

DON Detection and Removal System

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PROBLEM STATEMENT:

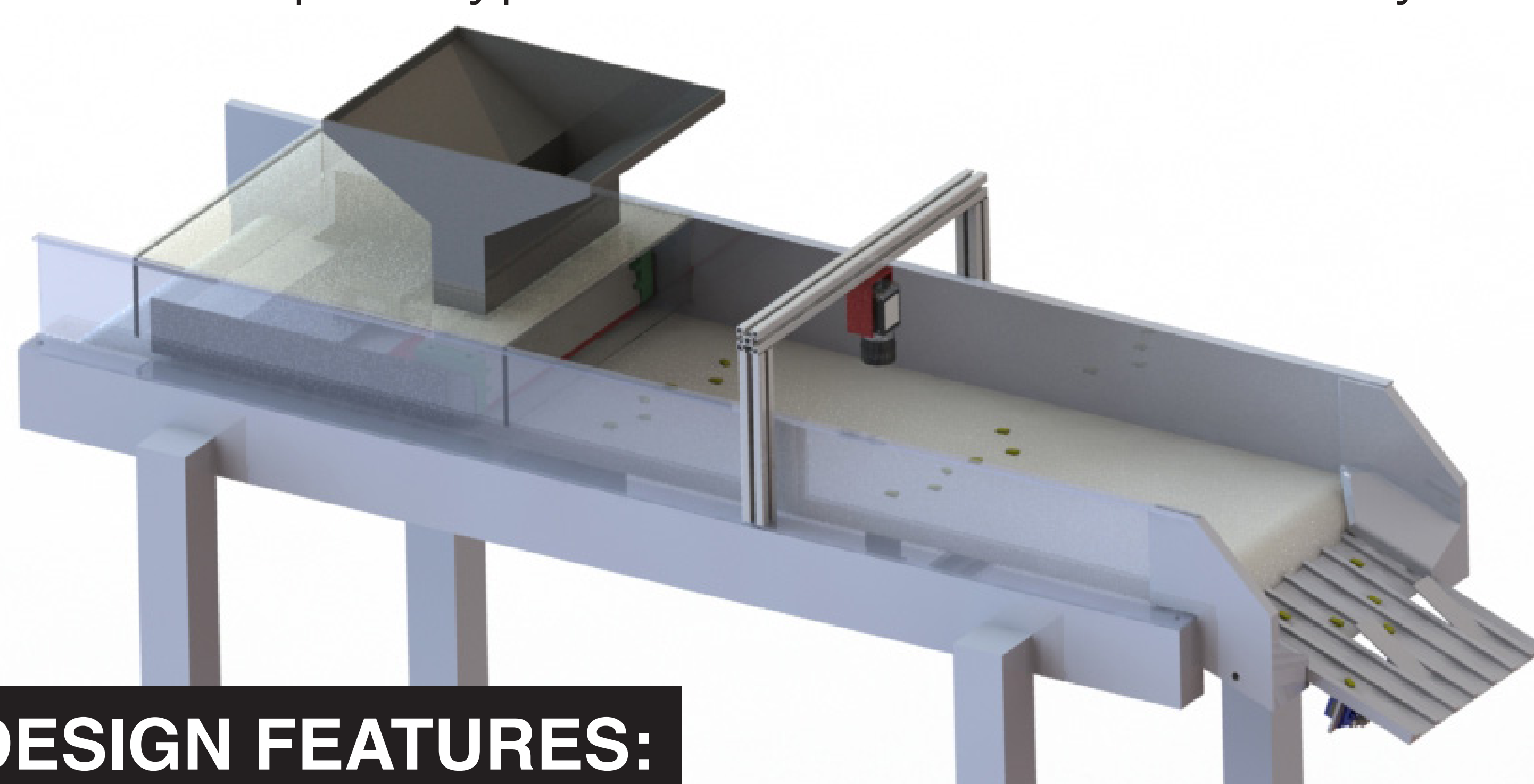
Fusarium is a fungus that infects grain species such as corn, leaving behind a mycotoxin called DON (Deoxynivalenol). When DON is ingested by livestock, the result is weight loss, feed refusal and reduced growth; all of which are disastrous results for farmers.

Current method of DON detection involves sampling batches of kernels with varying contamination levels. Unfortunately, sampling involves destroying kernels and gives inaccurate results.



PROPOSED SOLUTIONS:

- Precise machine vision tools and software used for identification of DON infected kernels.
- Custom fixtures designed to position and sort kernels using gravity.
- Identification and removal accuracy > 95%.
- Scalable prototype that can be used in industry.

