FAMU/FSU College of Engineering

Department of Electrical and Computer Engineering

Targets

Team 301 – FPL Pole Health Detection
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Date:
October 2, 2020

Targets

The following targets were derived from the customer needs and corresponding requirements.

1. Travel up and down utility pole
2. Detect voids in wood
3. Hold self weight
4. Keep tension in climbing
5. Controlled wirelessly
6. Powered wirelessly

Justification

The justifications were determined through research and inspection documents provided by the customer. The Class II and Class III southern pine utility poles are 30-40ft tall and are 7-8in in diameter.

1. Travel up and down utility pole
    - Climb and descend 35 ft
    - Importance: High
2. Detect voids in wood
    - Able to sense through the entire diameter of pole
    - Importance: High
3. Hold self weight
    - Able to stop at any point
    - Importance: High
4. Keep tension in climbing
    - Able to adjust to changes in pole diameter
    - Importance: High
5. Controlled wirelessly
    - Able to be controlled by a distance of 50ft
    - Importance: Moderate
6. Powered wirelessly
    - Can be used for 3 hours from full charge
    - Importance: Moderate

Method of Validation

The following tests will be performed to measure the validation of each target.

1. Travel up and down utility pole
    - Test ability to climb up and down the provided sample pole
2. Detect voids in wood
    - Test ability to detect the difference in wood density
3. Hold self weight
    - Test the robot's ability to remain steady while climbing and being stationary
4. Keep tension in climbing
    - A perfect cylinder cannot be assumed, so the robot must be tested on multiple varying-sized poles
5. Controlled wirelessly
    - Test robots at varying distances
6. Powered wirelessly
    - Determine battery life on a full charge while being used

Consequences

1. Travel up and down utility pole
    - Will be limited in ability to survey the entire pole
2. Detect voids in wood
    - Will not be able to inspect internal pole integrity
3. Hold self weight
    - Will not be able to hold elf weight and fall off the pole
4. Keep tension in climbing
    - Will not be able to climb the utility pole
5. Controlled wirelessly
    - Controller will need to be hard wired to the robot
6. Powered wirelessly
    - Will be limited by available sources of power

Summary

Based on the information stated above, the following table was derived describing the targets, justifications, and methods of validation.

Metric No	Need	Metric	Imp.	Units	Marginal Value	Ideal Value
1	Travel up and down utility pole	Test ability to climb up and down the provided sample pole	High	Feet	35ft±5 ft	35 ft
2	Detect voids in wood	Test ability to detect the difference in wood density	High	Inches	8in±2in	8 in
3	Hold self weight	Test the robot's ability to remain steady while climbing and being stationary	High	Pounds	35lb±10lbs	35 lbs
4	Keep tension in climbing	A perfect cylinder cannot be assumed, so the robot must be tested on multiple varying-sized poles	High	N/A	N/A	N/A
5	Controlled wirelessly	Test robots at varying distances	Moderate	Feet	50ft±10 ft	50 ft
6	Powered wirelessly	Determine battery life on a full charge while being used	Moderate	Hours	±2 hours	3 hrs