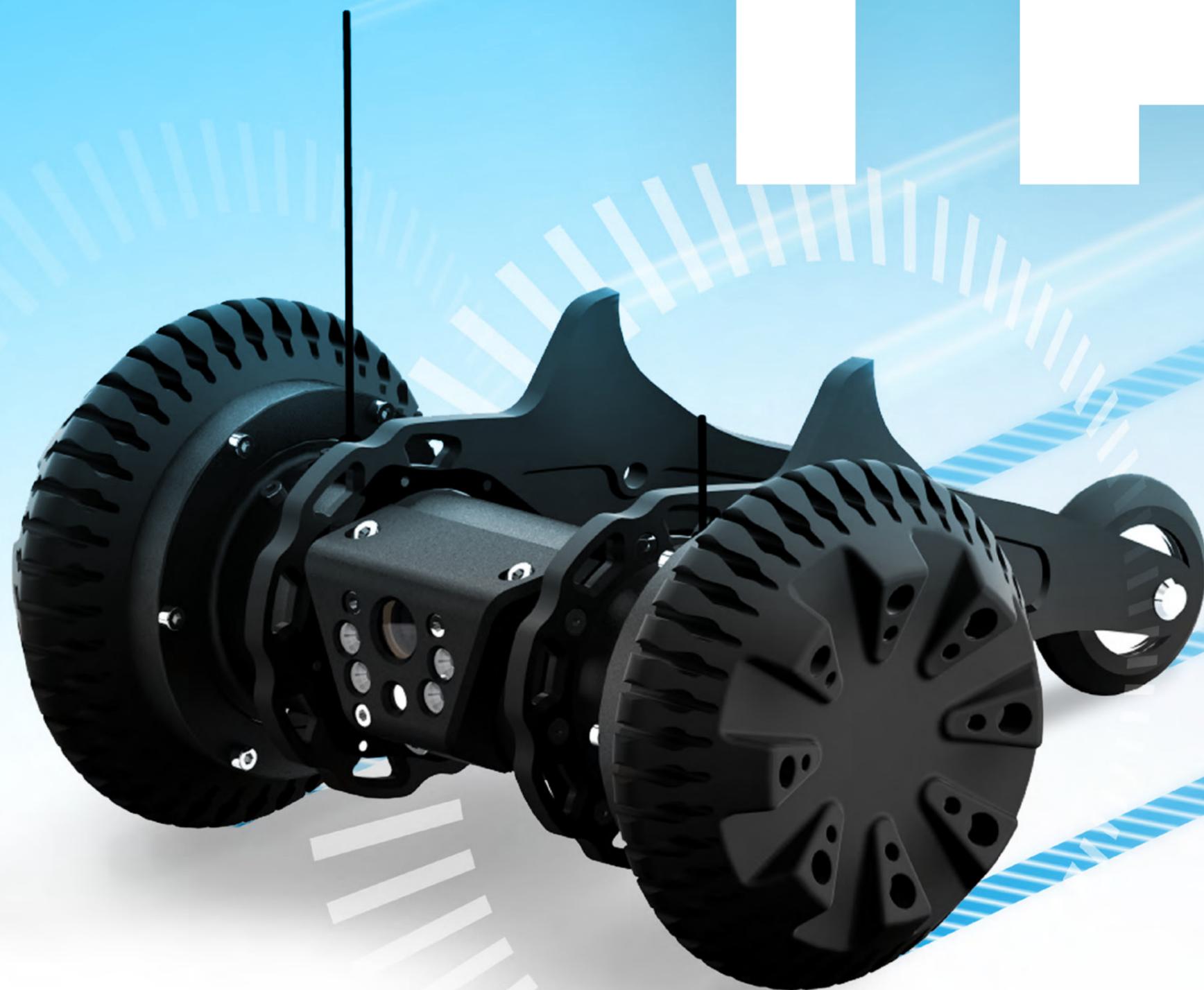


# PIAP TRM

## V 2.0

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**Two years ago, in FRAG OUT! #00 issue, there was an article about the TRM Tactical Hand-Thrown Robot – a small reconnaissance robot developed by PIAP (the Industrial Research Institute for Automation and Measurements). Simultaneously to that article, the works on the next generation of TRM were launched. A little less than two years later, design studies were finished and the new version is being implemented for production.**

The decision concerning modernization works was made mostly in order to simplify the construction, improve its features, and add new functions. Users of TRM eagerly share their experience with the designers from PIAP and suggest changes that would adjust the device to the tasks it must perform. Of course, not all changes are possible to be implemented, but in the case of TRM, the range of changes is really a major one. One may say that this is actually a new version of the robot, not only a modification. The first stage of works that resulted in creating the first model of TRM 2.0 was

finished in May 2014. The model underwent on-site tests. It helped in gathering knowledge necessary to implement further improvements and modifications, so that it was possible to construct another model already in October 2014. Testing of that version had been conducted until the end of the year and after completing the tests, a decision was made to construct a prototype. The prototype was ready for its first tests in the first half of 2015. The research was conducted for two years. The first, official demonstration of the prototype was held during the MSPO 2015 trade show.



