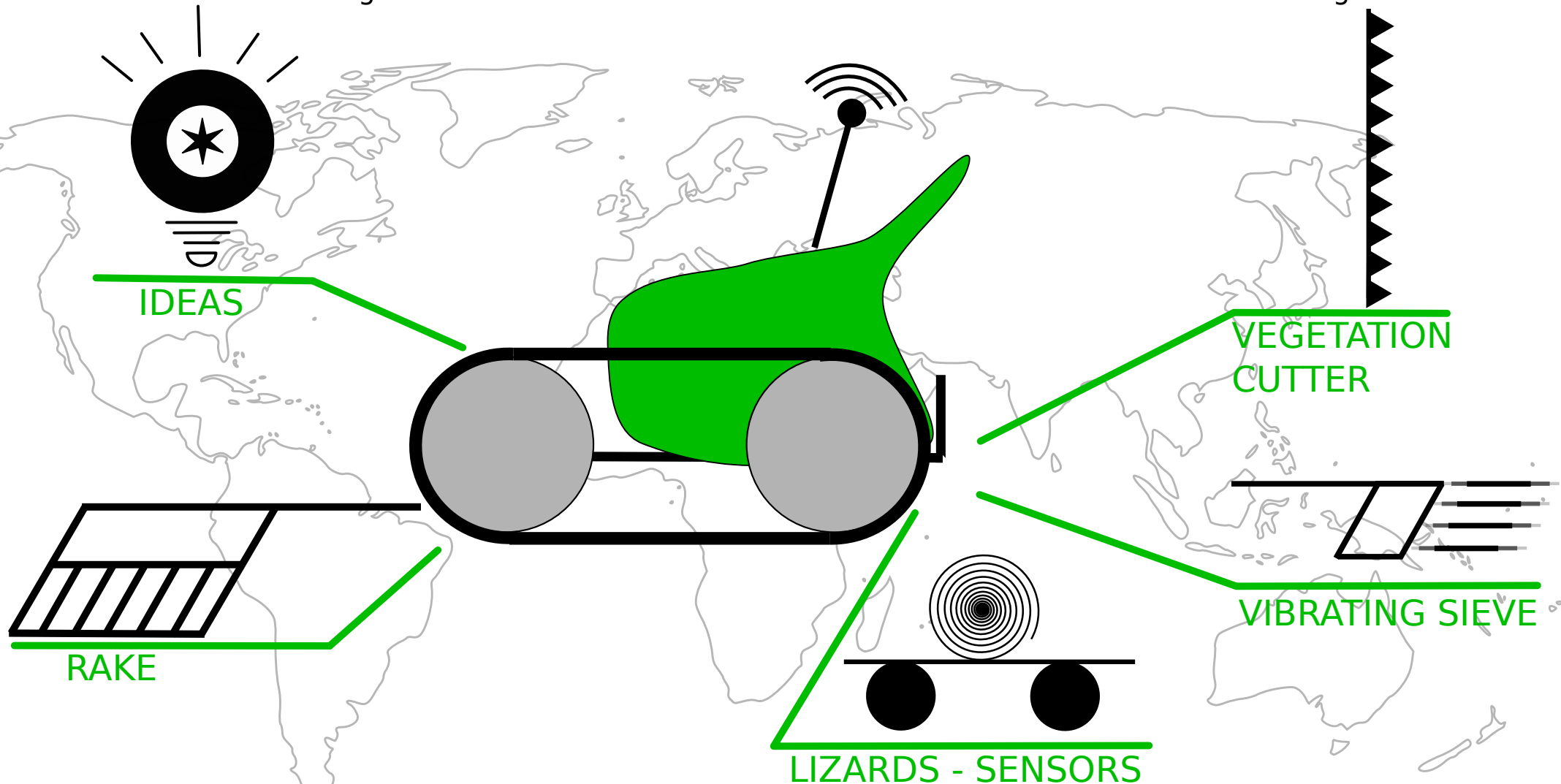


# CATALOGUE OF DISARMADILLO IMPLEMENTS

Disarmadillo project has been going on for more than 10 years thanks to the commitment and interest of many partners around the world. Many implements that can be mounted on Disarmadillo have been designed by partners.

