RESQBOT

Innovating for enhanced Victim Rescue Operations

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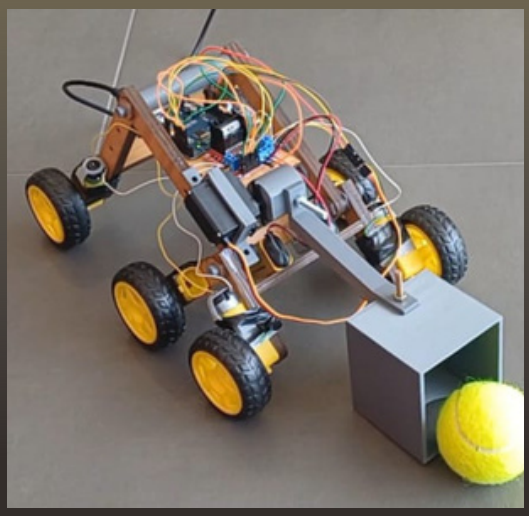
Aesthetic Appeal

Disaster Rescue Robots should espouse trust, familiarity, psychological well-being and universal safety symbolism.



Trust:

Victims need to believe that the robot is there to help them in a professional and reliable nature. Aesthetically, this would involve health related symbolism e.g. a red cross, face like structure, replacing sharp edges with softly curved edges to suggest comfort.

Familiarity:

Robots should be adapted to each societal location where the robots could resemble non-threatening and universally known objects to improve approachability and trust within victims.

Psychological Well-Being:

It is necessary to introduce a robot that can provide both physical assistance and emotional support. Aesthetically, bright lights to revitalize the victims' senses and audio from the rescuers can help soothe and reassure the victims' psyche, reducing the chance of possible resistance.

Universal Safety Symbolism:

Rescue operations often involve collaboration between teams from different regions or countries. Universal symbols bridge language barriers, enabling effective communication and coordination during emergencies and reduces the risk of misinterpretation.

Robust Design

The robot uses several methods to increase the sturdiness and stability of the robot, ensuring that it remains structurally sound and fully functional while completing performing rescue operations and expected behaviour is retained throughout.

Rocker-Bogie Deisgn

One such method is the use of the rocker-bogie design, a split axle design which allows for higher manoeuvrability on tough obstacles and distribution of force on rougher terrain, keeping internal components safe, due to the many rotational joints in the design to absorb rough contact with obstacles and steps.

Clearance Values

Another element used is tight clearance values, with 0.5mm clearance given for rotating pieces such as the L frame, minimizing horizontal sway while ensuring smooth rotational movement with the help of superglued fasteners to secure the frame in place

Beam Supports

Beam supports are used through to ensure at least 2 points of contact between corresponding parts of the split body design, further reducing horizontal sway and aligning the structure to ensure adequate wheel traction is established with the ground at all times.

Engineering Quality

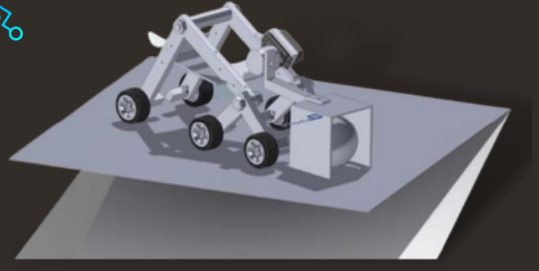
Made of a combination of 3D printed PLA and laser-cut wood with 1 kg weight and 30 cm length, the robot is designed to maneuver through complex environments, capable of navigating through mazes and climbing stairs, with the ability to go forward, backward, and turn with advanced control.

The robot's lifting mechanism using a servo has shown its strength, easily handling objects like a tennis ball, which ensured its effective payload management. Also, the robot is capable of moving at various speeds for quick or precise movements, important in sensitive rescue operations. Its connection via cable ensures a fast and reliable communication link, ensuring accurate controlling.

Innovation

Payload Collecting System

The robot uses a highly unique mechanism to collect the payload, being a box that the design rolls over the tennis ball, and then, once centered and held in place passively by the central ring, is rotated along an arm until the tennis ball and the box container are both held entirely upright against the body of the rig. This innovative mechanism dodges several problems about the storing of the payload and minimizes failure points on the design to just two very simple mechanisms.



Split-Body Design

The split body design for the robot, while complex, introduces far improved terrain traversal capabilities and makes the design far more flexible to solve other problems. These are just some of the features in our design which may spur further innovation in the field of miniature rescue robots.

Efficiency

The robot is supposed to use 2 motor drivers to control 4 wheels. But, this robot only needs one. The used of a parallel structure is very helpful to make the robot less expensive and more affordable.