MechBot Group

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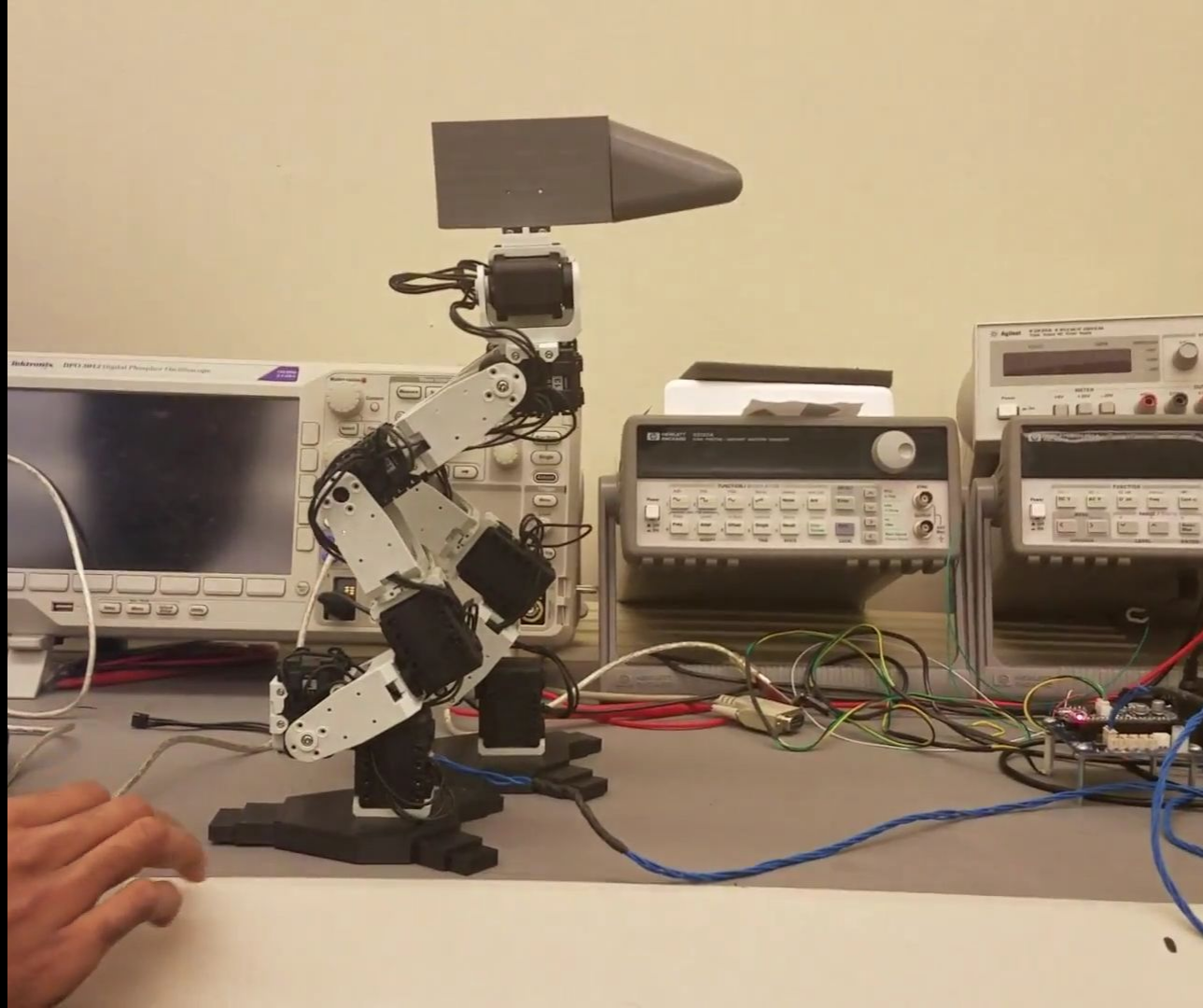
Description

