Sensing Peanut Seed Depth

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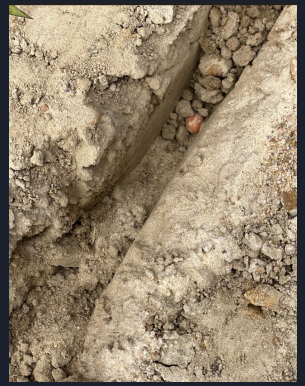
Background

- Optimal growth at 2-2.5” deep in soil
- Soil composition changes depth of furrows
- Depth of furrow needs to be sensed
- Reading will aid in automation of depth correction
- Need measurement system to sense depth between cutting furrow and covering seeds



Design Objective

- Depth of seeds sitting in furrow must be sensed
- Provide feedback loop to correct for depth
- Test the design to ensure proper performance
- Design a housing system that will contain the sensors and controllers that will hold up to use and abuse

Stakeholder and Their Requirements

- UGA Tifton
  - Test different sensors for maximum data acquisition
  - Consistent planting depths
  - Real time feedback to operate machines

Engineering Specifications

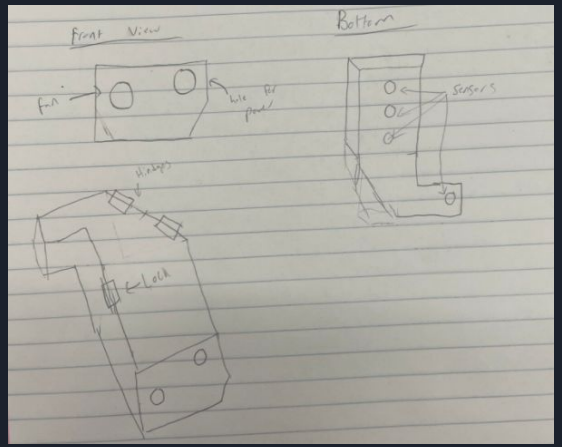
- Must minimize loading error when obtaining measurement
- Need to measure depth accurately to ⅛ “
- Try to sense actual peanut seeds to give estimate of planting density
- Means readings must be performed at least 18 times per second
    - If planter moving 3mph, it is traveling 1.5 ft/s
    - Need 6 seeds per foot → 9 seeds per second

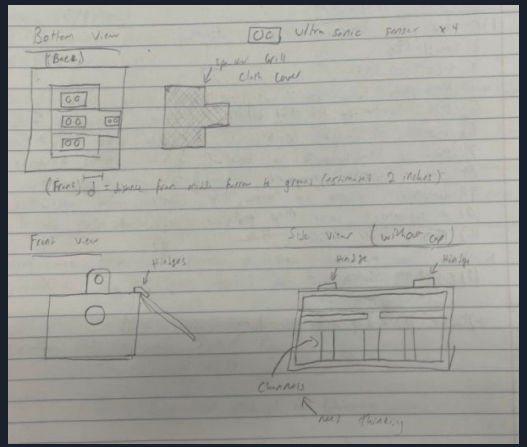
Benchmarking

- At the moment, no automated sensing system
- Farmer must periodically manually check depth
- Trial and error on which adjustments to make
- Correction systems exist, but none are automated

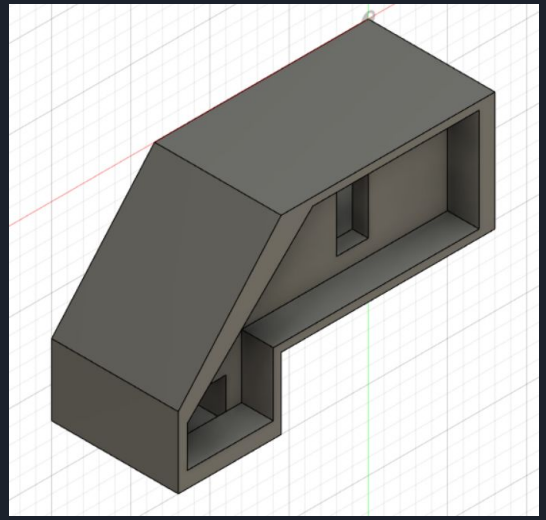
Design Concepts

- Create a redundant string of sensors to accurately determine furrow depth
- Have sensor to the side measuring ground distance to give relative depth instead of absolute distance
- Tests will be conducted to determine ultrasonic or IR sensing
- Methods for cancelling out noise and transmitter interference need to be created





