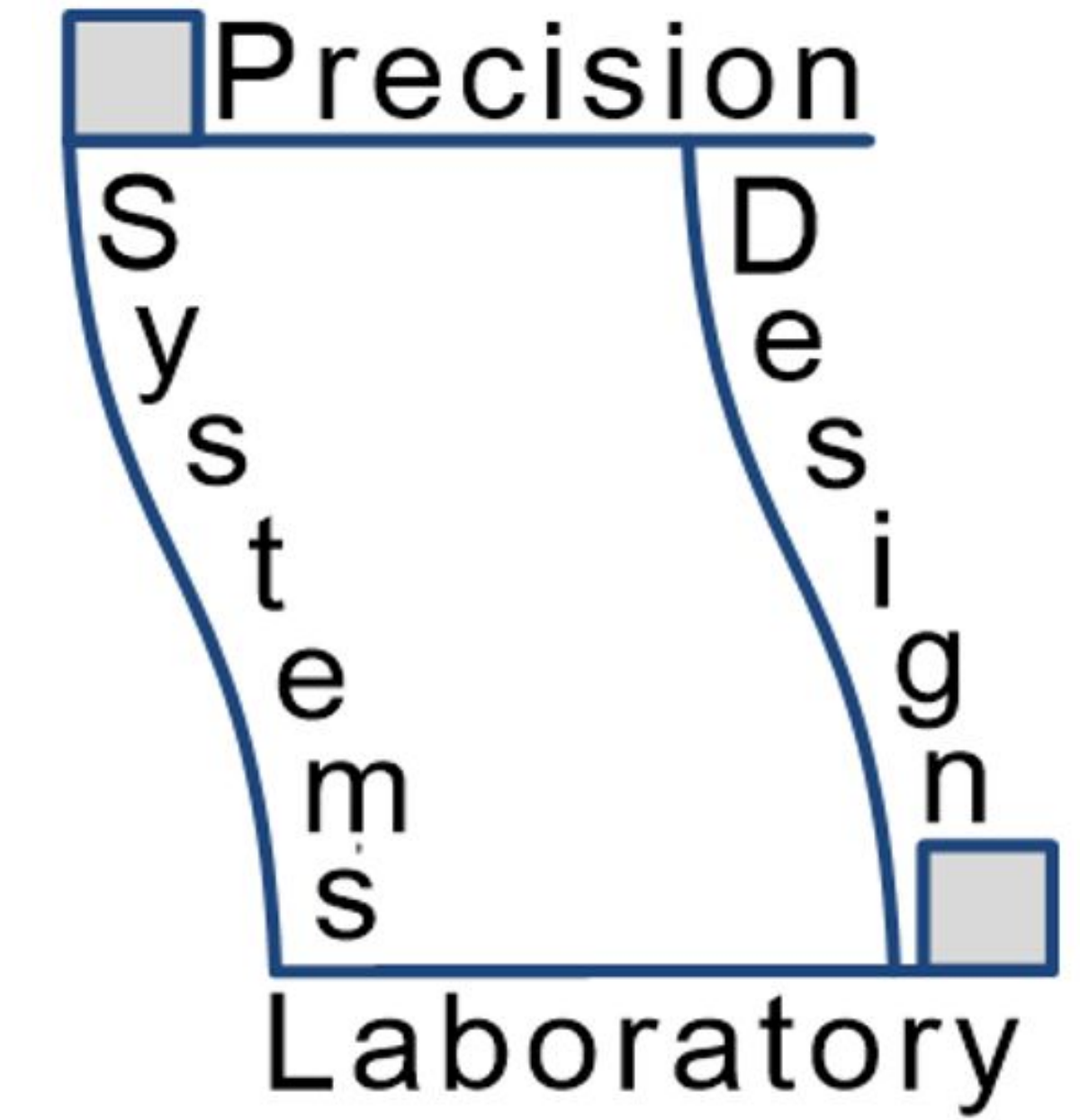


# Iteration of a two degree-of-freedom extrinsically powered prosthetic wrist design to meet dimensional, torque output, speed output, and range of motion specifications

