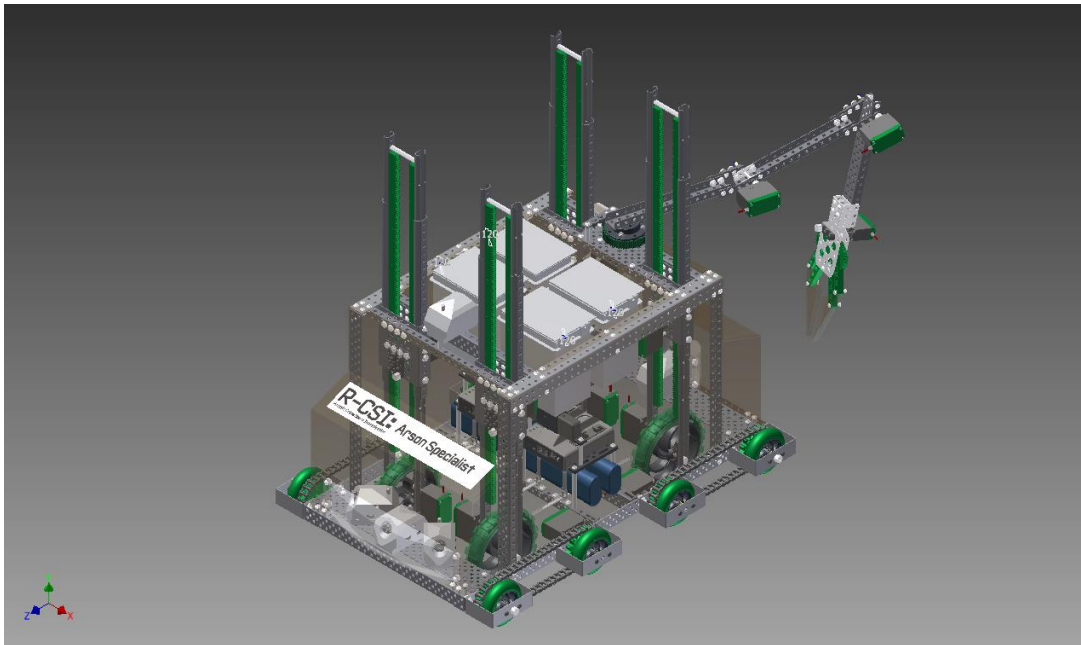


R-CSI: Arson Specialist

Robotic Crime Scene Investigation



Robot Name:

Robotic Crime Scene Investigation: Arson Specialist (R-CSI: A)

Purpose:

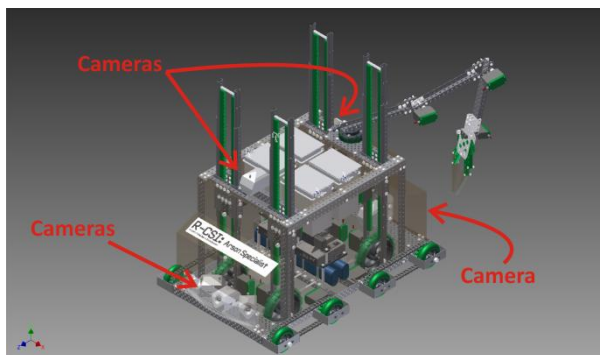
The R-CSI: A is used to document the scene and collect evidence in buildings where arson is suspected and where the building has been deemed unsafe for a human arson investigator to enter.

Design Highlights:

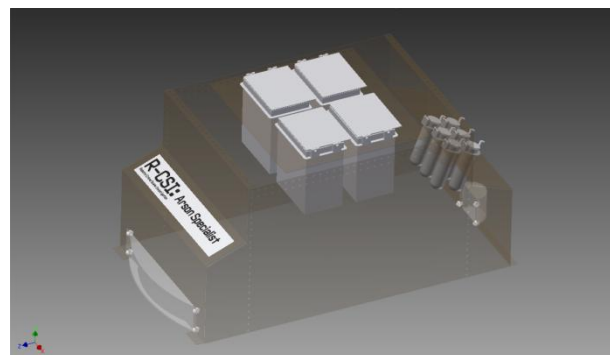
General

- The R-CSI: A is a VEX robot designed to be remotely controlled by an investigator outside of a building where arson is suspected.
- The robot has six cameras on it to document the scene with photos, as well as to assist the firemen in driving and collecting evidence.
- The robot is capable of climbing over fallen beams and debris.
- The entire robot is encased in polycarbonate plating to protect it from damage.