Some have been developed into a prototype that has been tested, some others are still in the form of designs or concepts. All have the potential to be used and more can be designed.

References and drawings of solutions described here can be downloaded from [www.snailaid.org](http://www.snailaid.org)



# DISARMADILLO



THE FIRST OPEN SOURCE ROBOTIC PLATFORM  
FOR MINE ACTION

DUAL USE: FOR DEMINING  
AND AGRICULTURE



DESIGNED IN A PARTICIPATORY WAY  
WITH END-USERS, ENGINEERS,  
STUDENTS, MECHANICAL  
WORKSHOP EXPERTS,...



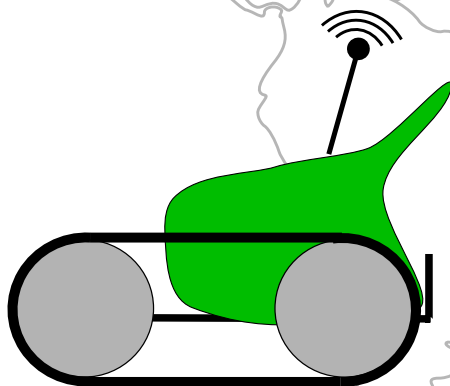
SIMPLE AND CHEAP



VERSATILE:  
ABLE TO HOST DIFFERENT IMPLEMENTS



## TECHNICAL DATA (based on Grillo G131 powertiller)



### DIMENSIONS

length: 2500mm  
width: 1000mm  
height: 1300mm  
mass: 500kg

### ENGINE DATA

type: Lombardini Diesel  
3 LD 510  
4-stroke air cooled  
power: 9kW - 12,2hp  
fuel consumption: 250g/kWh

### FEATURES

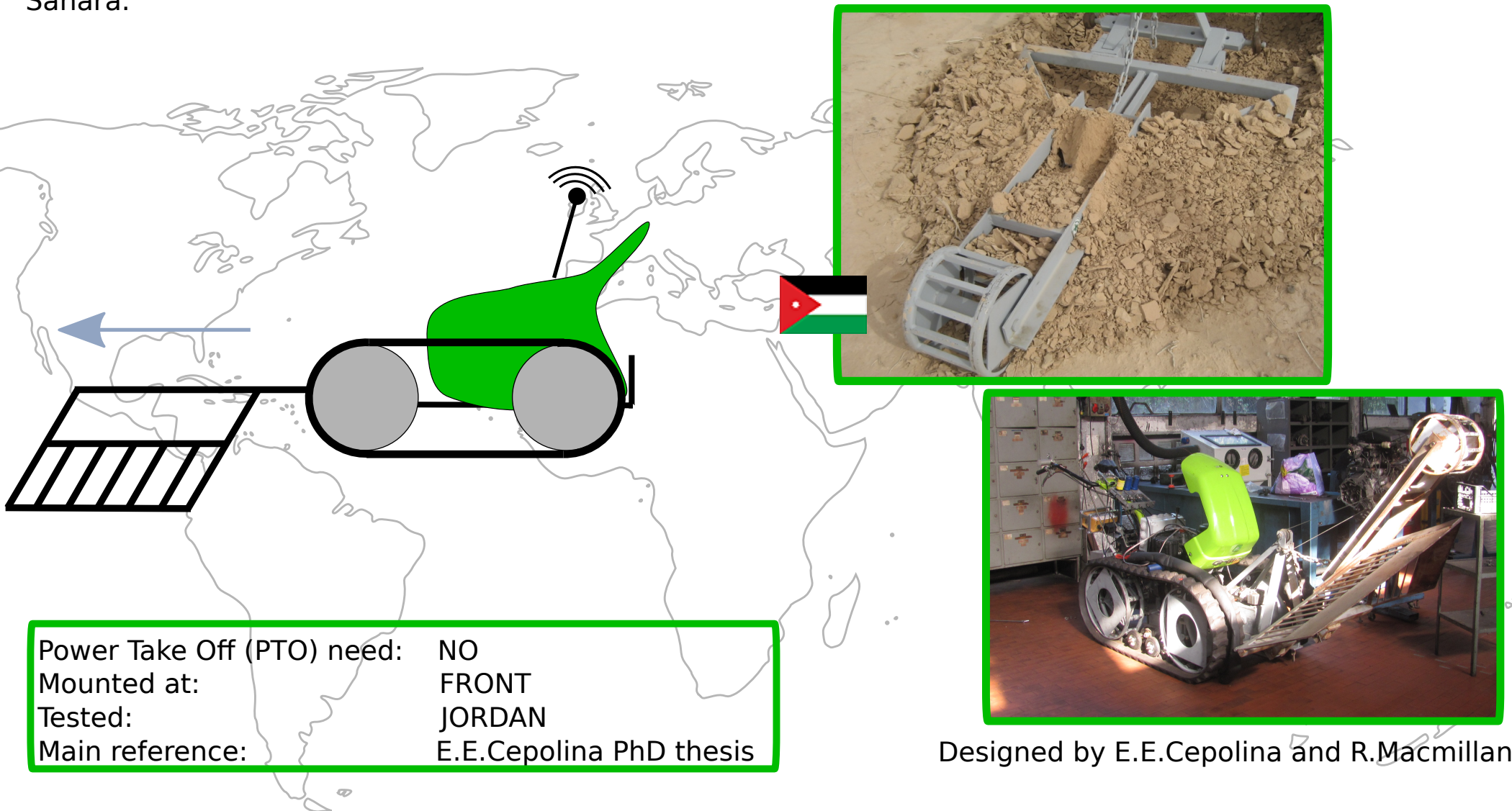
control system: remote and manual  
(safe areas)  
power take off  
differential skid steering  
reversible drive  
4 forward gears, max speed 7km/h  
2 rear gears, max speed 3,5km/h

