As said before the U-Breaks and the Anti-Roll back system may be controlled by bike break levers.

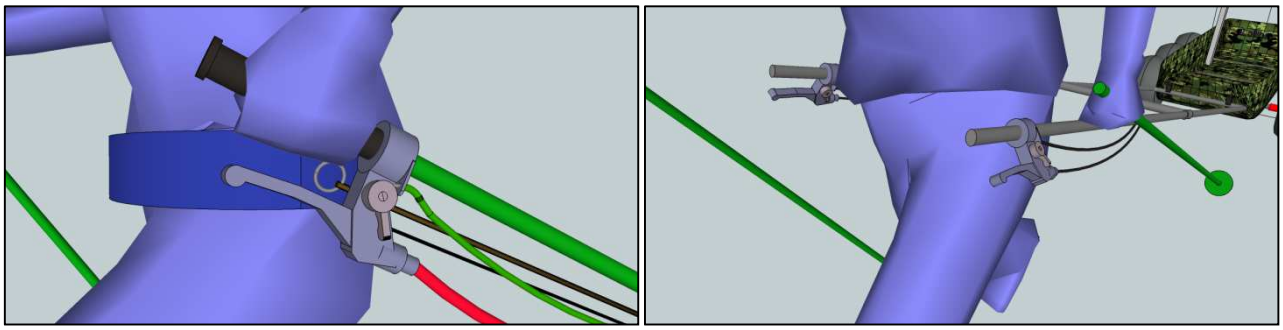


Figure 23 – Left: control levers mounted on a walking pole; right: levers mounted on the pulka-style shafts.

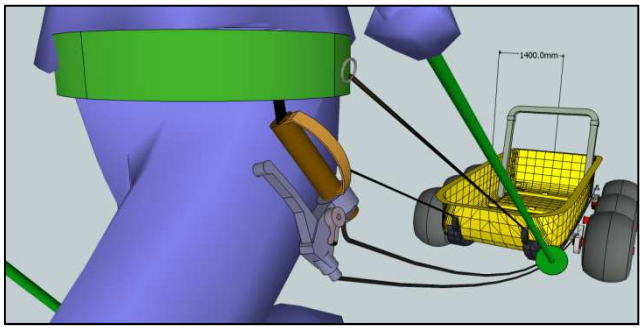


Figure 24 – Control levers attached to the hauling harness.

6. The Hull

The frame is similar to a boat hull with a flat bottom in order to provide buoyancy while on the water or on the snow. It is build in fiberglass or carbon fiber with Kevlar reinforcements. Three slots with semicircular section for the three wheel axis are molded directly into the hull. A special outfitting system was designed

for adding the different accessories (e.g. the U-Breaks, the ARBS, *etc*.) to the frame. A 3 cm wide flange around the external edge was designed for coupling with the deck system (see further).

6.1. Colors and dimensions

The Armadillo comes in two basic colors:

a) Yellow
b) Camouflage

The main dimensions are: l*ength* 1400 mm (55.2”); *width* 460 mm (18.1”); *height* 250 mm (9.8”).

The outer perimeter flange is 30 mm (1.2”) wide.

7. The Deck System

Different deck systems were designed in order to satisfy different requirements.

7.1.Deck fixing system

A fixing system was designed for all kind of decks. The fixers are positioned all along the perimeter of the hull and inserted into holes drilled into the flange.

