TEAM MEDEXTROUS

KLANN MECHANISED SPIDER BOT

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Problem Statement

Today , bots used for surveillance generally use either wheels or belts which leaves its mark while moving in enemy territory . Such bots can be easily traced by enemy and captured or destroyed.

SOLUTION

Spider bot uses Klann linkage mechanism and uses it’s eight legs to crawl on its tip which leaves no traceable marks on ground and can be easily deployed in enemy territory without being caught.

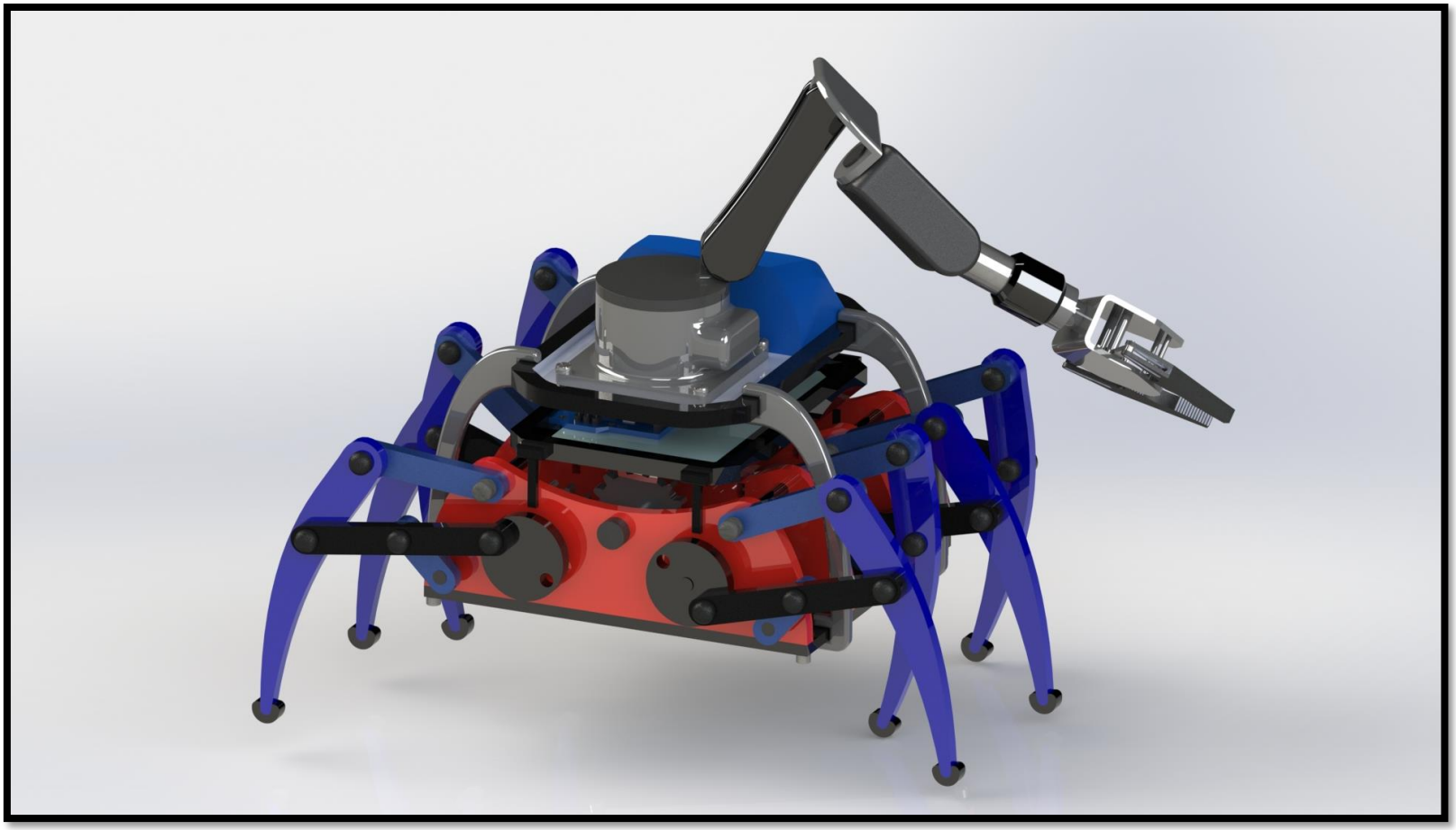
ABSTRACT

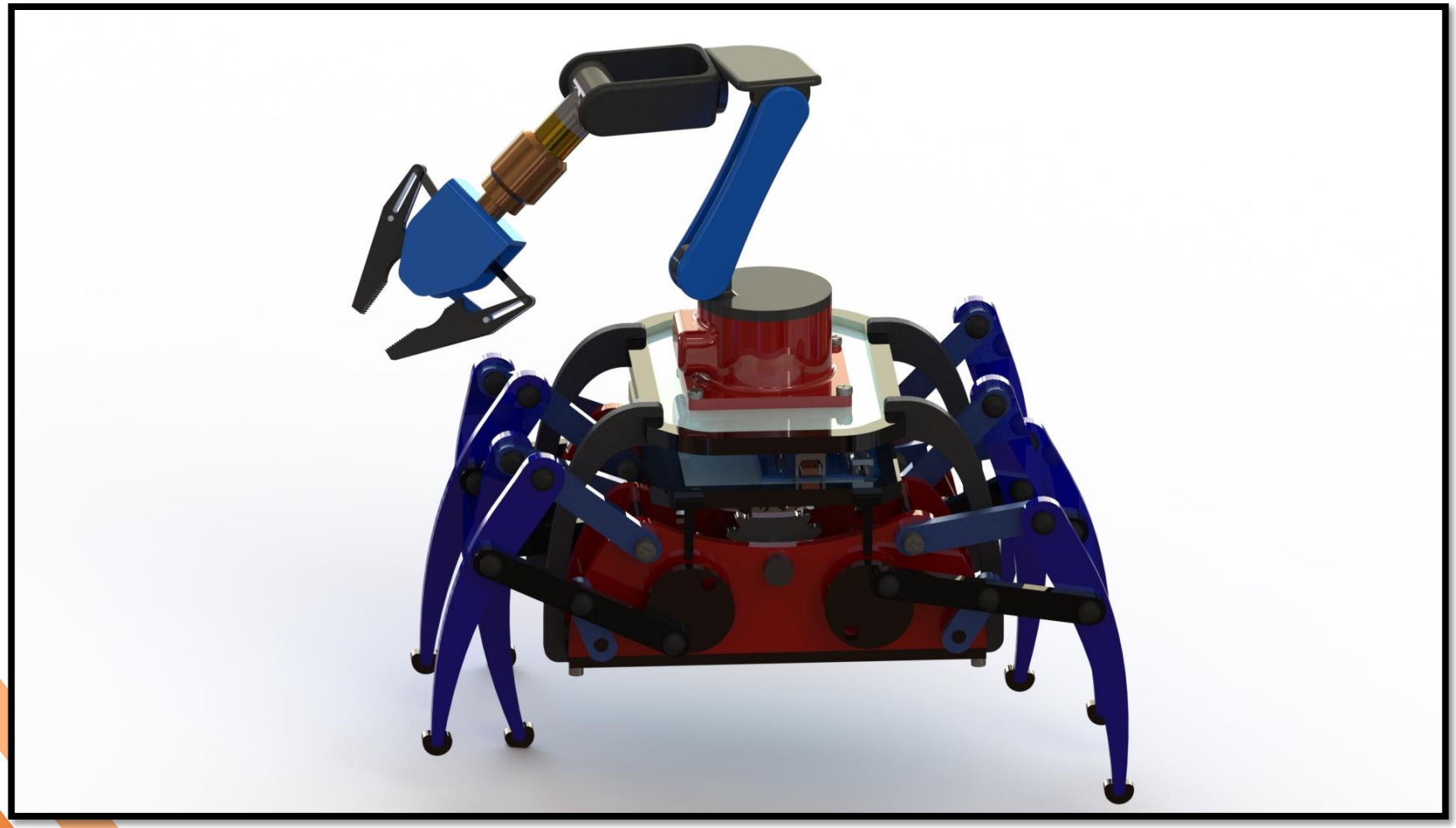
Klann linkage is a planar mechanism designed to simulate the gait of legged animal and function as a wheel replacement, a leg mechanism.
The linkage consists of the frame, a crank, two grounded rockers, and two couplers all connected by pivot joints. It was developed by Joe Klann in 1994.