# RAKE

Originally named Ground Processing Tool (GPT), it has been designed and firstly prototyped in Italy and later on manufactured, prototyped and tested in Jordan.

It is aimed at processing the soil at constant depth and expose landmines by lifting them up on soil surface, without actuating them.

It is specifically targeting areas where soil is loose (soil cohesion  $C = 10\text{kPa}$  and angle of internal friction  $=30^\circ$ ), typically found in Sri Lanka (country for which it was originally designed for), Jordan, Western Sahara.



Power Take Off (PTO) need:	NO
Mounted at:	FRONT
Tested:	JORDAN
Main reference:	E.E.Cepolina PhD thesis

Designed by E.E.Cepolina and R.Macmillan

# VIBRATING SIEVE

The Vibrating Sieve has been designed and firstly prototyped in Australia by Ross Macmillan, Senior Fellow in Agricultural Engineering at the University of Melbourne.

As the Rake, it is aimed at processing the soil at constant depth and expose landmines by lifting them up on soil surface, by means of a vibrating movement, without actuating them.

It is targeting areas where soil cohesion wouldn't allow a fixed rake to sieve the ground and lift landmines upwards.



Power Take Off (PTO) need:	YES
Mounted at:	REAR
Tested:	AUSTRALIA
Main reference:	R.Macmillan reports

