



Background

Enrichment devices (EnDs) are any tools used to help zoo animals learn and replicate **behaviors** that would normally occur in the wild. EnDs can serve many needs, from feeding habits to play.

Without proper stimulation from EnDs, captive animals exhibit **boredom**, **stereotypy** (unnatural repetitive behaviors), or self**harm**, which all contribute to a lower quality of life.

Design Challenge





MD Zookeepers need to automatically track the duration and time of day of interaction with EnDs for multiple species because current manual logging is inconsistent and timeintensive.

Design Features









Integrate with Existing Software



TailTagger: Automated Tracking of Enrichment Devices @ MD Zoo

Simonne Ponce, Albert Doan, Arul Garg, and Jayden Ma Faculty Mentors: Alissa Burkholder Murphy and Nusaybah Abu-Mulaweh

Our Solution: TailTagger Tracker



Zookeeper Workflow with App



Animal interacts with EnD in exhibit



IMU Acceleration in x,y,z is stored as .txt file in SD card



Zookeeper uploads .txt file from SD card onto app on their computer to visualize



Zookeeper clicks "Process Data" and duration of animal interaction per hour is graphed





EnD Compatibility

All animal EnDs fall into two categories: feeder ball devices and fixed hanging devices. Our TailTagger device is able to be fastened to both types of EnDs by using an adapter and screws for the feeder balls or zip ties for hanging devices.



Feeder Balls



Fixed Hanging Devices

Animal Testing @ MD Zoo

We have tested our TailTagger tracker in the rhino, porcupine, and donkey exhibits at the Maryland Zoo on their fixed hanging enrichment. Our Arduino electronics have been able to successfully log data for 24 hr time periods.



Acknowledgements

Special thanks to the Maryland Zoo, Alissa Burkholder Murphy, Nusaybah Abu-Mulaweh, Greg Wulffen, and Dr. Lucas Buccafusca!