



Automated Litter Box

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BACKGROUND

Emptying a litter box is a very tedious task to do around the house. Not only is it tedious but can also be seen as a health concern for pregnant women. Toxoplasmosis is one of the most common parasites in the world which may be passed onto women and cause illness. Our automatic cat litter box aims to combat this threat to pregnant women.



Figure 1

Credit: Pet Best

Current Automatic Litter Boxes

Figure 2



Credit: Chewy

Current automated cat litter boxes do exist, but they are very expensive and not everyone can afford one. Current cat litter boxes also have issues of being confusing because they involve a lot of technology and can be hard to fix by yourself. We tried to minimize the moving components to simplify our model and make it cheaper for those who need it.

Object Interference check

Since we are dealing with live animals, we needed to make sure that the Automatic Cat Litter Box only runs when it's free of an obstruction. We accomplished this through the use of a proximity sensor which checks the container before it runs to ensure nothing will be in harms way.

PROPOSED SOLUTION

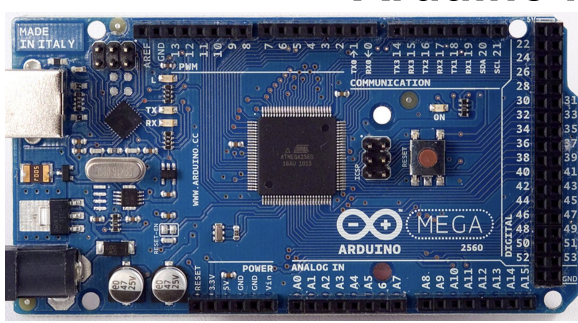
Our solution (Figure 3) consists of a manufactured litter box in the shape of a cylinder. It contains a touch screen to allow the user to select the frequency of the cycle which allows for more flexibility to their schedule. This is then connected to a motor and proximity sensor which checks for any obstructions before running. If no obstructions are present, it will spin a strainer it has inside which will move all the excrement to the back compartment.

Figure 3



SYSTEM DESIGN

Arduino Mega



The Arduino provided a flexible and cheap micro controller that was essential for our project.

Touch Screen

The use of the touch screen allows the user to cater to their own schedule with planned disposal times and forcing the system to run when necessary.

Litter Box

The litter box is a 3D printed model that is made from PLA filament. Due to this process the placement of the mounts is very accurate and secure. We used a digital calipers with a resolution of .01 mm

Manual Operation

This allows individuals to manually start or stop the litter box or stop it for any reason the user sees fit or in case of emergency.

Manual Operation

This action is added to the system in case the user wants to run the litter box at that moment and doesn't want it on a cycle. It is also a safety option in case the user must stop it immediately.

