Robot Design and Computer-Aided Design (CAD)

By Joshua Njau

What Is a Robot?

A programmable machine capable of detecting its environment and performing tasks autonomously or semi-autonomously.

Distinguished from other machines by their adaptability and mobility.


KUKA

Design

Plan or drawing that shows the appearance and functionality of the product it is based on, or the process of creating one.

Why Design?

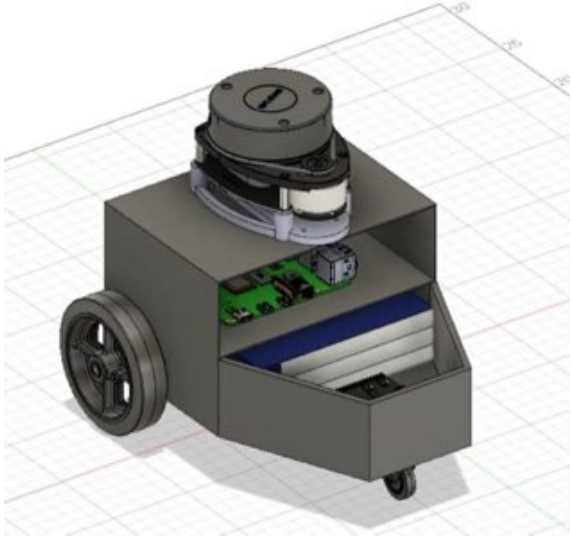
- Visualisation and modification.
- Collaboration.
- Gauge the manufacturability and machinability of the robot.
- Aids in coming up with a Bill of Materials.

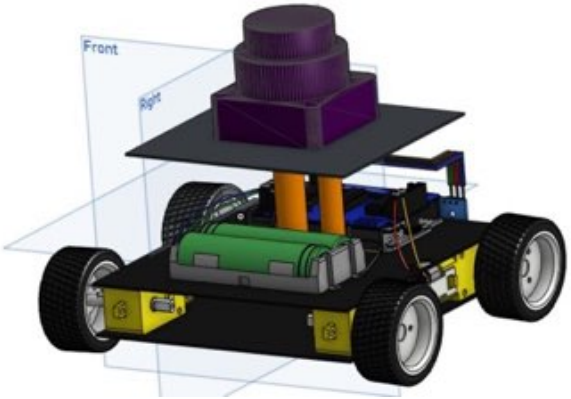
Key Considerations When Coming Up With a Design:

- Purpose and functionality (2025 Robotics Dojo Competition)
- Area of operation (Gamefield) *Atom on Game Field*
- Components
- Size constraints (30 by 30 by 25cm)
- Budget constraints (KES 15,000 + 5,000)
- Fabrication process

Important Tips

- Be thorough in your design.
- Strike a balance between aesthetics and functionality.

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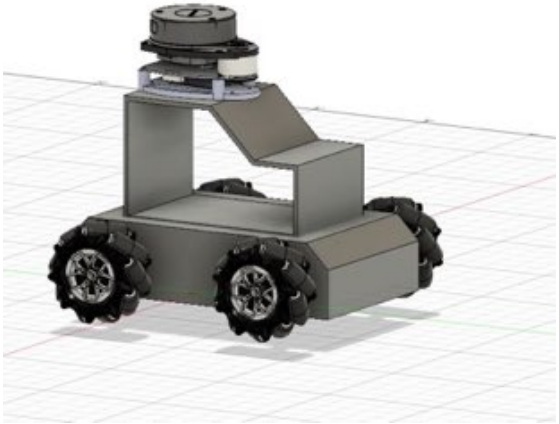

