2nd Prototype Testing Report

RoboSaw

By

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## Equipment and Setup:

For our 2nd prototype test we demonstrated the roller intake mechanism of the RoboSaw and the computer vision system's ability to direct the intake mechanism to align a drawn line on a piece of dimensional lumber with the miter saw blade. To perform these tests we used our RoboSaw prototype, with the intake mechanism installed and the three camera computer vision system. A camera is mounted directly above the wood to allow the RoboSaw to see the presence and angle of a line drawn on the wood stock.First we tested the roller intake mechanism by itself. A 2x4, 2x6 and 4x4 were inserted into the RoboSaw and directed the intake to move the wood through the RoboSaw. We performed the same tests again but with the computer vision application enabled and measured the ability of the computer vision application to stop the wood upon seeing the line.

## Measurements taken:

1. We qualitatively determined that wood stock of all sizes was securely held by the intake. This was measured by attempting to disturb the wood with our hands while it was held in the intake.

2. We tested whether the intake was able to pull in all three wood stock sizes through the RoboSaw frame. The 2x4 and 4x4 were able to be pushed through, but the 2x6 experienced too much friction with the cams to go though the intake. Upon disabling the cams, the 2x6 was able to be pushed through by the intake motors.

3. The computer vision application was able to detect the line, its angle and move the wood through the intake until the drawn line was aligned with the center of the camera view.

## Conclusions:

Because both the roller intake mechanism and the computer vision system functioned in accordance with our specifications, we are ready to install the saw actuation mechanism and the rotating table mechanism so that we can cut the wood and perform angled miter cuts. We conclude that the wood clamping mechanism consisting of two cams is unnecessary and causes jamming issues as a result of too much friction with large wood sizes. To get around this issue we can tilt the intake motors so that a portion of their force is directed against the back fence, clamping the wood in place as it travels through

the intake. We also determined that supporting the wood when its ends are far away from the RoboSaw frame is critical. To address this issue we will purchase a miter saw stand with extendable arms that can support wood stock up to 8ft in length. The computer vision system can be further improved by adjusting its calibration, and implementing a smoother PID loop to control the intake motors. Additionally, two more cameras should be added to the design, one mounted directly across from the back fence to check if the wood is present or not, and one mounted directly to the blade guard to improve the accuracy of lining up the blade with the drawn line.