Virtual Design Review 3

Team 510

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Introduction

Ghost Controls is a local Tallahassee-based company that specializes in automatic swing gate openers and accessories. The current ZombieLock design incorporates a spring-loaded, electro-mechanical latch and a receiver pin, called the catch. The latch is attached to the gate itself, whereas the receiver is attached to a post. This whole system is located at the end of the gate opposite the motorized gate opening arm and control box.

Current State

An updated design with two new key features was developed by Team 510 to address the issues present in the current lock design. Both features are an addition or change to the catch component and, therefore, the current ZombieLock latch can be kept. The first component is a 3D printed ramp made of PLA, angled at 30° below the horizontal. The addition of this component allows the latch to be guided up into the catch in the case that the latch is approaching the catch too low. The second component is an adjustable plate, also made of PLA, that the catch is attached to. This plate allows the user to slightly lower or raise the catch as the gate sags. The plate is meant to be used for larger misalignments, and each adjustment is 0.875 inches apart. The total range of adjustments afforded by this component is 5.25 inches in the vertical direction. The ramp is meant to account for smaller misalignments.

Future Work

The next steps are to continue prototyping and testing. The 3D printed prototypes produced for VDR3 will be tested using a 3-foot model gate provided to us by Ghost Controls. Testing on this scale will provide helpful insight into the success of the design. Further adjustments, such as ramp angle and adjustment plate dimensions, will be made if necessary to reduce costs and minimize potential future issues.

Once design geometry prototyping has been completed, both the ramp and adjustable plate will receive improvements to increase their functionality and bolster durability. The primary way of accomplishing this will be to test and select materials. It is intended for both components to be constructed from aluminum to provide more strength and rigidity, with a powder coat finish to better protect the products from environmental conditions. However, validation testing still needs to take place to confirm the selection. To decrease the amount of friction between the latch and the ramp, the ramp will feature plastic rollers or a section of slick coating such as Teflon. The final product will then be attached to the scale gate provided by Ghost Controls to be used as a display on senior design day towards the end of the spring 2025 semester.

Problem Areas

A main concern for the plate component lies in its unnecessary existence. Currently, if a customer experiences misalignment issues with their ZombieLock, they have the option to manually relocate the ZombieLock or the receiver to correct the issue. While true, it requires unnecessary time and effort for the customer to remove and reinstall either the lock or the receiver. This also leaves unnecessary holes in the gate or post. The new product will not require the use of tools or drilling unnecessary holes in the gate or gate post. It will allow quick adjustments to overcome misalignment issues.

The automatic gate opening arm is designed with safety in mind and will stop closing the gate and open it back if it feels too much resistance exerted against it. For this reason, it is important for the success of our product that the ramp is as frictionless as possible. Determining the maximum amount of friction the gate can power through can only be done through testing.