### CHANGES

One may notice the changes made in PIAP TRM 2.0 at first glance, but, obviously, those are not all of the introduced modifications.

The first noticed change are the new wheels. They have a more aggressive look, provide better mobility and "off-road capability" of the robot. What is more, they work much more quietly in comparison to the previous version. Thanks to optimization of the shape of the tread and application of new electric motors, the robot may move almost noiselessly. Another easily noticeable change of the chassis of the robot is its "tail". The first version had a tail in form of a steel wire ended with a ball, but

after some time of using the robot, it appeared that in some cases such assembly may get destroyed. It usually occurred when the robot was dropped from a great height and landed "on the tail", which lead to deformation of the steel wire. The new tail is in form of two rubber belts with a small stabilizing wheel (that prevents the ball from shuffling on the surface and robot's movement is now even more quiet). Apart from stabilization, the tail serves also as shock absorber – its deformation is, then, temporary and goes back to the original shape. Additionally, the robot it was profiled in a way that allows attachment of a small explosive, e.g. a flashbang that may be detonated with an electric fuse launched via the control panel. The last function of



the tail is continuous adjustment of the angle at which the camera of TRM 2.0 will operate – the tail is mounted on the body, so that it is possible to even rotate it by 360° without tools. It allows setting the camera in any position, so that it is possible to move it e.g. vertically upwards and use the robot to inspect the underbody of a vehicle.

**The TRM 2.0 has been facilitated with much more sensitive microphone.**

The redesigned body of TRM and the camera with lights constitute a separate module that may be easily disassembled. Of course, the disassembly should not be performed by the user, but it makes it easier for the institute to adjust the robot to recipient's needs. Currently, TRM 2.0 is facilitated with a color camera with high sensitivity WDR of 0.01 lux, 90° angle of view, and resolution of 700TVL with a CCD 1/3" converter and an F2.0 3.7mm lens (in the case of infrared lights, with the function of infrared imaging). The recipient may choose from the following light configurations:

- 2 x LED white light 2 W+ 2 x LED IR 940 nm 2 W – basic version;
- 2 x LED white light 2 W+ 2 x LED IR 850 nm 2 W;
- 4 x LED IR 940 nm 4 W;
- 4 x LED IR 850 nm 4 W.

A new operator console was designed. It is smaller, lighter, and more convenient than the previous one. On top of this, it will provide the ability to control even six robots simultaneously. The console has been facilitated with a large 4.3" screen, capacity to record video broadcasts, and an SD card socket with the maximum size of 32 GB (it is also possible to copy data through the in-built USB port). The console has its own speaker, but it is also possible to connect headphones – in some situations it is recommended, due to the confidentiality of the broadcast or just in order to limit surrounding noise.

The new console allows controlling the robot from a distance of up to 150 m in open space and up to 100 m in buildings. Working time on one charging of the batteries is three hours.

The robot has an attractive design, clear distribution of manipulators and buttons, as well as compact design with foldable antennas for transportation.

The new full version of new robot, along with the new operator console, will be presented during MSPO 2016, but there is a possibility that first units of the robot will start their service even earlier.



**PIAP TRM 2.0  
UGV Data Sheet**

Maximum width of the robot	<b>212 mm</b>
Wheel diameter	<b>102 ± 3 mm</b>
Maximum height of the robot, including antennas	<b>170 mm</b>
Maximum length of the robot with a stabilizer	<b>215mm</b>
Weight	<b>1,6 kg</b>
Maximum speed	<b>3,5 km/h</b>
Range of the robot in buildings	<b>30–100 m</b>
Range of the robot in open space	<b>100–150 m</b>
Work time	<b>1 h</b>
Charging time	<b>3 h</b>

**Technical specification  
of the console**

Maximum width of the body	<b>265 mm</b>
Maximum length of the body	<b>165 mm</b>
Maximum thickness with the joystick	<b>50 mm</b>
Maximum thickness of the body	<b>37 mm</b>
Maximum height with antennas, when extended	<b>185 mm</b>
Display	<b>4,3" TFT</b>
Weight	<b>1,2 kg</b>
Working time capacity when not recording	<b>4 h</b>
Working time capacity with recording	<b>2,5 h</b>
Charging time	<b>3 h</b>