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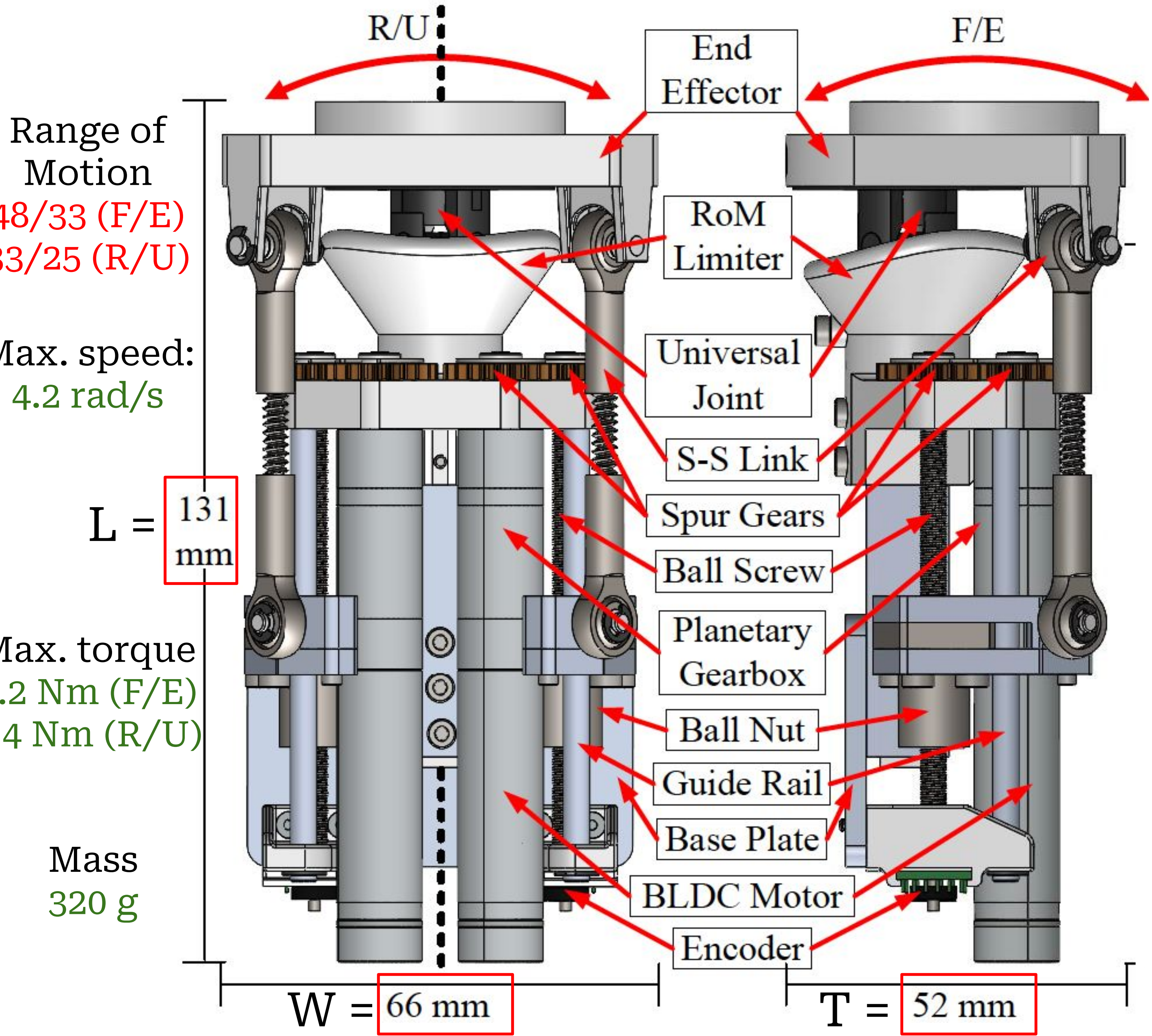


## Motivation

- **41,000 upper limb (arm) amputees** in the USA will benefit from **dexterity** of **extrinsically powered** prosthetic wrist to prevent intact limb overuse.
- **Previous iteration** does not meet **target specs**:

Dimensions (L x W x T) <i>mm</i>	Part Mass <i>g</i>	Max. Joint Torque <i>Nm</i>	Max. Joint Speed <i>rad/s</i>	Range of Motion <i>deg</i>
70-100 (L) 55-60 (W) 35-40 (T)	260-370	8-12	2-3.5	55/55 (F/E) 25/45 (R/U)

