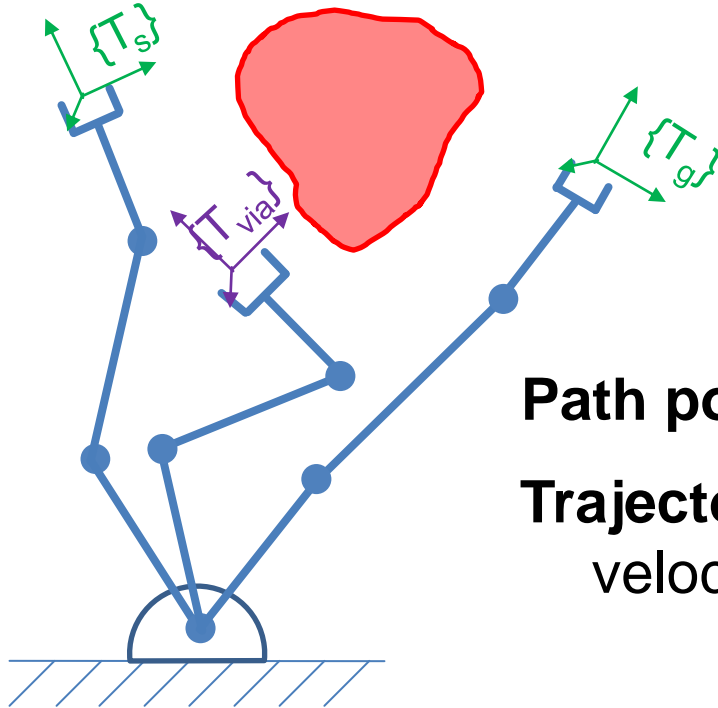# Trajectory Generation

The Challenge

Move the manipulator from an initial position $\{T_s\}$ to a desired final position $\{T_g\}$

(Optional: through some via point $\{T_{via}\}$)

Path points: initial, final and via points

**Trajectory**: time history of position, velocity and acceleration for each DOF

State Spaces – Pros & Cons

▶ Joint/Configuration Space

- No problems with kinematic singularities
- Less calculations
- Cannot track shapes (e.g., a straight line)

▶ Operational/Cartesian Space

- Can track shapes
- *BUT*: singularities, more expensive at run time, …

Unreachable Intermediate Points
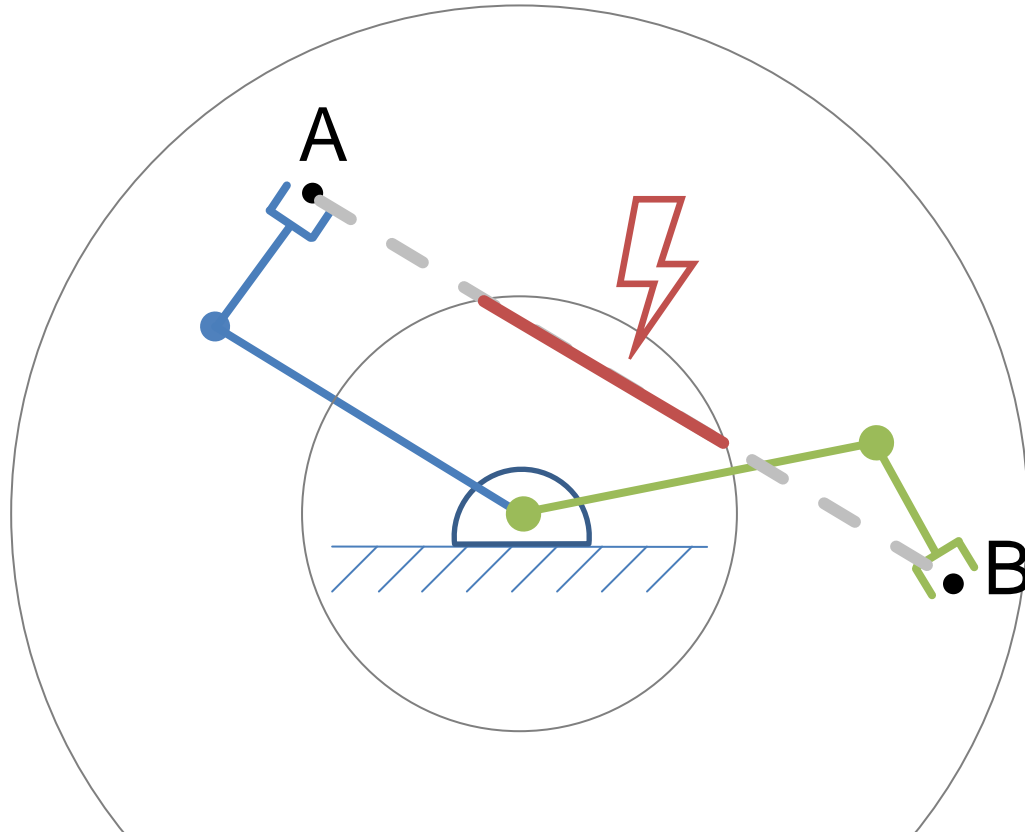
Kinematic Singularities
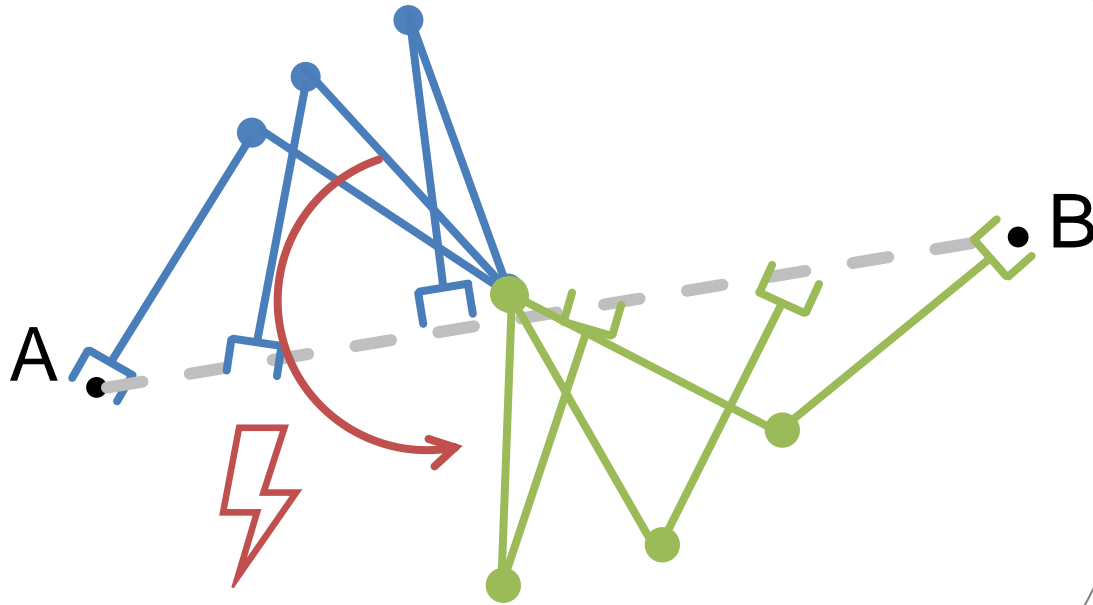
Different Joint Space Solutions