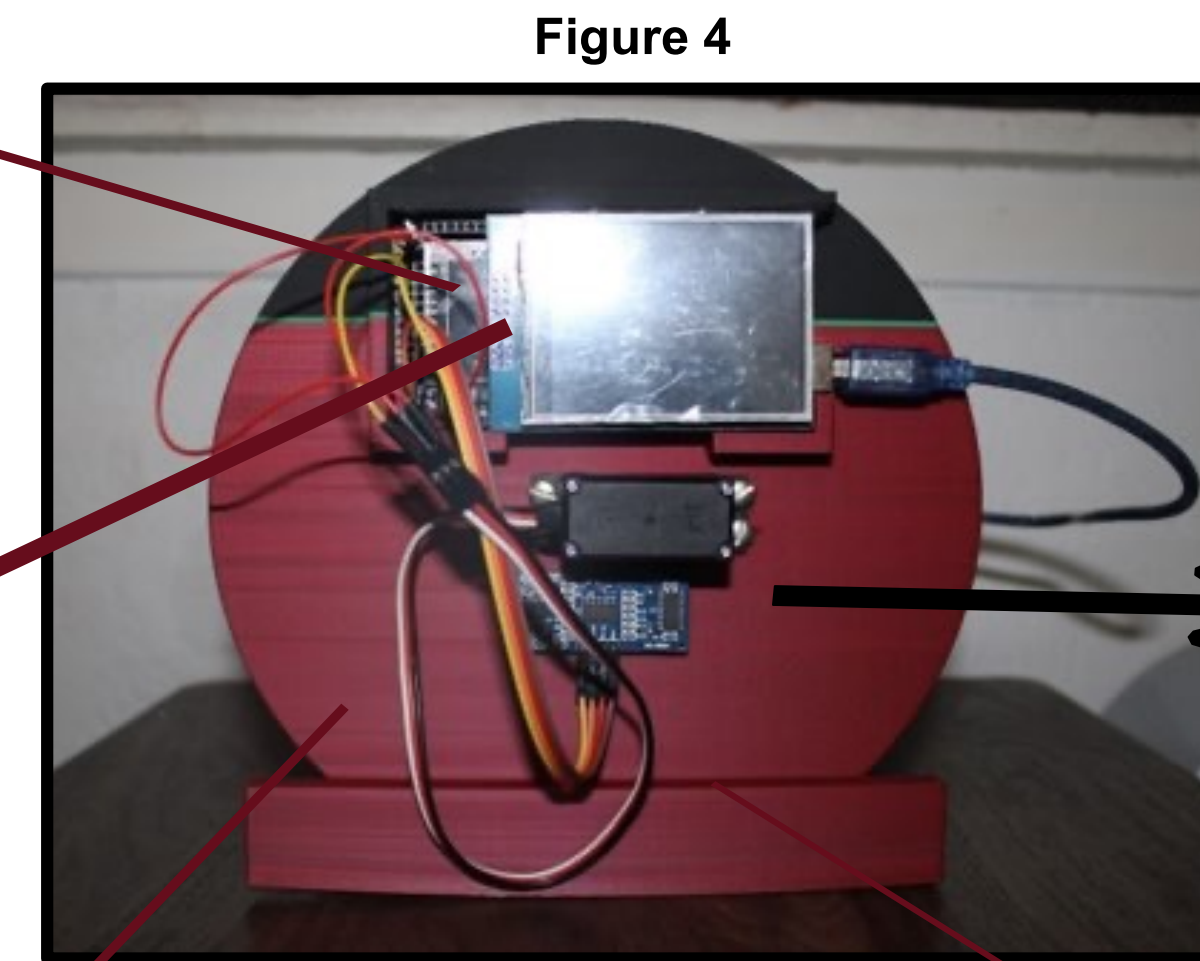
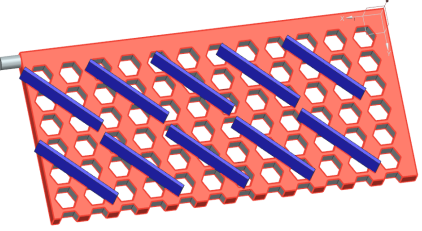


Figure 4

Cat Litter Box

Excrement Strainer

We developed a strainer that would fit perfectly in the litter box and not be in the way when inactive. This allows a good flow for cat litter while also moving the cat waste to the compartment for easy disposal.



Proximity Sensor

The proximity sensor allowed us to check for any obstructions such as animals in the litter box. This was done to provide a safe use of the device. It also helps prevent any ethics violations since our product is being used with a love animal.

PLA Plastic Casing

The litterbox was 3D printed using PLA, in the ECET design laboratory. It was drawn using Siemens NX-12 which is a CAD software free for students and highly used in the industry for professional drawings.