OBJECTIVE

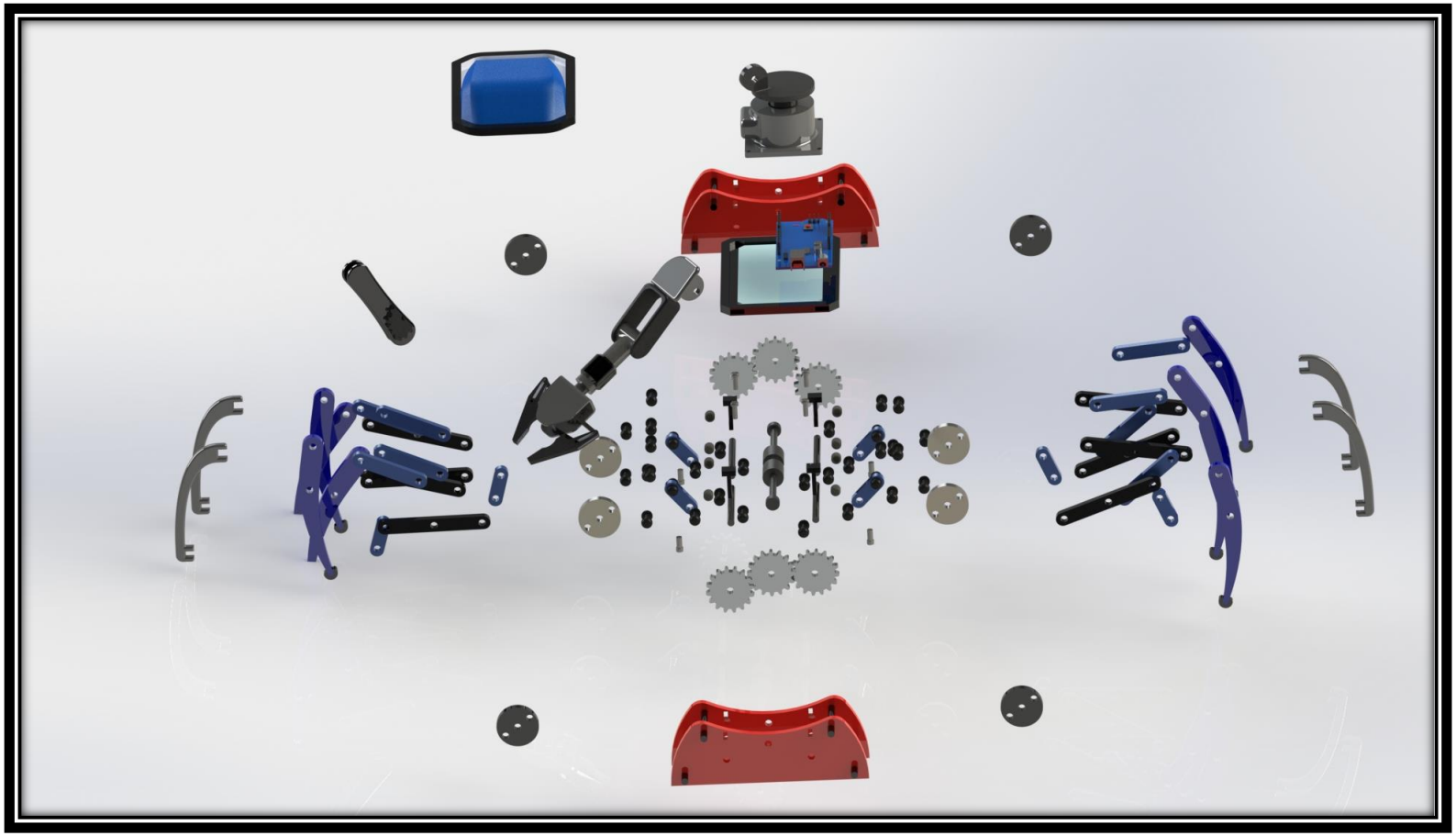
- The objective of this project is to design such a six leg spider bot that can be used for security purposes such as surveillance.
- The bot can move on any rough terrain and has in-built ultrasonic sensor controlled by Arduino.
- It also has a robotic arm which can pick and place any small weapon , camera or trap for enemy.