  
Designed by R.Macmillan

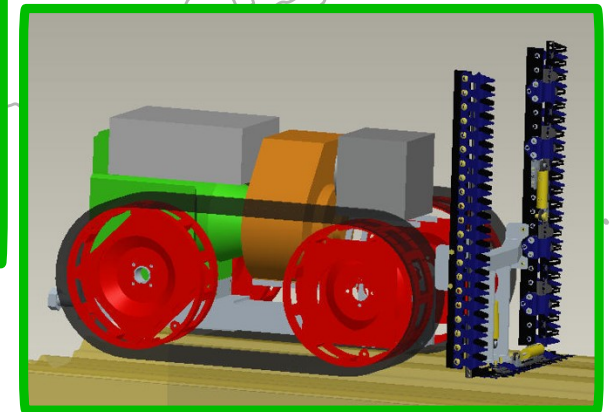
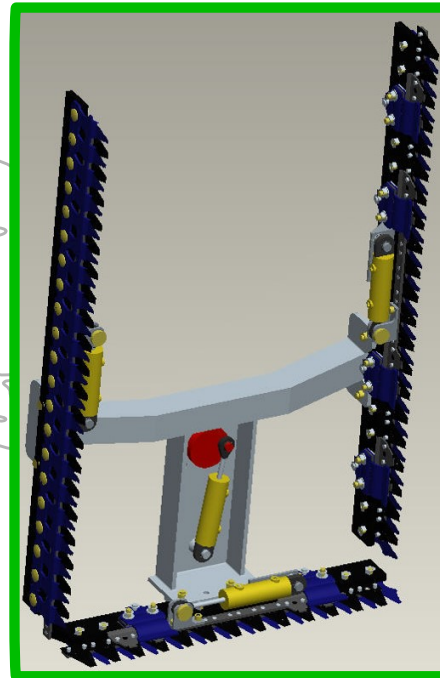
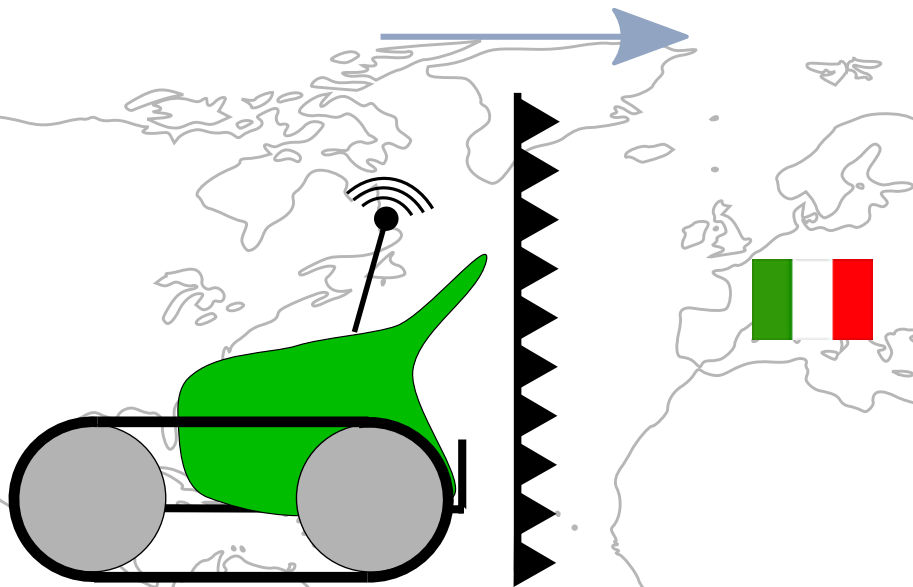
# VEGETATION CUTTER

The vegetation cutter has been designed by Paolo Silingardi, during his master thesis in mechanical engineering at the University of Genova, Italy.

It is aimed at cutting vegetation in front and at both sides of Disarmadillo, to make space for the machine to pass.

It is targeting areas covered by light and medium vegetation, including palm leaves.

It is employing off the shelf cutting bars actuated by cylinders connected in series to an additional cylinder moved by an eccentric wheel connected to the pto.



Power Take Off (PTO) need:	YES
Mounted at:	REAR
Tested:	not yet, only design
Main reference:	P. Silingardi master thesis

