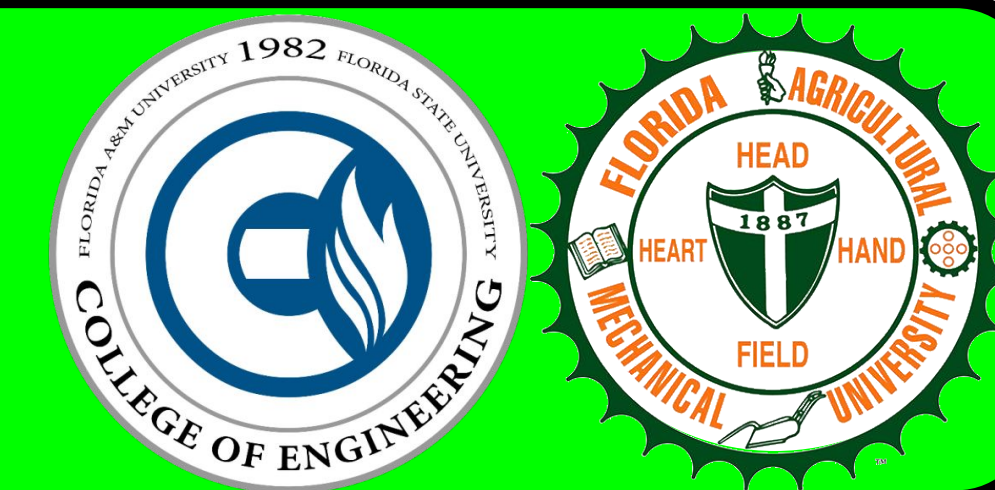




# HANS Cycle – Reciprocating Lever Transmission

Team 8 : Darren Beckford, Nicholas Khayata, Alison Pustelniac, Michael Roddenberry



## Overview

**Problem Statement:** The rotation of conventional bicycle cranks can harm knee joints and doesn't produce enough torque.

- Utilize sponsor's existing RLT patent
- Utilize last years project prototype
- Make commuter/city cycling easier
- Increase torque and power output
- Reduce strain on riders joints