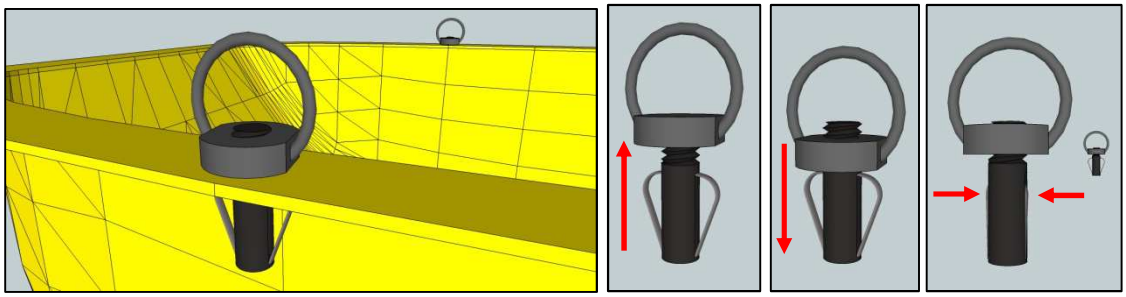


Figure 25 – Deck fixing system

7.2. Elastic net

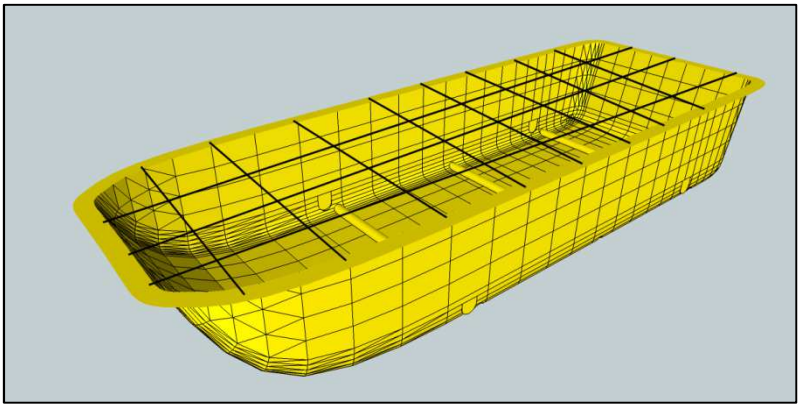


Figure 26 – Elastic net

7.3. PVC coated polyester

This system is similar to the one used for snow pulkas.

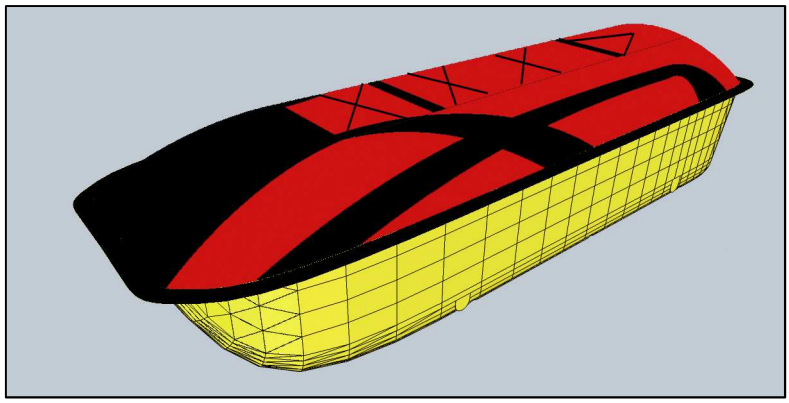


Figure 27 – Polyester fabric coated with PVC

7.4. Rigid deck

For extreme conditions and intensive use of the cart in the water a rigid fiberglass deck was designed. The access to the cargo area is through two seal hatches.

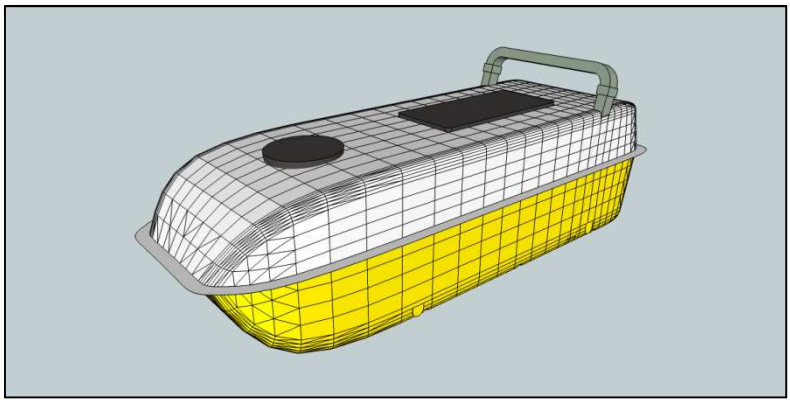


Figura 28 – Rigid fiberglass deck with two seal hatches.

8. The Outfitting system

8.1. The Roll bar

Many accessories can be attached to the roll bar thanks to the fitting system designed for attaching accessories like solar panels, GPS, position lights, etc. using Velcro straps or screws.