Cameras:



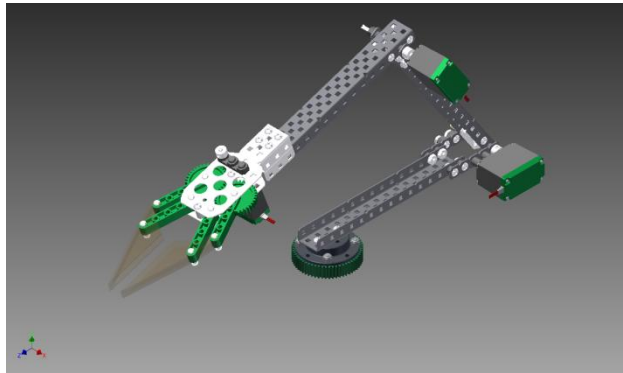
Polycarbonate Shell:



Arm

- The evidence collection arm is mounted on a turntable for slight adjustments side to side.
- The claw has specially designed fingers that can either pick up objects or scoop up soil or ash.
- Evidence collected by the arm can either be placed in one of the four removable sample bins, or in one of the six removable test tubes.
- To protect samples from contamination, these containers have flip open lids that the robot's arm can open and close.

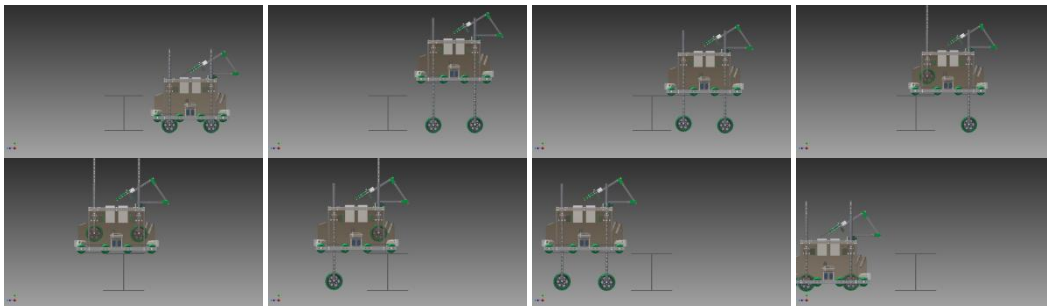
Arm:



Drive

- Main drive wheels are mounted on four independent lifts.
- The robot has eight smaller drive wheels to assist in climbing objects.
- Climbing is achieved through a series of movements that involve placing the small wheels on the object, retracting the main drive wheels, driving across the object, and then lowering the main drive wheels.

Climbing:



Design Process:

- Brainstormed ideas for each category.
- Eliminated ones that had already been done, or did not seem useful or feasible.
- From the remaining list, chose the one that seemed like the best application for the VEX platform.
- Once we had decided on an arson investigation robot, we research arson investigation and made a list of everything it had to do.
- Sketched out some different ideas for drive trains and possible solutions to the other required features.
- In Inventor, we started by designing the drive train we had chosen then added in the other features.
- We then went back and looked over the robot for problems and made a few small design changes.

Evidence that the robot can collect:

Evidence	Reason
Cigarettes	Sometimes used as part of an incendiary device
Fabric, paper or cardboard	Can have accelerant soaked into it
Ash from low points in the floor or near floor drains	May contain accelerant
Used bullets	Used to identify suspects
Broken glass	Used to identify if the building was broken into or had a projectile launched into it
Soil	May contain accelerant
Tape	Often used as part of an incendiary device

Autodesk Features:

The most helpful feature in Autodesk inventor had to be the rectangular pattern tool. We used it for placing screws and other pieces that had to be copied many times. I also found the copy tool useful for creating sub-assemblies and the center of gravity tool useful for making sure that the climbing would work.

Sources and Credits

Arson Investigation:
interfire.org
ncjrs.gov

VEX Inventor Parts:
Team 4542's VEX Inventor Standard Library
<https://sites.google.com/site/inventorstandardlibrary/>

YouTube Video Clip:
KXLY Channel 4