## Springboard Design

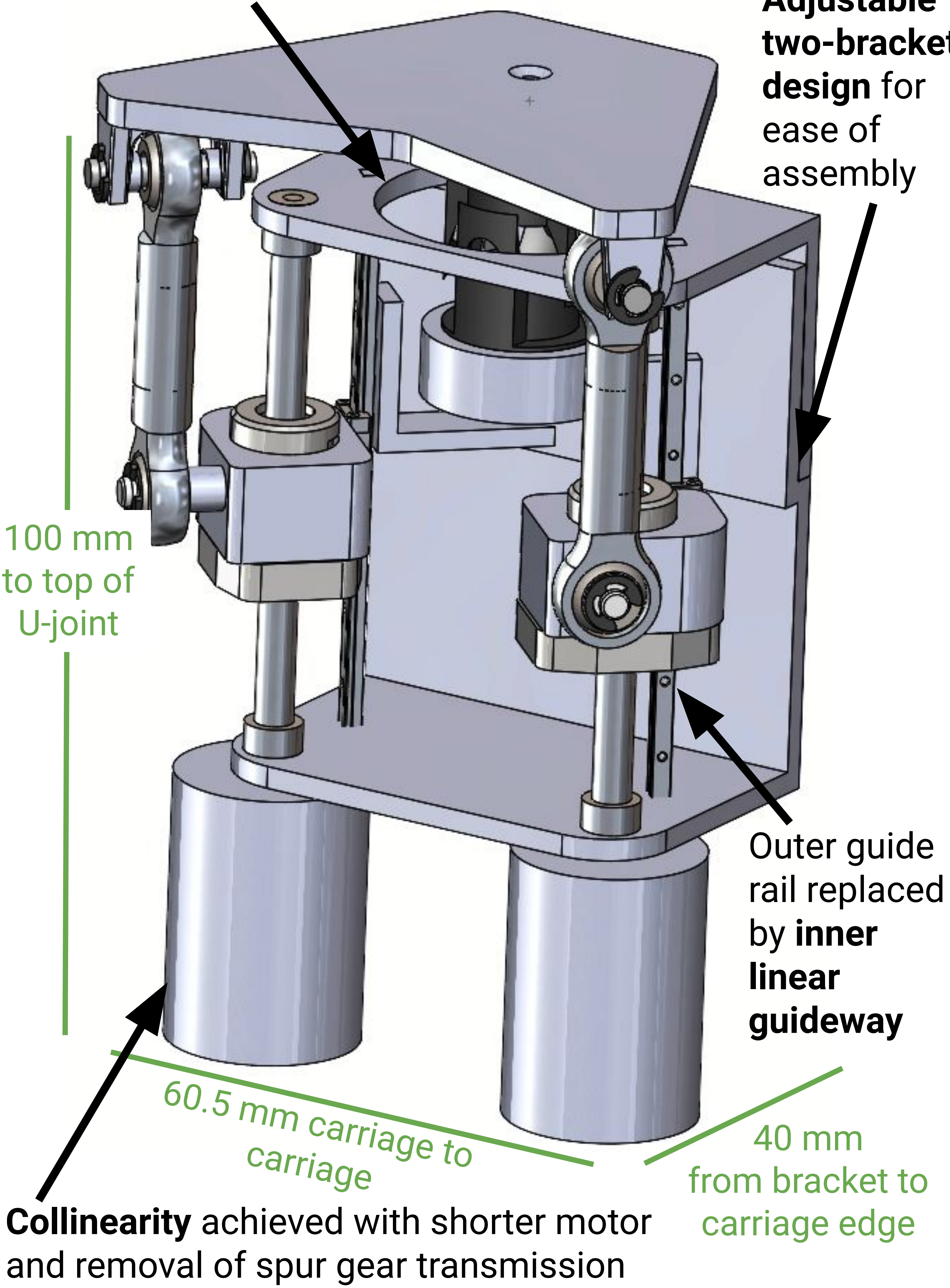


## New Design Concept

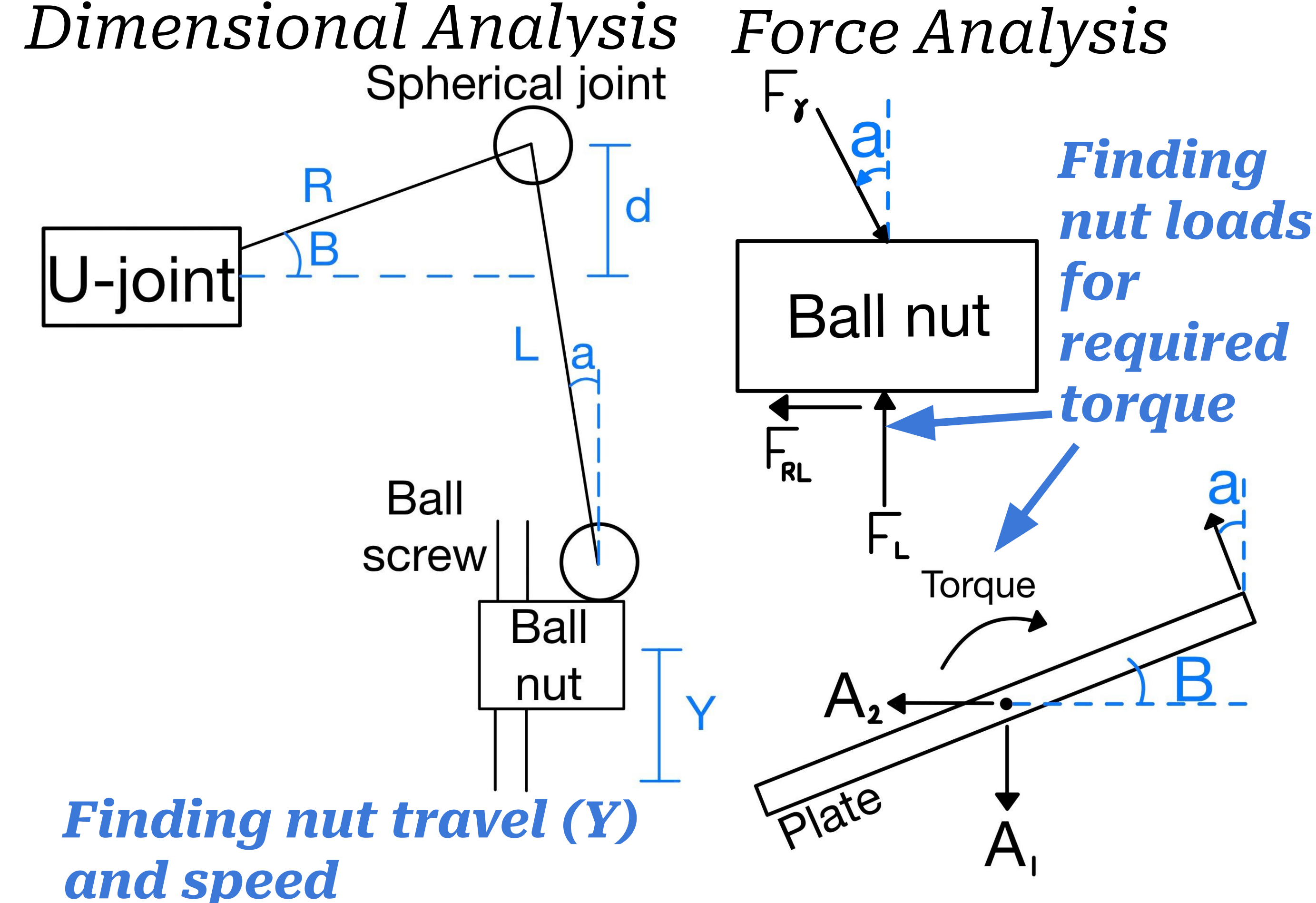
The new design concept meets specification, and is shown without fasteners for clarity.

Approximate Mass <i>g</i>	Max. Joint Torque <i>Nm</i>	Max. Joint Speed <i>rad/s</i>	Range of Motion <i>deg</i>
155	9	10.7	55/55 (F/E) 55/55 (R/U)

RoM limiter integrated in base plate



## Theoretical Validation



## Future Work

- Order **high-lead time parts**.
- **Assemble** updated prototype and **verify** theoretical calculations.
- Update design for **manufacturability**.
- Integrate existing **third DoF design** and **powered hand** into full wrist.

## Acknowledgments

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## References

Awtar, S. et al. (2022). Design and testing of a novel, high-performance two DOF prosthetic wrist. *IEEE Transactions on Medical Robotics and Bionics*, 4(2), 502-519.