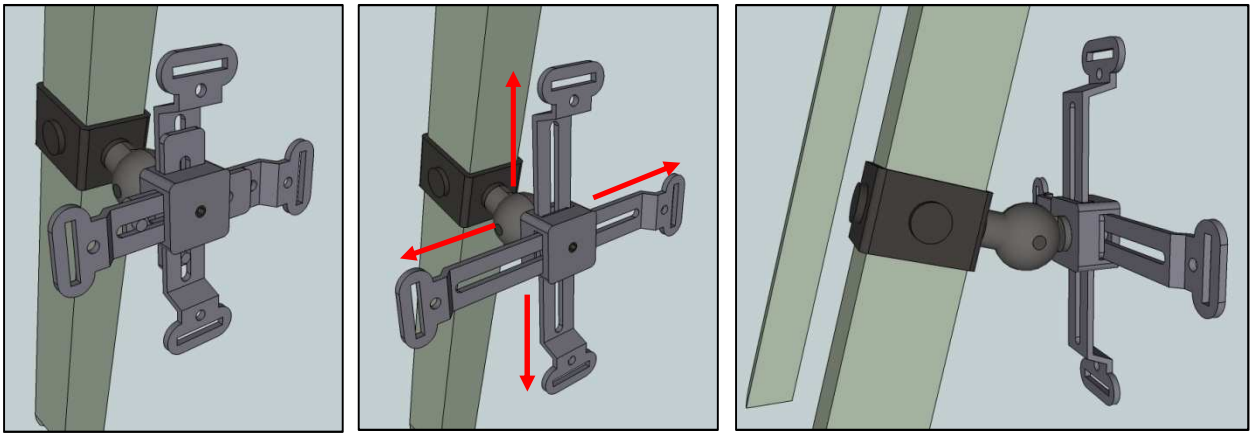
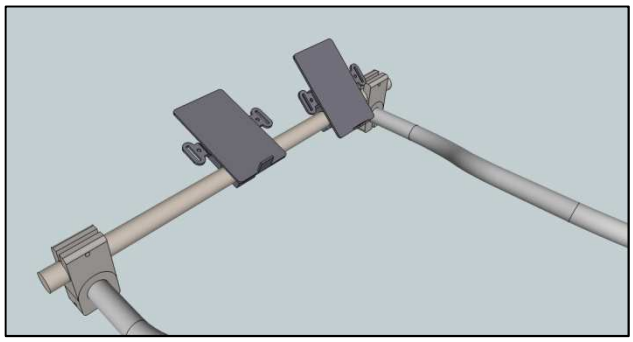
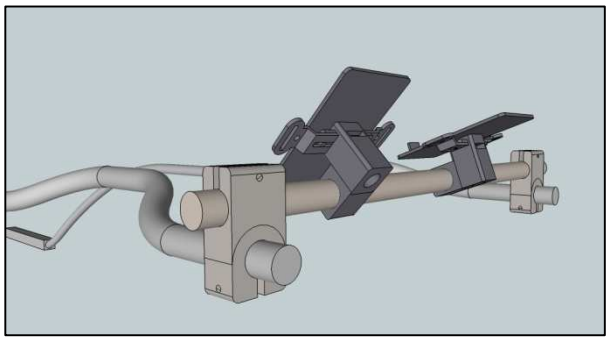


Figure 29 – The roll bar accessories outfitting system.

8.2. The navigation bar

The navigation bar is a cross bar that fits on the rigid bar hauling systems (“classic pulka” and rickshaw bar). Maps, compass, GPS, etc. may be fixed on it in order to have your navigation tools handy.





8.3. The screw system

Many components (e.g. the ARBS, the U-Break, the Roll bar, etc.) have to be fixed directly to the hull via stainless steel screws. A low profile screwing system was designed to fit all the accessories to the hull using just one allen key.

9. Market & commercial scenarios

The applications for the Armadillo may be of different kind:

9.1. Adventure and explorative expeditions

Of course the Armadillo was thought for this kind of applications and of course it may be used in the most different environments, from the desert to the arctic landscapes and in the roughest conditions.

9.2. Scientific expeditions

The Armadillo may be used by scientific expeditions for transporting equipment on difficult terrains and/or in environmentally fragile areas. Environmental sensors and probes (e.g. Geiger counters, weather sensors, air quality probes, etc.) may be attached on the roll bar for continuous sampling. Coupling the Armadillo to an ATV may be a good idea…

9.3. Doomsday prepping

Doomsday and modern survivalist preppers relay often on the their own forces and are waiting for the end of the world. In the mean time they prepare themselves to survive the collapse of the modern civilization: what is better than a man hauled cart for transporting equipment, food and water when there will be no more gasoline for the cars?

9.4. Military applications

Special operations like those of the Navy Seals on rough terrains and harsh environment that need the transportation of heavy equipment but with a silent approach and little visibility may be the scenarios for the use of the Armadillo. Special adaptations and outfitting for small radar systems or rocket launcher may be designed *ad hoc* together with Kevlar reinforced hull walls that will provide a shelter during a gunfight.

