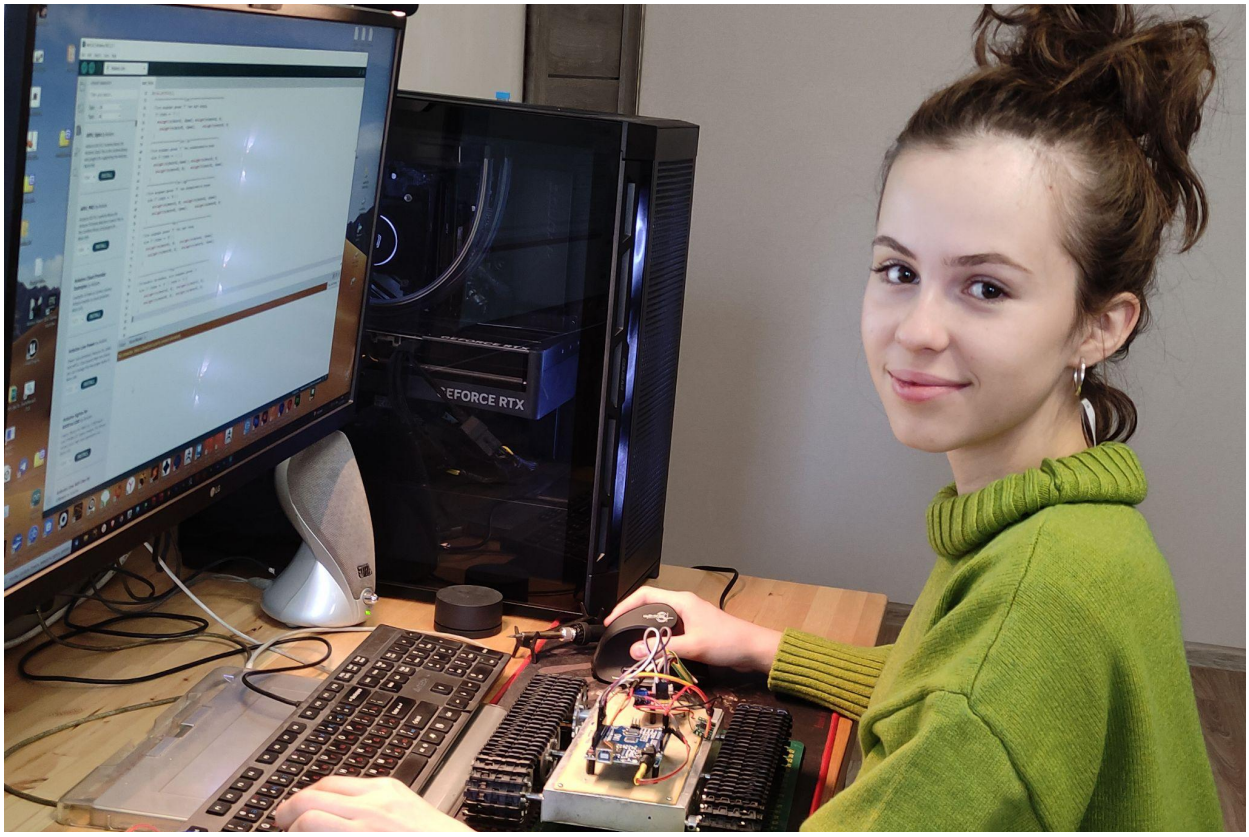

Search and Rescue Robot:

An Autonomous Drone Project for Disaster Relief

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Author:
Sofiya Sverdlik

Introduction:

My first research study on robotics is titled "Search and Rescue Robot". The goal of this project is to explore how to create a prototype of an autonomous drone that can be used to search for and rescue people trapped under rubble after natural disasters or armed conflicts. In the future, the robot will be equipped with artificial intelligence, which will allow it to navigate in space without the help of an operator and free up rescuers to focus on other tasks.

Relevance of the topic:

- Almaty, Kazakhstan, is located in a zone of 10-point seismic activity.
- Political instability leads to numerous casualties among the civilian population. Such a robot can help save lives after the destruction of a building.

Tasks of the project

- To create the robot's construction.
- To develop a program for the robot.
- To determine additional features of the construction.

Stages of work

I. **Preparation stage**
   1. Determination of the necessary amount of knowledge for the implementation of the project.
   2. Drawing up a plan of work for the implementation of the project.
   3. Collection and analysis of material on the design and structure of similar robots.

II. **Design stage**

   1. Selection of the optimal option for implementing the project.
   2. Selection and purchase of necessary components.
   3. Assembly of the robot according to its own scheme.
   4. Modification of the construction proposed in the kit.
   5. Study of the capabilities of the robot and the programming environment.

III. **Technological stage**

   1.Making changes to the main chip.
   2. Physical assembly of electronic components.
   3. Programming.

Results

At the first stage, I was able to assemble the first test robot. Its components are as follows:

- The body is made of aluminum.
- This increases the reliability of the robot while keeping it lightweight.
- The caterpillar chassis is assembled on the basis of two 12-volt gear motors.
- The lifting force is 5 kg.
- The radio control is assembled on the basis of a 4-channel 900 MHz RC receiver.
- The signal range is 200 meters. (Allows you not to be afraid of signal loss)
- Two 18650 batteries.
- Arduino UNO platform for controlling the robot.

What remains to be done

- To undergo field tests to overcome obstacles and modify the body and chassis if necessary.
- To add a night vision camera so that the operator can observe what is happening.
- A manipulator arm. It will help the robot clear the way or help the victims. • Switch to another platform or expand the existing one.
- To add a LiDAR sensor. It will help the robot to independently create a map of the area.
- To add AI. Together with the LiDAR sensor, AI will be able to plan the optimal route.
- To add an infrared sensor (optional). It will give the ability to determine the condition of the victim.
- A GPS module can transmit data to the operator about the robot's location, as well as indicate the exact coordinates of the people found under the rubble.
- To attend university to become a skilled practitioner in this area.

Skills acquired during the work

- I learned to independently set a design task and find ways to solve it.
- I conducted research work on the collection and analysis of material on the design and structure of similar robots.
- I independently mastered the basics of robotics based on Arduino.
- I studied C++ programming.

- I learned to solve non-trivial problems of combining purchased components.
- I learned to assemble and solder electronic components.
- I studied materials on artificial intelligence and wanted to continue to develop in this area.

Conclusion

My first solo engineering project was a challenging but rewarding experience. I learned to research complex theories, apply engineering principles, and work independently. This project was a bridge between the classroom and the real world, and it ignited my passion for engineering. I am committed to seeing this project through, and I am excited to continue to learn and grow in this dynamic and impactful field.