The Pot-pulator is a machine with purpose of aiding Sheridan Nurseries in populating their trays with pots, in order to prepare them for filling with soil and seeds. Their current method of populating the trays with pots is a process with little to no automation, requiring many manual hours of labour. Each year, 250,000 annual plants need to be produced by the nursery. Recently, the supervisors have found it increasingly more difficult to fill positions with enough workers to run the operation smoothly and meet production demand. The Pot-pulator will alleviate the large reliance on manual labour and improve the overall efficiency of the nursery.

The Pot-pulator will have 4 branches working together to accomplish the task. The branches of the Pot-pulator include a conveyer belt, tray allocation, pot dropping and verification. These four systems will be implemented to work together to create an efficient product. First, the trays and pots will be manually filled into their respective sections of the machine, with a maximum of 30 trays and 300 pots. The first section of the machine, the tray dropper, uses stepper motors to drop trays one at a time. The conveyer belt will then move it to the pot dropping section. The conveyer belt is controlled by an Arduino Uno microcontroller and will stop once it senses the tray is in the correct position. The trays will then move to the pot dropper, consisting of stepper motors and an Arduino Uno microcontroller. This section of the machine will drop pots until all 10 spots are filled. The conveyer belt moves the tray according to the needed positions for pot dropping, dispensing 2 pots into the allocated positions, moving forward 4 inches at a time until the process is completed. The tray filled with pots will then move into a verification system, to verify the pots have been placed in the correct positions. The verification system consists of ultrasonic range finders mounted to the rails on either side of the conveyer, alerting the system when a pot is not correctly in place. The conveyer belt will then move it to an existing conveyer system as part of Sheridan Nurseries’ current soil-filling machine.

The Pot-pulator is reliable, easily configurable, affordable, and will greatly reduce the need for hands-on labour in relation to seed population. The system implemented is designed exclusively for Sheridan Nurseries, and for the pots and trays at their locations in a three-dimensional workspace. It is limited to usage on their round, 4-inch diameter pots and their respective trays. Considering the conditions of the greenhouses this machine will be used in, material degradation, water resistance, and pressure will all be negligible. In order to maintain speed of the pots being placed in trays in a timely manor, this machine will fill each tray with 10 pots every 30 seconds, while moving them down the conveyer belt. With this standard in place, the machine will only need to be refilled with pots and trays every 15 minutes, greatly reducing the amount of hands-on labour from the workers at Sheridan Nurseries.