9.5. Humanitarian applications

The Armadillo may be used for transporting medical equipment and materials, portable water purification systems and food in hard approachable areas or for supporting mass escapes of refugees.

9.6. Other applications

If you decide to become a modern tramp consider to buy an Armadillo before losing all your possessions!

10. Other models

10.1. The Armadillo III

The bigger brother of the Armadillo is 200 cm (78.7”) long and is designed for very long time expeditions and/or for hauling a large amount of equipment.

10.2. The Slim Dog

The Slim Dog is our countryside explorer, it is 99 cm (39”) long, has only two wheels and can be used as a rickshaw or a bike cart. It can be completely dismantled and put in a special and compact bag while traveling from one place to another by train or plane.

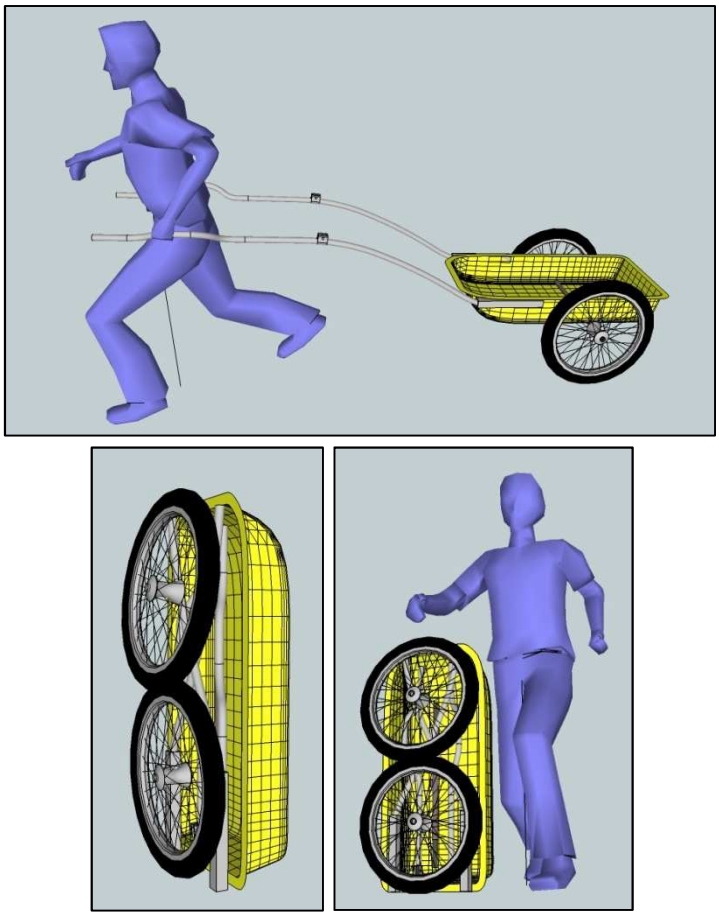
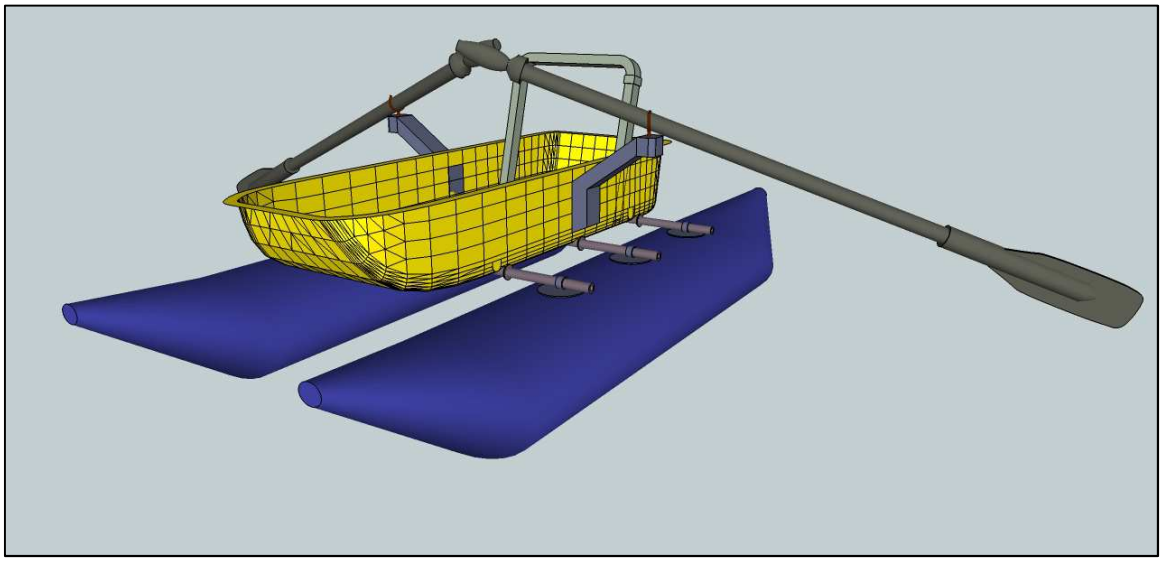