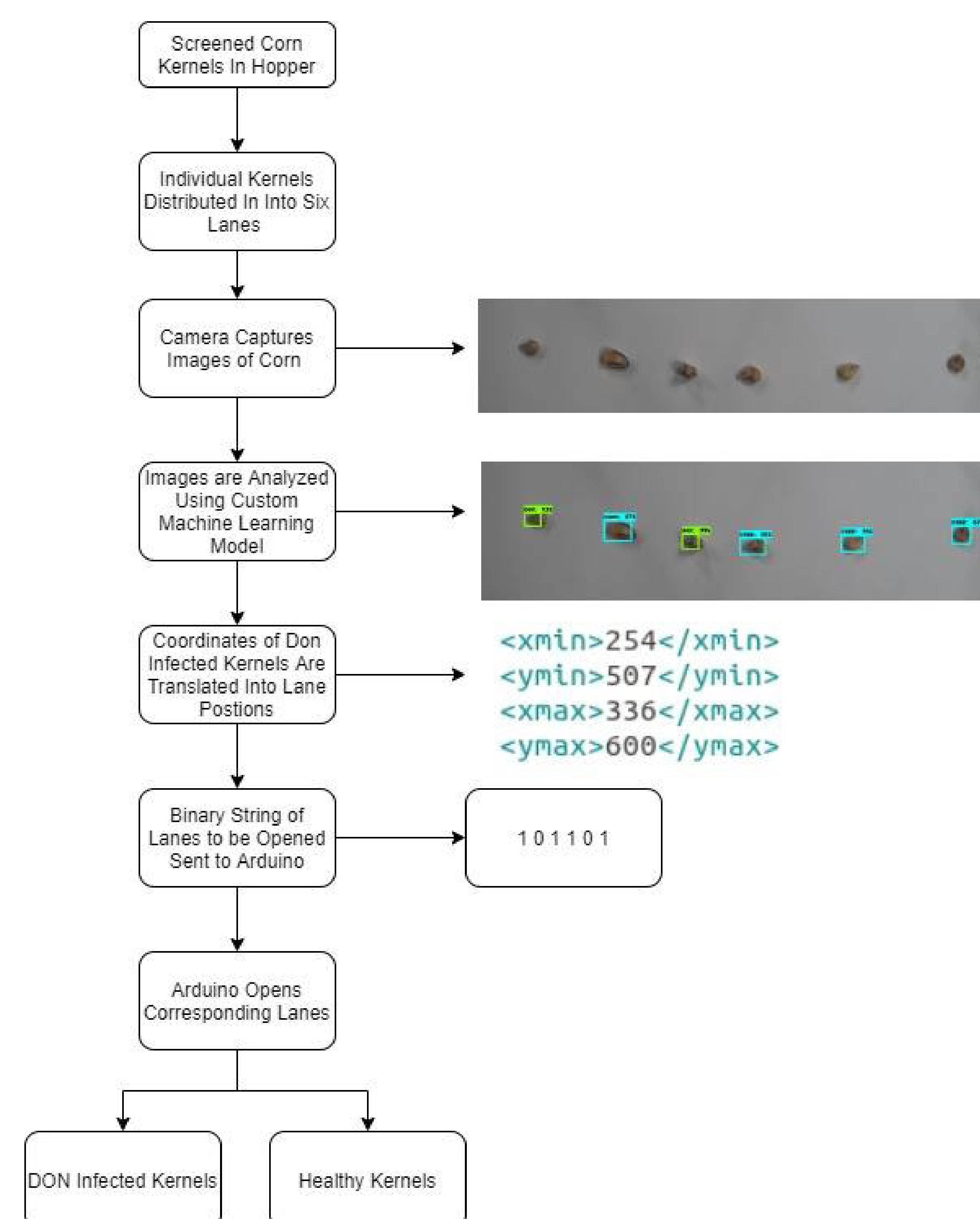


DESIGN FEATURES:

Mechanical: Kernel metering hopper and ejector mechanism 3D printed using biodegradable and food safe filament known as Polylactic Acid (PLA).

Electrical: System requires six servo motors, one linear actuator controlled by Arduino Mega 2560 & DFK 33UX178 high resolution camera mounted flawlessly to an industrial food-grade conveyor belt

Software: Predominantly written in python, it analyzes camera images and identifies lanes corresponding to infected kernels. The Arduino receives lane information from the python program opening the ejector gates using a servo motor.



FUTURE WORK:

- To make this machine accurate with a wide variety of corn strains, additional photos would need to be gathered to create a larger set of training images.
- A higher flow rate is required in commercial applications of this technology. More lanes would be configured in the future designs to reach desired flow rate demanded by Ontario farmers.