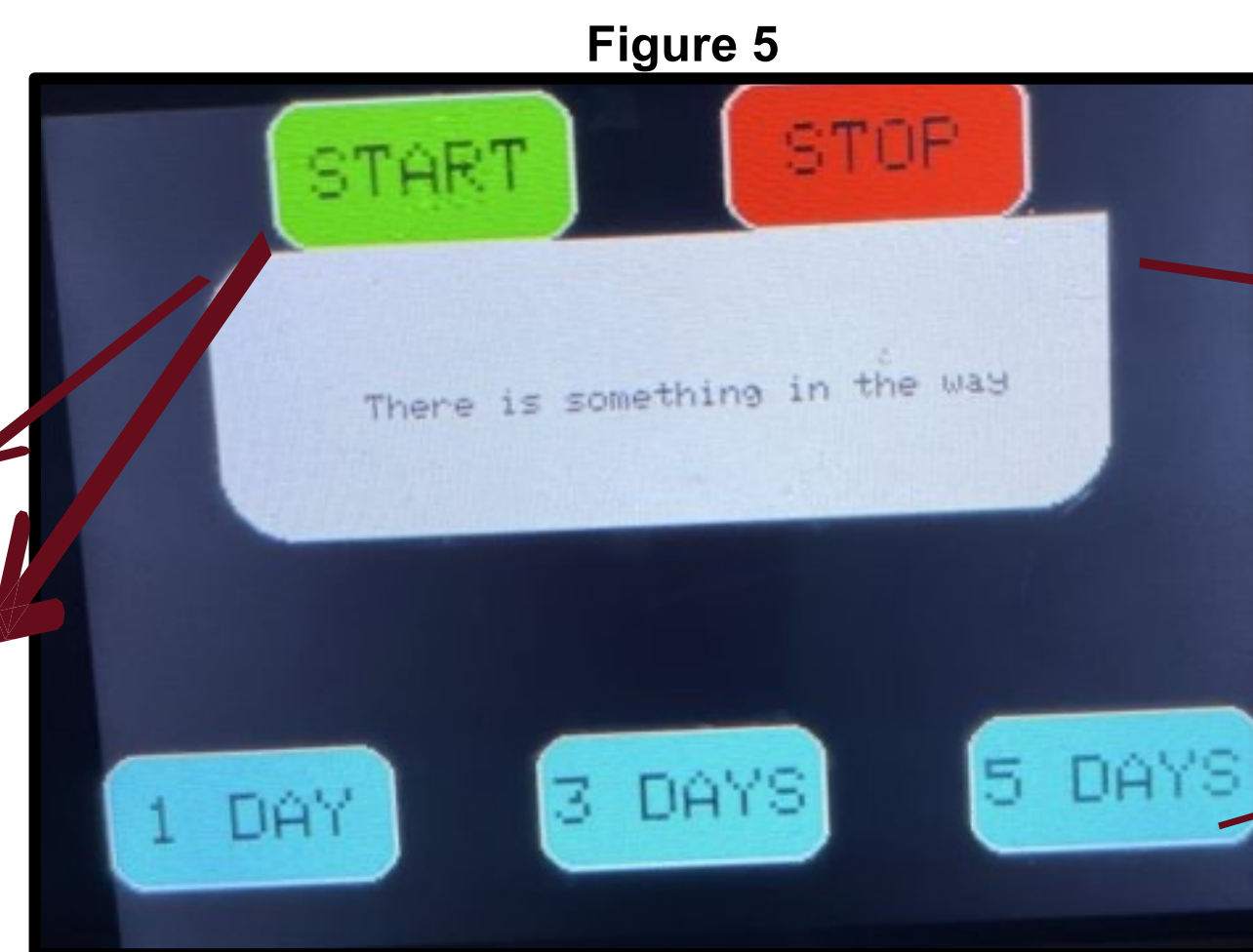


Figure 5

GUI

Object Interference Message

We decided to utilize the proximity sensor as a safety check. This allows the cat to not get caught if the process for cleaning is about to start. As shown in the picture a message is displayed to alert individuals about something being in the litter box.

Frequency selection

We wanted to give users the ability to pick a frequency of cleaning. We wanted to keep the frequency at a maximum of 5 days so users don't accidentally input a high number and forget to have it cleaned.

FUTURE DIRECTION

- Explore integrated circuit options to reduce size of Micro Controller used
- Make mobile application to interreact with ACLB
- Add way to dispose of waste container without human being involved.
- Add feature to control with smart at home tools like Alexa
- Add door that shuts once cycle has begun for safety purposes

ACKNOWLEDGEMENTS

We would like to thank the ECET faculty for providing tools needed to build prototype in timely manner

REFERENCES

- <https://www.peta.org/living/animal-companions/lowdown-litterbox/>

CONTACT INFORMATION

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