Weeds can aggressively reproduce and damage crops in a field. Applying herbicide is a common solution, but it is expensive & inaccurate, weeds are evolving to resist herbicides, and many consumers are uncomfortable with herbicide use.

Weedbot uses two USB cameras, one to identify weeds and the other to navigate the corn field. Weeds are identified using their shape and color features. Rows are found by model fitting lines to segmented green convex hulls.

Weedbot uses a Hokuyo laser scanner to create a map of the field as it navigates. Pictured to the left is the Hokuyo-based point-cloud map of the indoor field used for testing. One can distinguish the points corresponding to corn in the center of the image.

A 2 degree of freedom arm was designed, powered by 2 linear actuators, to mimic a human using a stirrup hoe to remove weeds.

An indoor field and dirt test-bed was created to test during winter. Corn was constructed from theater stage props. For testing weed identification, spare stage props were used. For testing weed removal, artificial weeds and transplanted flowers were used indoors, and a variety of weeds and grass was tested outdoors.

Conclusions and Future Work

Weedbot successfully navigated the field and removed weeds. All functional and nonfunctional requirements were met. We have shown that a herbicide-free weed control solution is possible using current robotics technology.

Future work will be focused on outdoor testing for robustness of the vision systems as well as redesigning the arm to work on both sides.

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