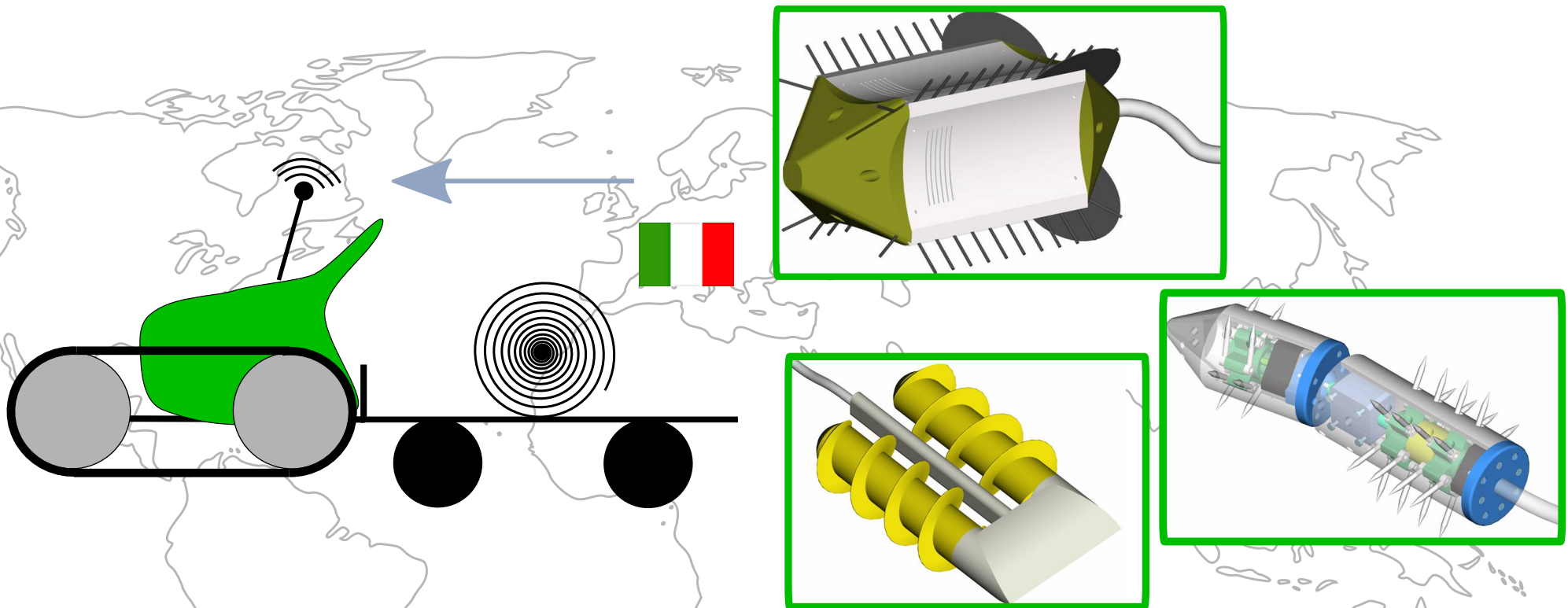
Designed by P. Silingardi

# LIZARDS

Several types of Lizards, to be carried in loci by Disarmadillo, have been designed by students from the University of Genova, Italy.

They are targeting areas covered by thick vegetation, where some additional data collection, in the form of REST sampling, spectrography or other sensors might be needed before cutting vegetation.

Lizards are able to crawl in thick vegetation, thanks to bio-inspired locomotion systems, and are powered by Disarmadillo via umbilical.



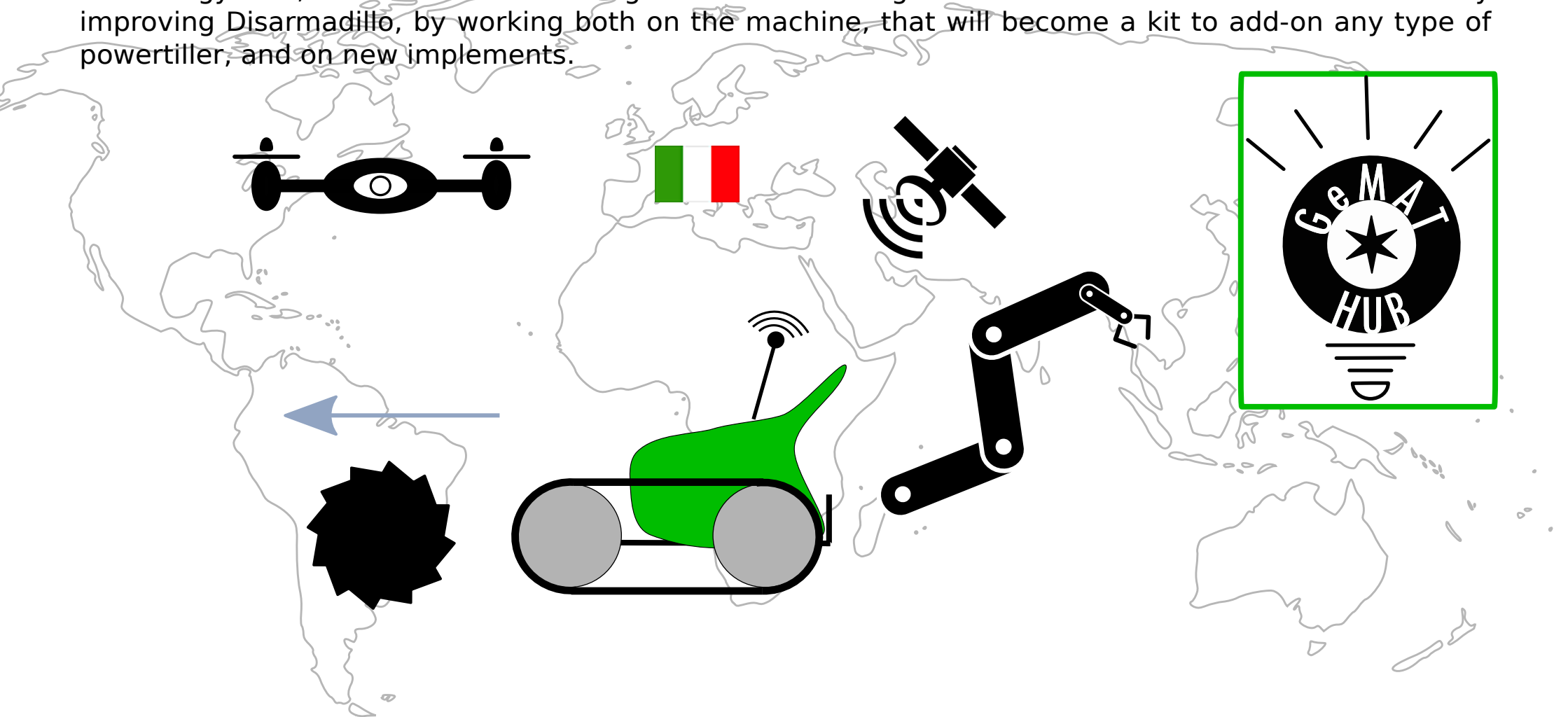
Power Take Off (PTO) need:	NO
Mounted at:	Trolley
Tested:	not yet, only design
Main reference:	The PMAR lab in HD effort, paper

