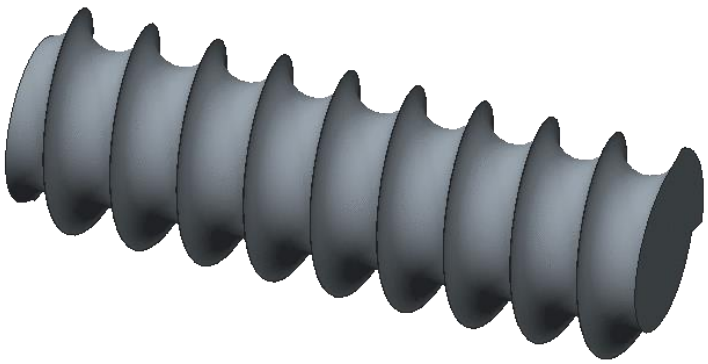
helix

The helix concept is an idea that comes from a turning an auger that is normal vertical, to a horizontal orientation. In this way the helix can shift the dirt that in comes in contact with by a specific amount thereby displacing the weeds. This could move the entire root system away from its nutrients and potentially force the roots to the surface where they will do no good. This apparatus will be placed on the back of the robot so that the displaced dirt and weeds do not affect the path of the robot.

The helix concept will have to be made from a metal with high yield strength such as steel. This is because it will have to go through countless cycles of rotation and be able to withstand large torsional forces brought about by its rotation and the resistance from the dirt and weed that it is trying to displace. The helix itself will have a shaft and bearing on both ends to attach to the robot. This shaft will either be driven by its own motor or it will be driven by the same motor that drives the robot but will be geared to a different speed depending on the needed displacement of the dirt.

