United Nations Educational, Scientific and Cultural Organization

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AUTOMATIC DEMINING AND FRAGMENT COLLECTING SYSTEM

Introduction and problem

Currently, there are more than 30 active armed conflicts in the world, including the conflict in east of Ukraine. Anti-personnel mines, which are prohibited by the UN Convention, are actively used in hostilities. Sooner or later, areas contaminated with mines and debris will have to be returned to normal. No field or farmland can be used as long as there are mines or fragments, which in turn can lead to a humanitarian crisis. It is obvious that mines are a direct threat to human life, however even their fragments can also cause severe damage by getting inside valuable agricultural machinery and disable it.

Aim

Creation of an economically automated system for demining territories, which are in an active human use, from fragments and debris.

Idea

The idea is to use a new demining conception. The developed robot will clear unexploded ordnance with a trawl, which will also protect robot. After that, the remains of mines, debris and fragments will be collected by an electromagnet and taken for recycling.

Tasks

1) Research of the state of the frontline territories of Ukraine, the degree of contamination by mines and fragments;
2) Identification of shortcomings of existing systems and mechanisms for demining and collecting of fragments;
3) Designing a robot that avoids the shortcomings of the existing system;
4) Designing a reduced robot model to establish its real capabilities.

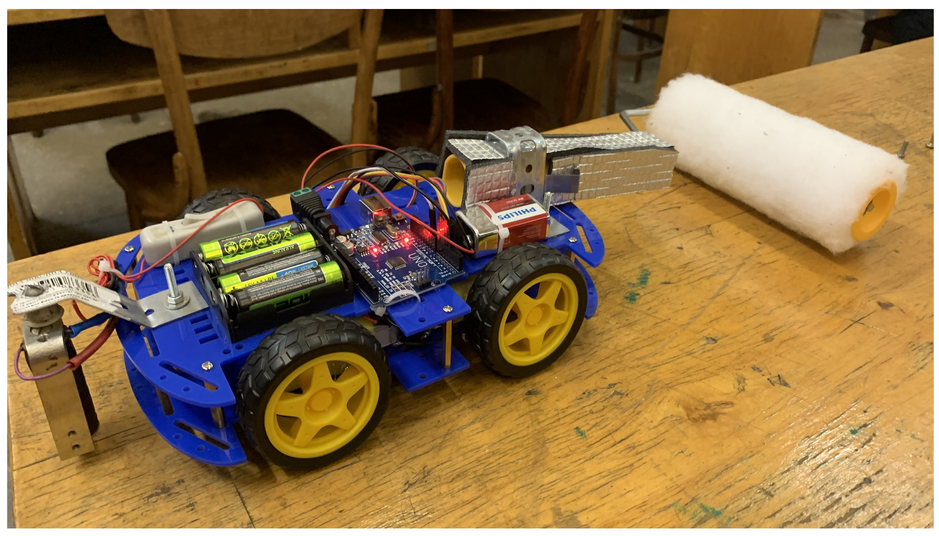

Fig. 1 Robot's model

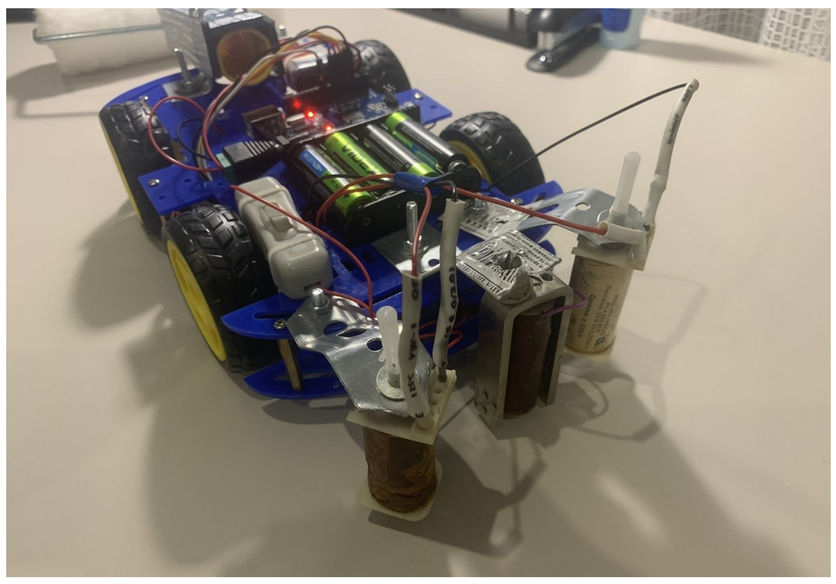

Fig. 2 Updated version of model with three electromagnets

Economic efficiency

The cost of the developed complex will be up to $ 60,000. On average, it will take up to demine 100 mines for a robot to cover its cost.

Operating principle

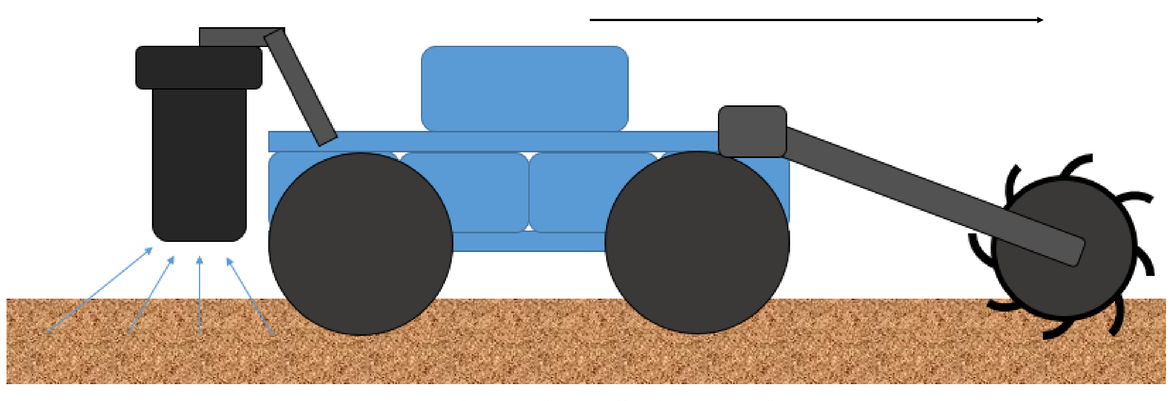

Fig. 1 Sketch of the robot

Figure 1 shows a sketch of the robot. In front is a heavy metal trawl, which will detonate mines, thereby demining the area and protecting the robot.

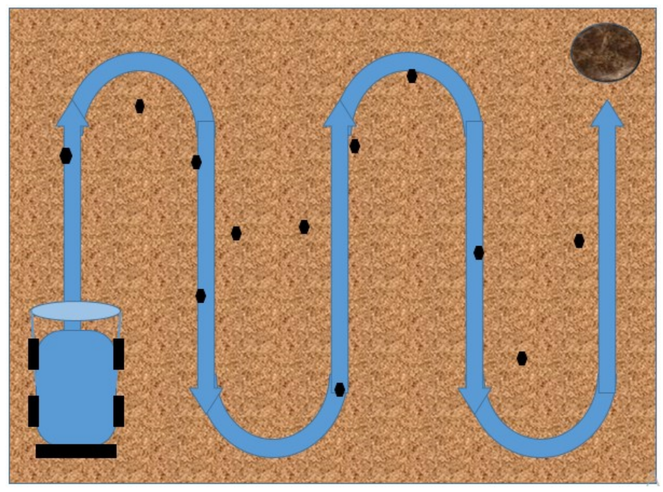

Fig. 2 Robot's route

There is a powerful electromagnet in the back part of the robot that lifts fragments from the ground. The robot follows the path shown in Figure 2 and at the end of the route dumps fragments in a certain place.

Results

-Efficient and cheap demining complex has been created, which has more advantages than existing demining systems.

-The developed complex allows to collect fragments by an electromagnet without involvement of the person in this process.

-The developed complex allows to save human lives, because it can be controlled remotely.

-The system can and should be used for humanitarian and military demining.