Design #1



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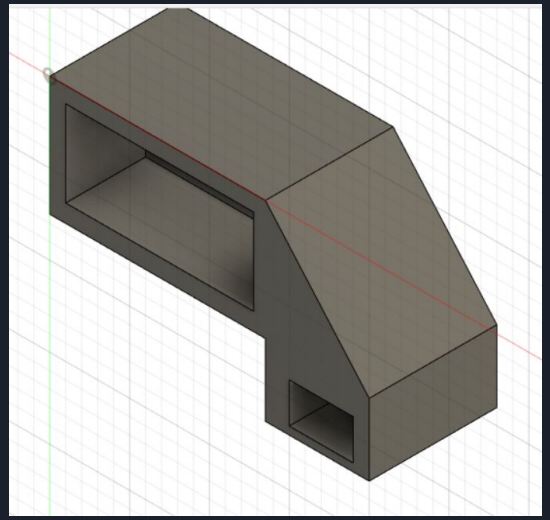
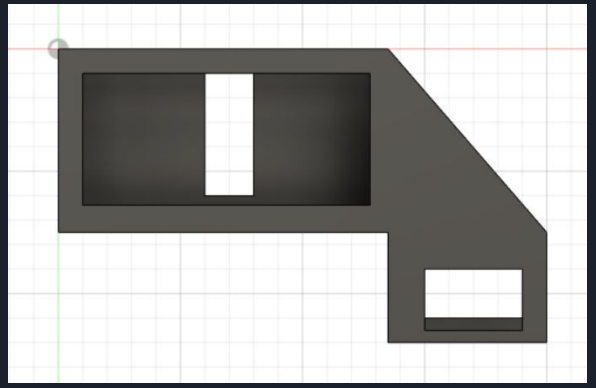
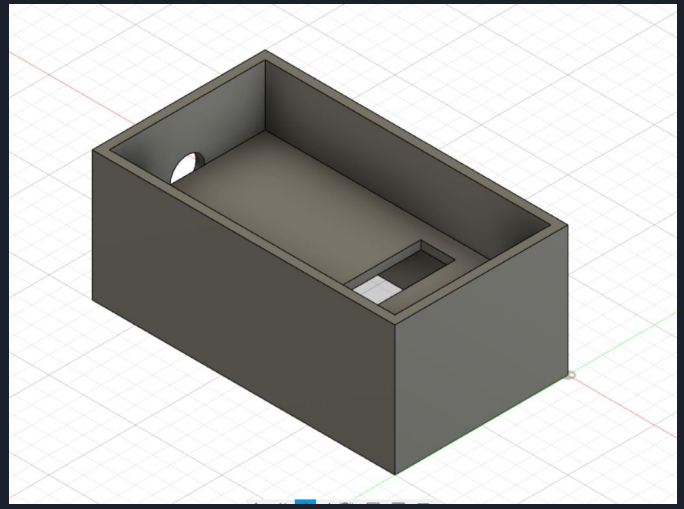


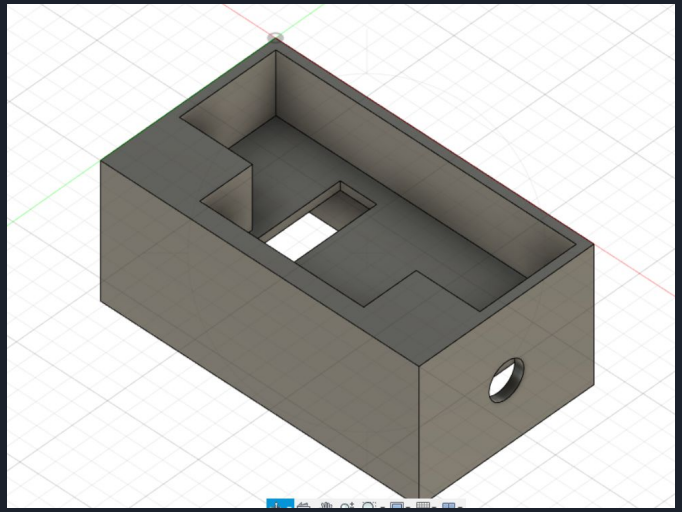
(B)

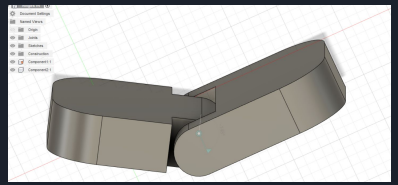


(C)

Design #2







New Knowledge Development

- Made a trip to UGA Tifton to learn about and observe the planting process
- Obtained planter unit to analyze individually for fitting and functionality
- Testing of sensors will provide a working knowledge of what will work best in certain situations

Spring Semester Plans

- Compose sensing systems to test
- Construct a testing rig for sensors
- Decide upon best sensor based on testing data
- Design housing
- Integrate sensor and housing unit onto row crop planter for final testing