Designed by F. Canonica, A. Ferrara,  
E. Micheli, L. Rimassa, M. Sawush

# IDEAS...

Some implements, such as a roller to be mounted in front of Disarmadillo to reduce the risks of explosions underneath the machine when tools mounted at rear are used, or a range of inspection tools that originate and use power from Disarmadillo to enter hazardous areas, are still only in the form of ideas. But they could become prototypes soon thanks to new collaborations that keep on being established.

Snail Aid has recently submitted a proposal to work with the Italian Institute of Technology (IIT), a leader research institute in the field of robotics, to establish the GeMAT Hub, the Genova Mine Action Technology Hub, dedicated to the design of new technologies for mine action. The work will start by improving Disarmadillo, by working both on the machine, that will become a kit to add-on any type of power tiller, and on new implements.



# DISARMADILLO

the deminer companion



Istituto Professionale di Stato Settore Industria e Artigianato

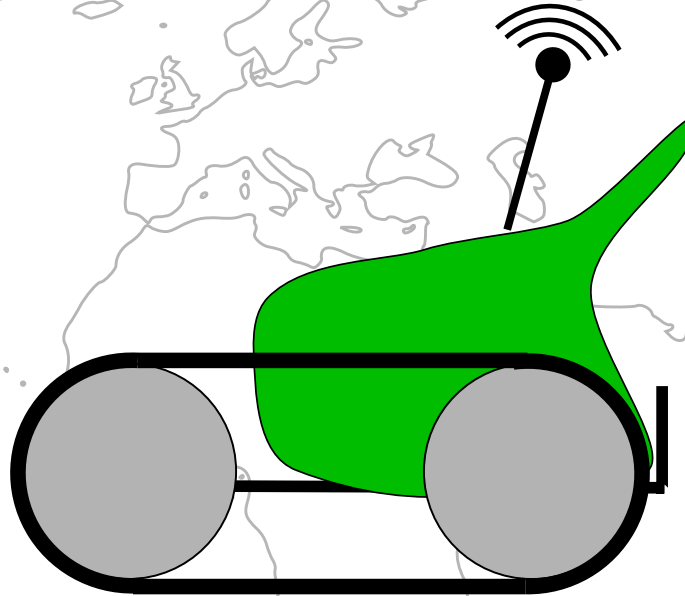
**Attilio Udero**



UNIVERSITÀ DEGLI STUDI  
DI GENOVA



DISARMADILLO



ISTITUTO ITALIANO  
DI TECNOLOGIA

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