DESIGN

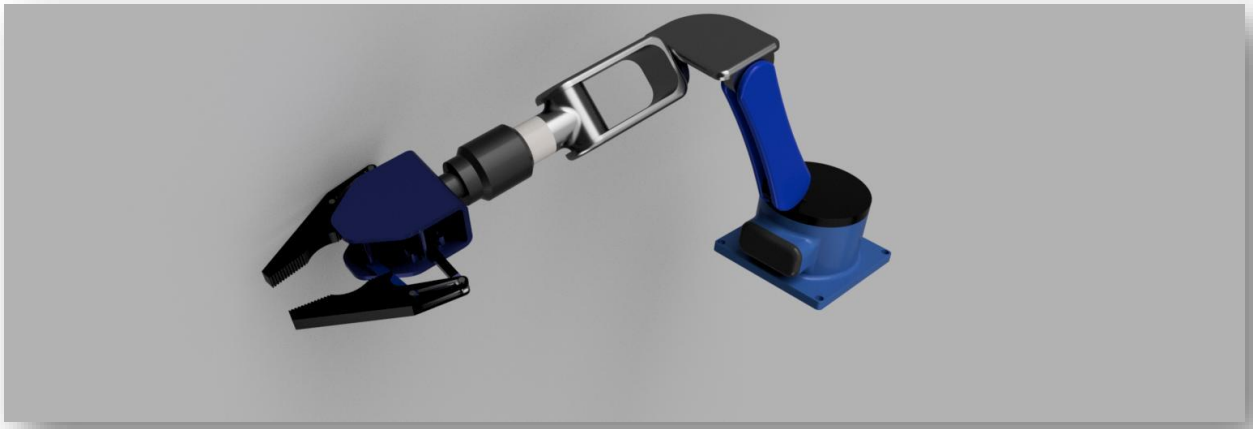




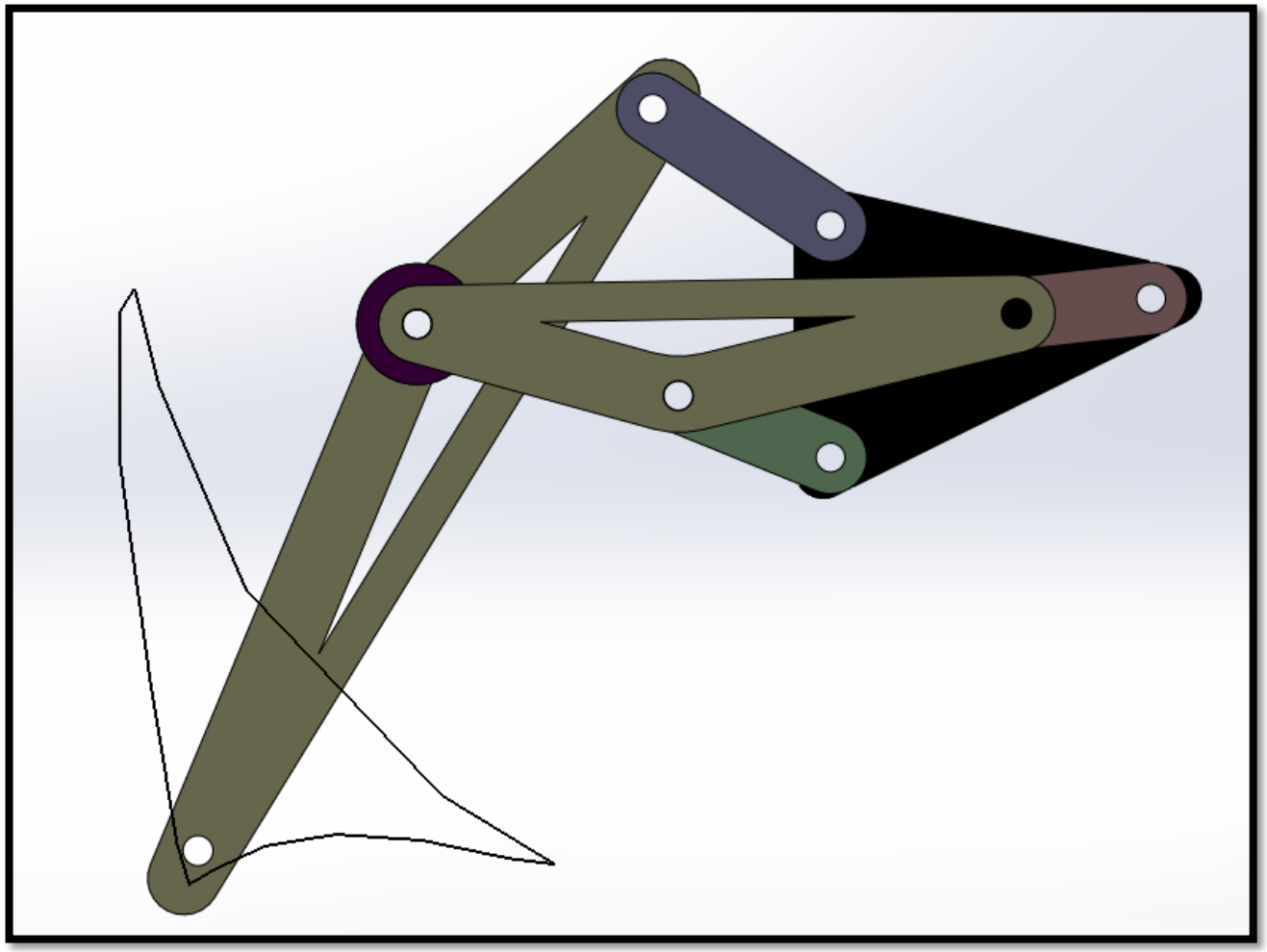
Parts



Robotic Arm

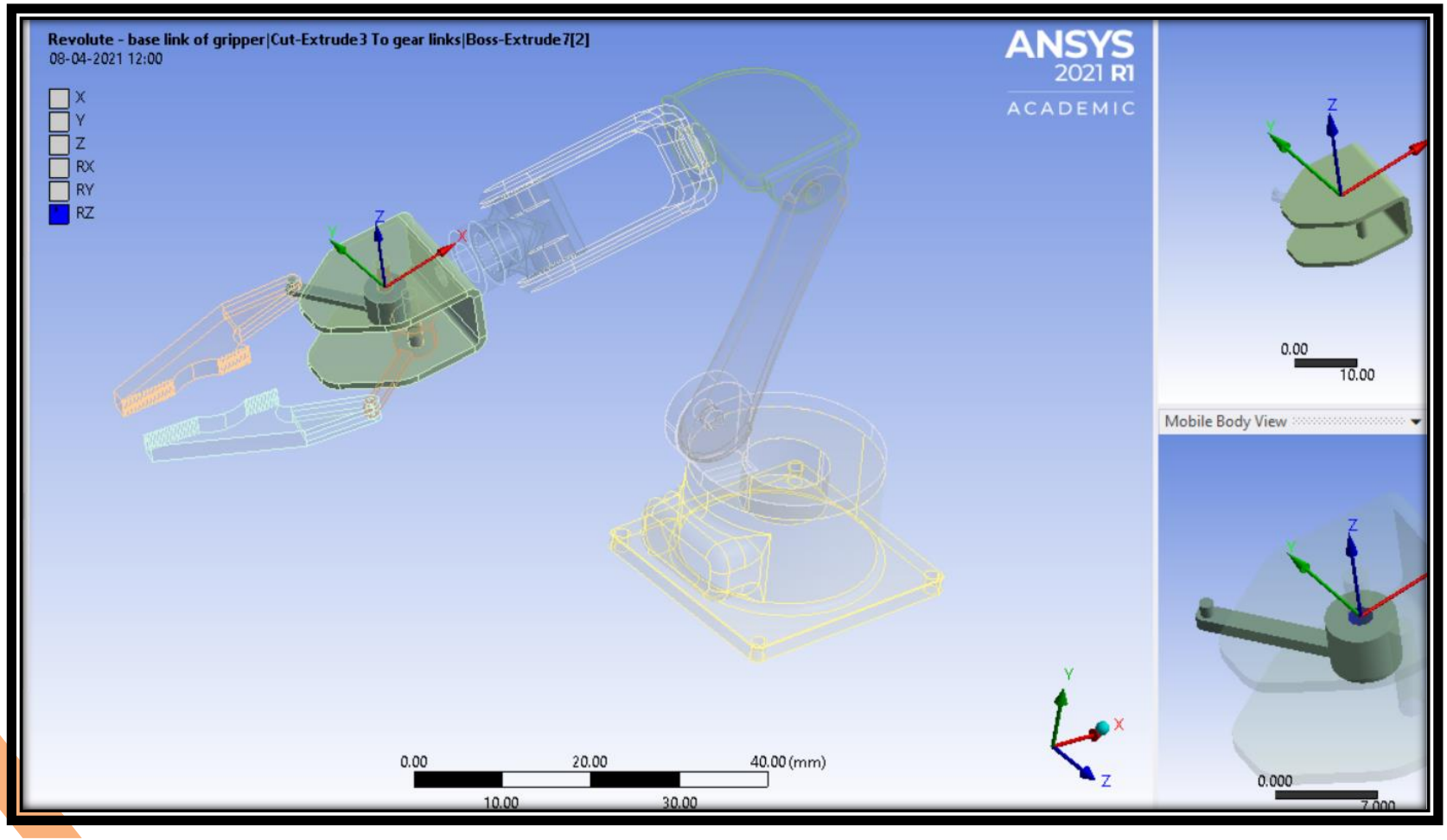


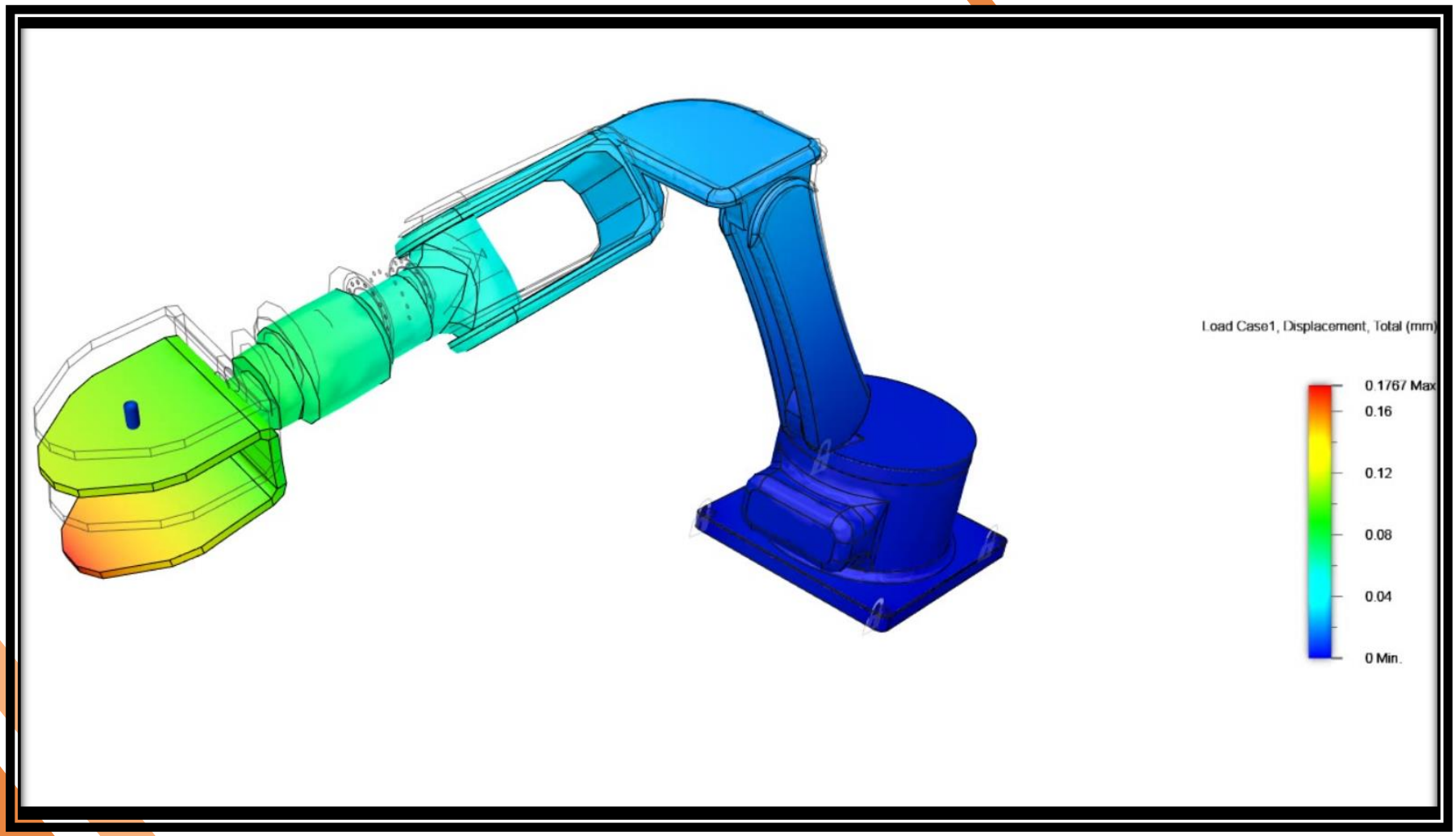
KLANN Mechanism



The path traced by Klann mechanism is shown

SIMULATION


Revolute - base link of gripper|Cut-Extrude3 To gear links|Boss-Extrude7[2]
08-04-2021 12:00
X
Y
Z
RX
RY
RZ
ANSYS
2021 R1
ACADEMIC
0.00
20.00
40.00 (mm)
10.00
30.00
0.00
10.00
Mobile Body View
0.000
7.000


Load Case1, Displacement, Total (mm)
0.1767 Max
0.16
0.12
0.08
0.04
0 Min.

Calculation of DOF

N = 3(L-1)-2J (KUTZBACH Criterian)

Where N = degree of freedom

L = number of links

J = number of binary joints

In Klann mechanism , for single leg

N = 3 (6-1) – 2*7 = 15 – 14 = 1

Hence , the DOF of spider bot is 1

CONCLUSION

- The project can step over curbs, climb stairs, or travel into an area that are currently not accessible with wheels.
- It may not compete with the efficiency of a wheel on a smooth hard surface but as conditions increase rolling friction , this bot becomes more viable and wheels of similar size cannot handle obstacles that this Klann linkage is capable of.
- Also it allows the legs to fold up compactly for storage and delivery.
- If implemented properly, automobiles moving on legs using Klann mechanism have the potential to change mobility as we know it.