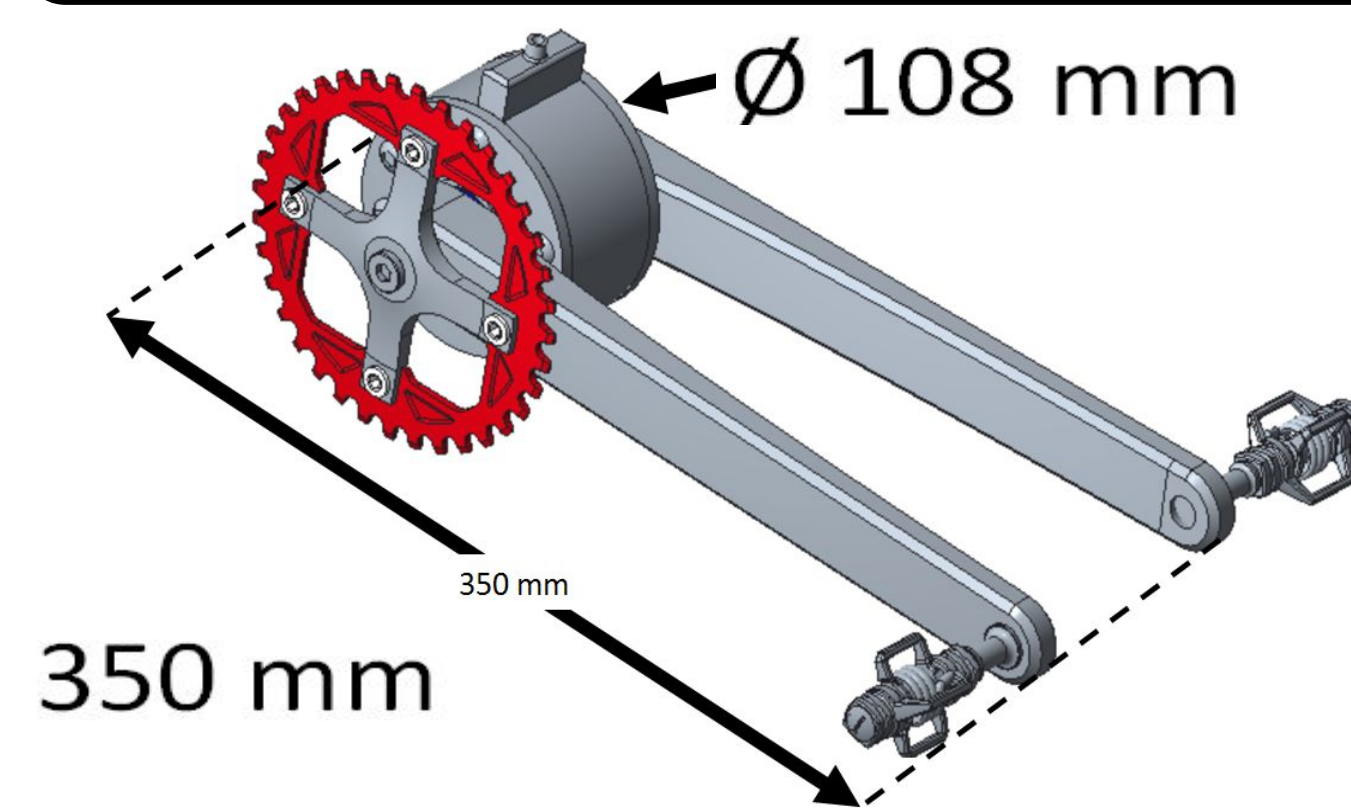
## Design

- 12 inch long crank arms made from 1018 Steel with multiple pedal positions
- Dependent crank arm motion
- SUS303 stainless steel bevel gears
- Internally contained gear housing
- Free wheels to transmit power in one direction
- RLT neutral plane positions for adjustable riding angle
- Bicycle torque couplings (BTC) for frame collapsibility
- Incorporate a one way keyed bearing to allow backward motion

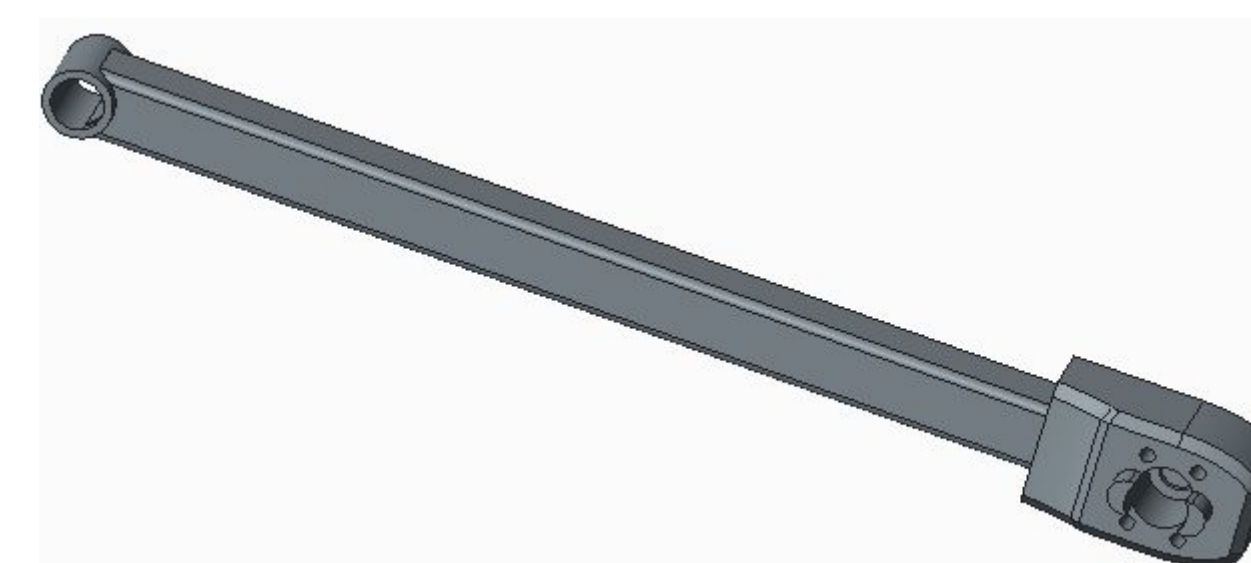
## Objectives and Constraints

- Optimize and test the Reciprocating Lever Transmission
- Produce enough torque to climb steep hills
- RLT must be reliable and sturdy for daily use
- Utilize the previous prototype frame incorporating RLT
- Design for a maximum weight of rider 250 lb or more
- Utilize a standard sized 26" wheel
- Utilize crank arms up to 12" with an arc no greater than 100°
- Accommodate rider heights between 5'3" to 6'3"
- Have the ability to fit complete prototype into a 26"x26"x10" box for shipping purposes
- Incorporate ability to use conventional crank for testing
- Optimize existing prototype while maintaining budget of \$2000

## Prototype Reciprocating Lever Transmission (RLT) Bicycle



Steel crank arm design



## Testing

### Requirements:

- Proof of torque increase
- Proof of decreased joint wear
- Comparable cadence rate
- Adequate power generation

### Results:

- Current prototype needs several components in order to get accurate results
- Proper testing is still needed
- RLT and frame need refinement



Keyed One Way Bearing



RLT Bevel Housing



Testing Rig

## Conclusion

**Success as proof of concept**

**Design needs to be refined:**

- Improve crank arm design
  - Improve shaft material
- Component Implementation**
- One-way bearing
  - Potential ratchet and pawl alternative