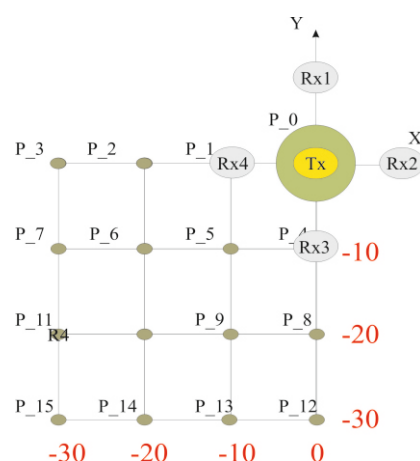
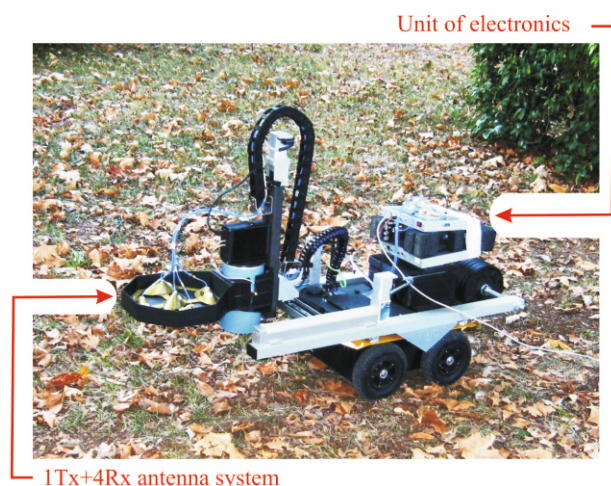


# UWB IMPULSE RADAR WITH 1TX + 4RX ANTENNA SYSTEM



Location of objects relative to the antenna system

UWB pulsed radar with 1Tx + 4Rx antenna system  
on robotic platform UGO-1st

Table 1. Positioning Errors in cm.

P N	Metal disk Ø 10 cm				PMN-2			
	x	y	z	Err	x	y	z	Err
0								
1								
2								
3	-31.9	-5	-33.5	0.35	-14.40	-4.10	-34.2	10.13
4					-1.00	0.50	-32.3	4.55
5								
6					-9.20	-6.60	-25.2	5.32
7					-33.70	-17.30	-38.7	2.18
8					-0.70	-29.30	-35.1	3.33
9								
10								
11	-34	-13	-35.3	3.06	-25.00	-16.10	-37.8	0.34
12	-6.5	-30.2	-35.6	1.50	0.00	-2.80		21.20
13					-38.30	-20.20		23.95
14					-20.50	-19.10	-39.1	4.91
15	-28.5	-37.6	-28.7	2.75	-28.50	-23.00	-37	1.16

Empty cells in Table 1 mean that the calculated position is inside the contour of the object. Value Err in the table is distance from projection of contour of the object on the XY plane to calculated position

For the plastic target, there are two detected positions P\_12 and P\_13 with corresponding errors almost two times larger than the target diameter.

(Cited from [G. Pochanin, L. Capineri, T. Bechtel, P. Falorni, G. Borgioli, V. Ruban, O. Orlenko, T. Ogurtsova, O. Pochanin, F. Crawford, P. Kholod L. Bossi "Measurement of Coordinates for a Cylindrical Target Using Times of Flight from a 1-Transmitter and 4-Receiver UWB Antenna System," in IEEE Transactions on Geoscience and Remote Sensing, vol. 58, no. 2, pp. 1363-1372, Feb. 2020, doi: 10.1109/TGRS.2019.2946064.  
<https://ieeexplore.ieee.org/document/8878010>])

## Areas of Application

Detection of objects (including plastic) under the soil surface. Works as part of the robotic platform UGO-1st, created during the implementation of the project G5014 "Holographic and pulsed radar subsurface sensing for the detection of landmines and improvised explosive devices", which was carried out under the NATO program "Science for Peace and Security".

<http://www.nato-sfps-landmines.eu/>.

## Specification

Detection depth - from the surface to a depth of 20 cm; width of the inspected lane - 40 cm; probing signal - pulse without carrier of 0.4 ns duration; sampling receiver with operating frequency from 0 to 2.4 GHz; weight - 2 kg.

## Advantages

Real-time monitoring occurs when the robotic platform is moving. No mechanical scanning is required to locate a subsurface object. Variable reading time and its optimization (Patent UA96241) increase the signal/noise. Analog accumulation when received expands the operating frequency band and increases the signal/noise ratio. Low cost.

## Stage of Development

IRL3, TRL5.  
Prototype testing in the test field.

## IPR Protection

IPR1

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