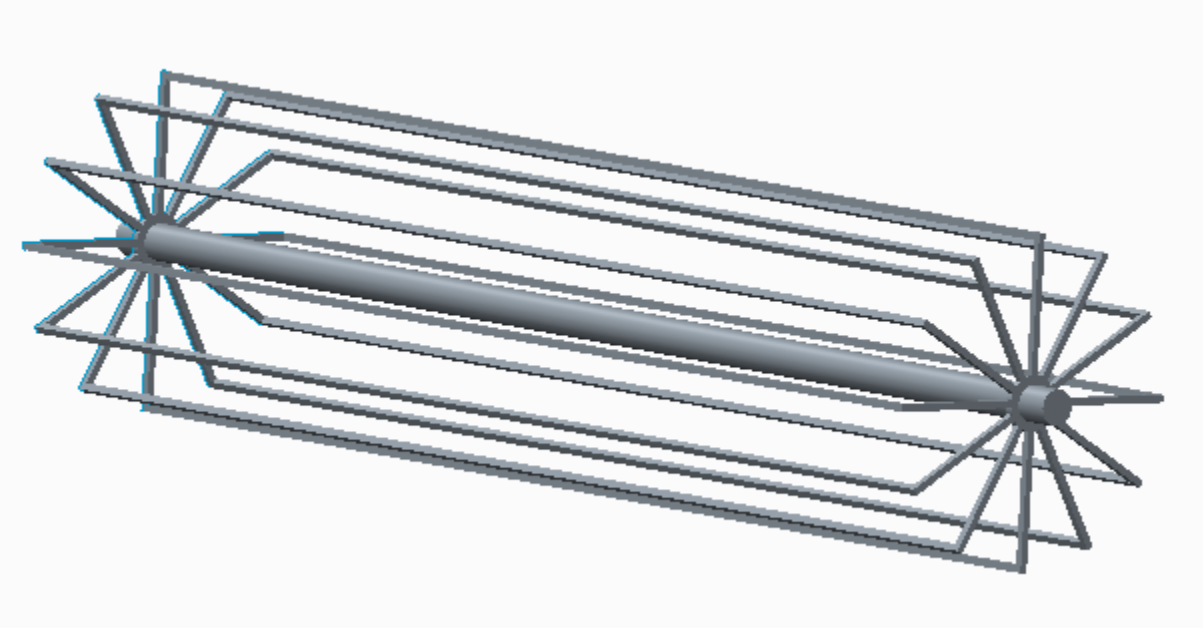


The length of the helix will roughly be the same width of the robot minus what is necessary on both ends to drive the helix shaft. The diameter from the center of the helix to the edge of the blade will be smaller half of the height of the robot from the ground up. This is just to keep the bulk of the helix down. The shaft will have to be driven at a different speed than the robot or there will be no displacement of dirt. The precise speed will be determined when we determine the speed that the robot will go and further prototyping.

If helix blades where to be bought on line it could cost from one to three hundred dollars. Machining them might cost less because our sponsor says that he knows someone who could do it for us. But the price for that is still unknown. If since there are companies that make helix blades it could be possible to reproduce the idea on a larger scale with only minor changes to already existing auger designs such as how they are mounted and driven. The helix itself will remain almost the same.

The important criteria that we are judging are simplicity, weeding effectiveness, speed, cost, construction, and durability. On the subject of simplicity the helix design gets high marks. The only thing this design needs to came it work is proper gearing. The down side though is that the design does not directly affect the weeds. Since the design only shifts the dirt it is possible that the weeds will remain planted in the soil. The design itself does not hinder the speed of the robot directly but the design is more driven by the speed that the robot travels. The cost on the other had could be a restricting factor. The helix design might require a higher grade metal due to the excess force placed on it by the earth. The assembly of this design after being machined should be simple because of its small number of parts. This and its sturdy materials will cause this design to have a fairly high durability even though it will have a large amount of wear.

Basket



The basket weeding design looks like a cylindrical cage that rotates on the horizontal axis. This basket sits with the edges of the basket digging almost an inch into the ground. The basket will either be driven by a motor, geared to run off of the same motor that runs the robot, or there will be a basket that is rotated by the soil and one that is geared from the first basket to move at a different speed. Regardless off the option that is chosen the main weeding basket will be moving at a different speed than the robot. This will allow the basket to sweep roots out from under the plant thereby removing the weed from its nutrients.

The outside frame will be made an aluminum alloy. The reason for this is that the design has to be light, with only a small impact to the soil. There will be a support shaft that extends through the axis with enough room on both ends for bearings and a driving mechanism that will control the speed of the shaft.

The length of the basket will almost be the same width of the robot minus what is necessary on both ends to drive the basket shaft. The diameter from the center of the basket to the edge will be smaller half of the height of the robot from the ground up. This is just to keep the bulk of the basket down. The shaft will have to be driven at a faster speed than the robot so that the bars of the basket have time to sweep under the root system of the weeds.

Although there are similar designs already in existence, it will be difficult to get them in the size and scale that we are looking for. It may be possible to alter a basket idea that is already in existence, but this will take a deeper look into the current basket designs. Because of this they may have to be machined which will usually cost more time and money. The upside is that the basket requires only a small amount of metal to be able to machine it due to the thinness of each of its parts. Because of the small amount of metal and the simplicity of the design this would not be hard to manufacture on large scale.

For this design, simplicity, weeding effectiveness, speed, cost, construction, and durability are the major criteria that are being judged. On the matter of simplicity, the basket design it probably the best. This design is self-driven and does not contain complicated motion. In addition to this the design is highly effective. Because the bars do sweep under the plant by a small margin, it is likely to pull or cut the weed from the ground. Similar to the helix design, the basket design's speed will be directly related to the speed of the robot, and will not cause much hindrance on its velocity. Because we may be able to modify something already in existence and the materials that will be used will be a cheaper metal the cost for this design should remain lower than some of the other ideas. Its construction will also be easier since we may be able to repurpose something that is already in existence. The one down side to this design is that the bars on the basket are susceptible to being bent by large force. This could compromise the effectiveness of the design but should not completely hinder its weeding capability.