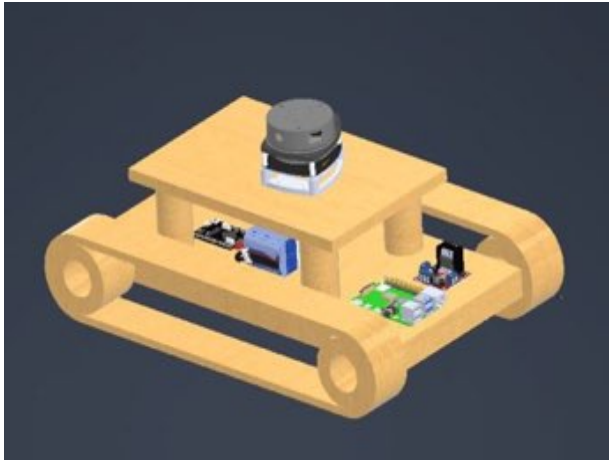

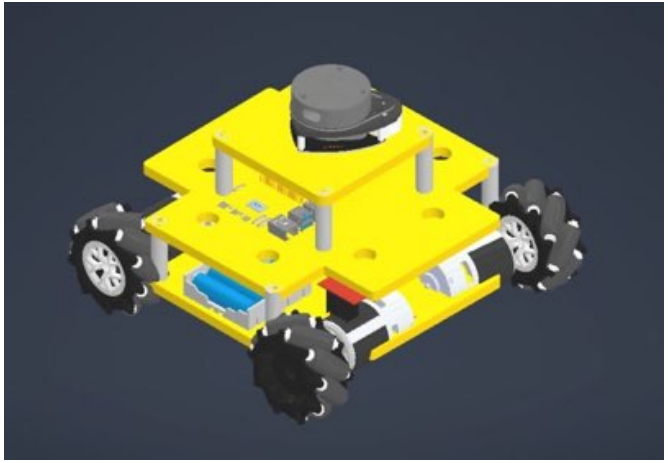

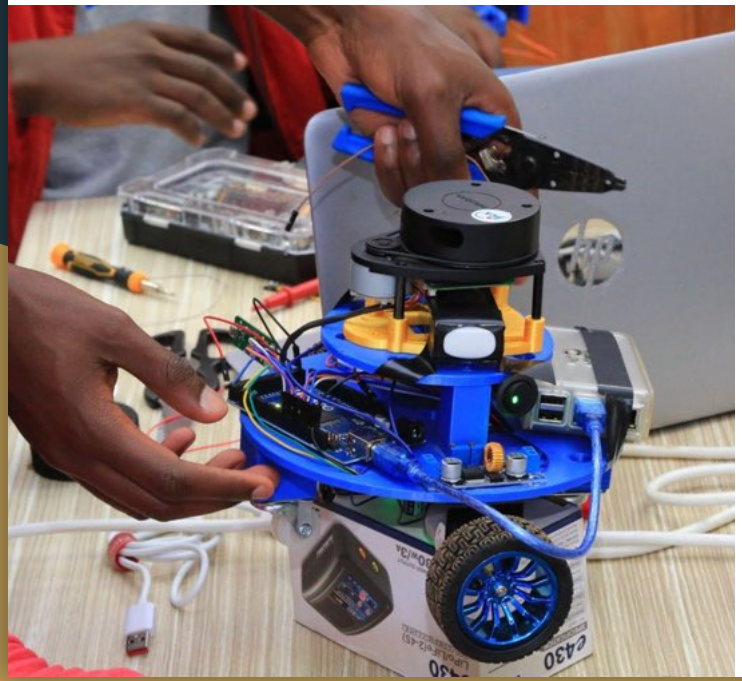

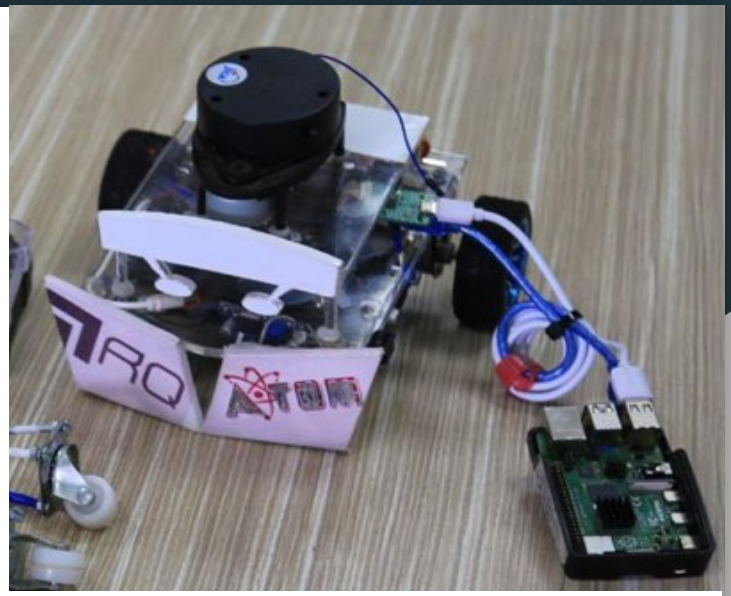
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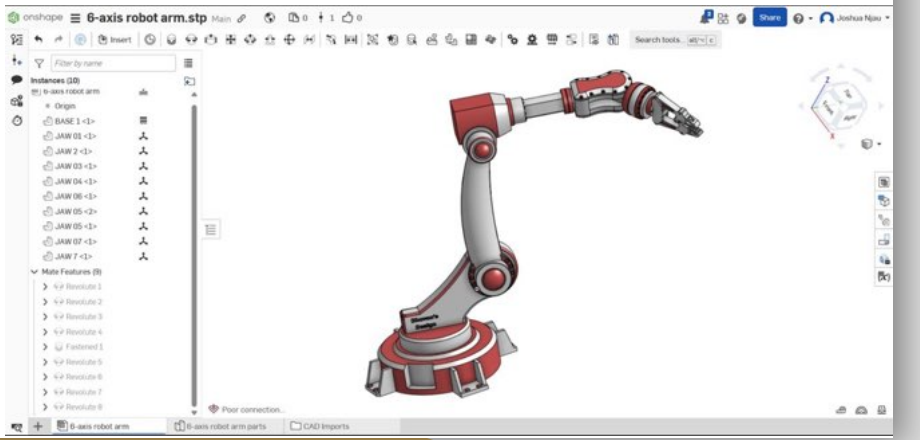
Computer-Aided Design (CAD)

It is a method of digitally creating 2D drawings and 3D models. It is used in simulate objects and processes, aiding in design and enabling accurate visualisation before physical creation.



Examples of CAD Software

- Autodesk Inventor
- SolidWorks
- Autodesk Fusion 360
- OnShape
- TinkerCAD
- FreeCAD

Why use CAD tools?

- Industry standard
- Powerful visualisation and simulation tool
- Collaboration
- Documentation
- Ease of creation of URDF and SDF

References

- Designing a Robot 101
- A Guide to Computer-Aided Design

Thank you!