Executive Summary

Jansen’s Pet is a steerable two-legged mechanical walker, capable of being remote controlled via infrared signal.

- Overall controls facilitated by Arduino UNO
- Uses an IR receiver for IR remote control
- Uses a DC Gearmotor for Jansen style leg mechanism actuation
- Uses a servo motor for bell crank steering control
- Battery powered by 12V lithium ion battery pack
- The team referenced the book “Design of Mechanical Walking Robots” to improve on preexisting designs.

Chassis

- Two legged Dachshund walker
  - Steerable
  - Walks well forward & backwards
  - 15.4 x 8.3 x 4.5 inches

- Laser cut Baltic Birch Plywood

Steering Mechanism

- Bell crank
  - Feasible, simple, reliable
  - Manufactured by 3D printing
  - Laser cut acrylic

Leg Mechanism

- Jansen style leg mechanism
  - Original: 11 linkages generating smooth walking motion
  - Parallelogram makes leg susceptible to singularities ⇒ mechanism may collapse into itself

- Solution: Jansen leg with belt drive
  - Provides a hard stop ⇒ eliminates singularity

- GeoGebra
  - Convenient tool that helps design mechanism

  ■ Scales image to obtain appropriate dimensions for linkages & joints

Power Train

- Single drive motor for leg on both sides
  - Laser cut gears transfers rotational motion from motor to crank

- Servo motor for steering mechanism
  - Servo horn connected to linkages & pivots
  - Secured with brackets

Electronics

- Arduino UNO R3
- IR controlled
- Battery powered
- DC Motor for leg mechanisms
- Servo Motor for steering

Software

- Arduino IDE

Future Improvements

- Make chassis larger, but still compact
  - More space to work with
  - Parts less likely to interfere with one another while in motion

- Reduce friction
  - There’s a difference between CAD parts and manufactured parts

  ■ Need to get used to the nuances of fabricating (GD&T, Engineering Fit)

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Hardware Performance

- Prototype build is in-progress, although it should be done by Week 10
- Electronics have been tested by itself
  - Works perfectly as the code intended

References