Figure 30 – The Slim Dog.

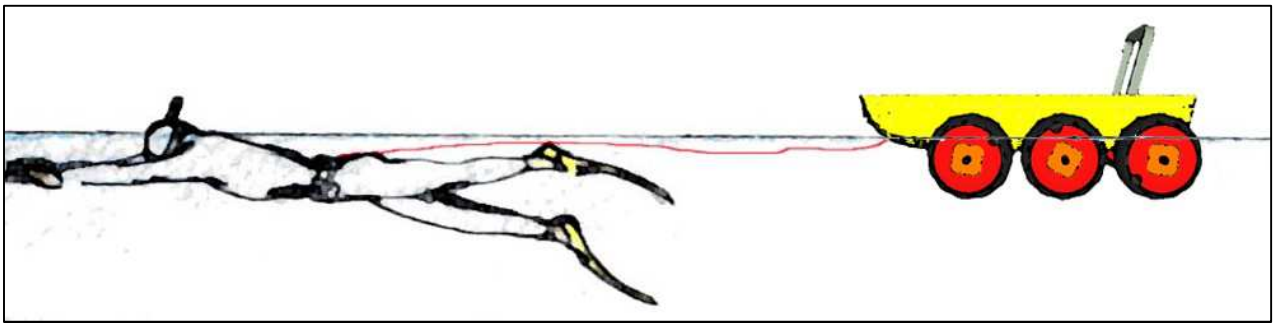
ANNEX A – ON THE WATER OUTFITTING AND USE

Especially the longer model (Armadillo III, 200 cm), that has more volume and thus more floating capability, may be driven as a kayak with a paddle.

If long stretches of water may be crossed we suggest our inflatable pontoons that fit directly to the wheel axis with our special detachable rowing outfitting system and a foldable seat.



When crossing temperate water also another kind of transport solution may be applied: hauling the cart wearing a wetsuit, a pair of fins, mask and snorkel.



ANNEX B – ON THE SNOW OUTFITTING AND USE

Some special outfitting where designed for the snow use: basically the Armadillo can be used on the snow as a pulka (sledge) just by taking off the wheel axis but, in some cases, some special outfitting are needed. On mixed terrain the *Big Yeti* skies can be a good solution if it is often needed to change from sledge mode to wheel mode.

Figure 31 – *Big Yeti* skies for mixed terrrain.

For the normal “sledge mode” reinforcements made of low friction polyethylene where designed, also the tracking of the Armadillo improves with this accessories.

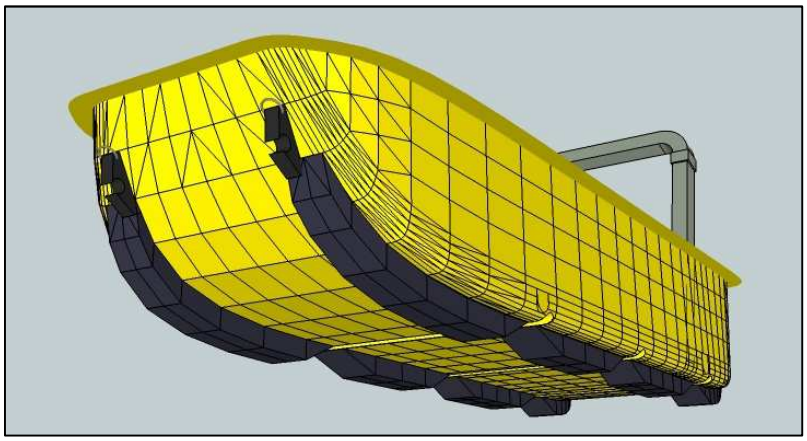


Figure 32 – Polyethylene reinforcements for better tracking, hull protection and lower friction.