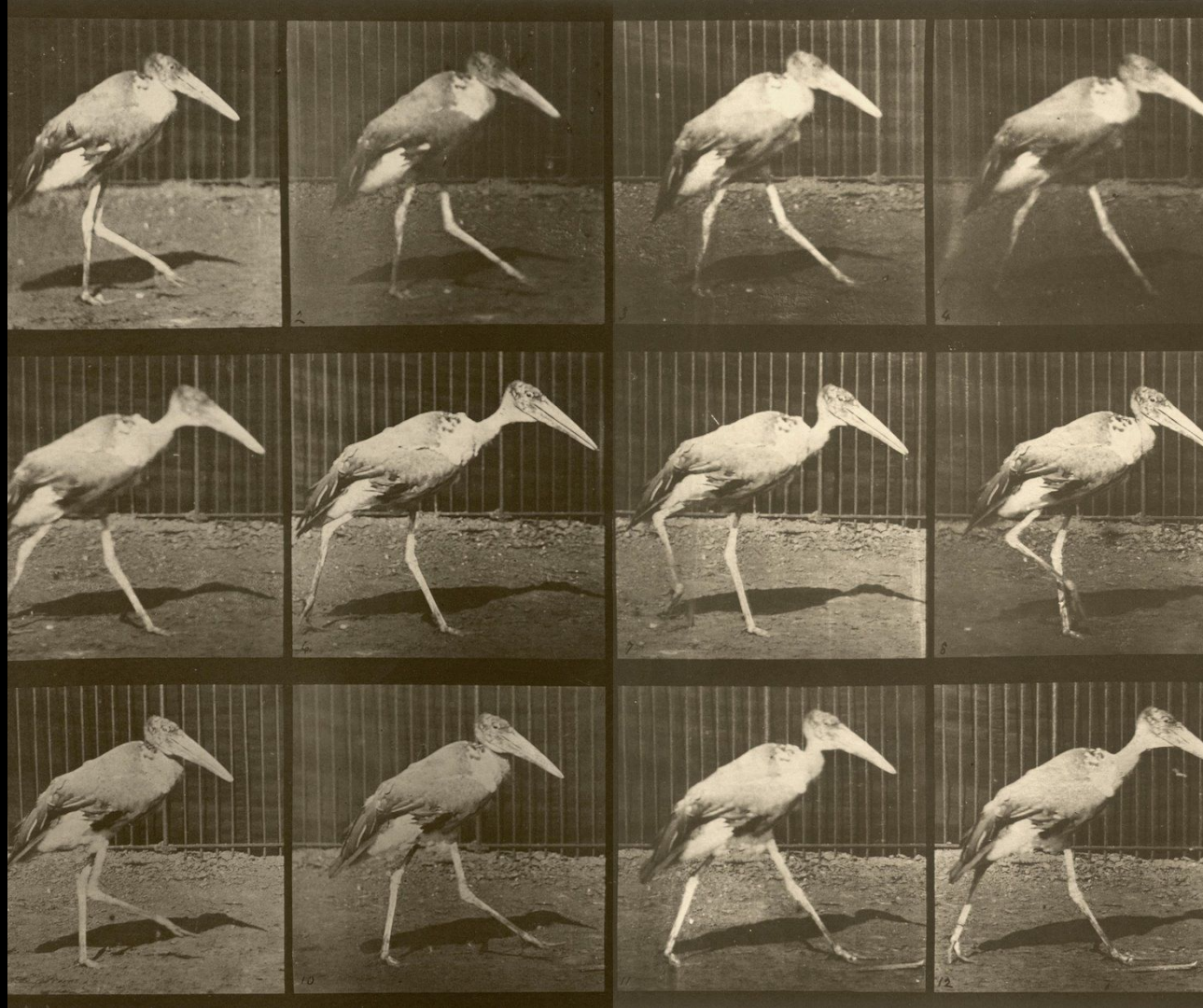
The MechBot is a bipedal robot that has an inverted knee compared to that of humans.

- Dynamixel AX-12 servomotors
- 6 servomotors per leg
  - 3 motors locked to prevent lateral movement



Challenge Task

- **Let the MechBot walk by itself without human assistance**
  - Boom will provide lateral support

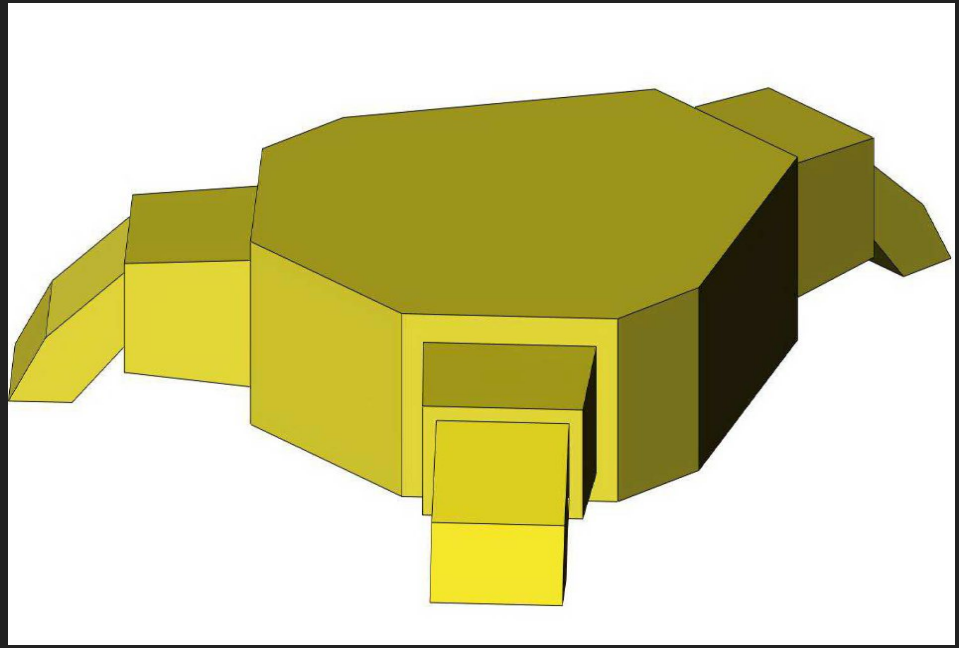


Solution

- Develop a Matlab class that represents the MechBot’s orientation
  - Forward Kinematics and Plotting
- Create single-step gait and trajectory with constraints
  - Matlab simulation
  - Optragen and .csv
- Read .csv files and output trajectory to corresponding Dynamixels
  - Correct motor IDs

3D Printed Foot

- Previous implementation of foot was too small: created instability in walking gait
- Modeled new foot in SolidWorks
- 3D printed and attached to robot
- Almost impossible to tip robot over



Optragen

- MATLAB library
  - Set up: joint frames, positions, center of mass
- Input
  - Joint angles/derivatives
  - Initial/final positions
  - Constraints
- Output
  - .csv file containing data points for every angle at each frame
- Optragen animation with generated trajectory
- Animation of complete walking gait

Final Demonstration

Possible Future Development

- Improvement on existing gait cycle
  - Faster
  - More fluid
- 3D limb control
  - Wider stance for better balance
  - Basic movement without assistance