Release Mechanism for Wildlife Tracking Collar

Western Carolina University
School of Engineering + Technology

Problem Statement

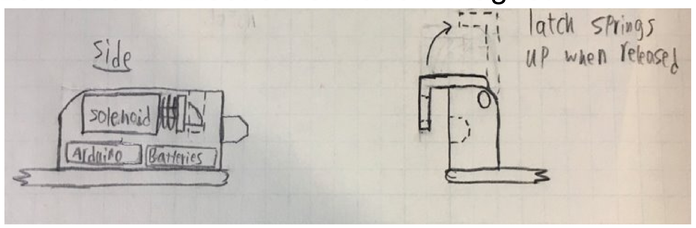
- Tasked with creating cheaper/more reliable release mechanism
- Functions on a time-based release
- Device should release on programmed date
- Device should adhere to requirements
- If successful, the device could be scaled to larger collars in the future

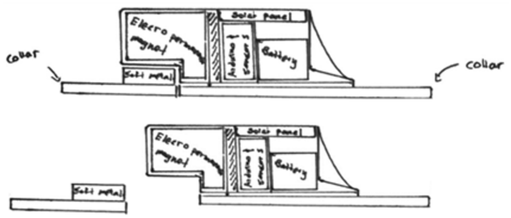
Requirements

1. Release mechanism should be less than 50g
2. The mechanism must operate from its own power source
3. The device should be programmable
4. The device should be weather resistant
5. The battery should supply power for up to one year
6. The cost for one unit should not exceed $200
7. The device should user friendly for installation

Concepts

- Five initial concepts considered
- Analysis of Alternatives was used to narrow the selection down to two concepts
- The two highest scoring designs were compared by risk, cost and feasibility
- The two final concepts considered were a Solenoid Lock and an Electro-Permanent Magnet

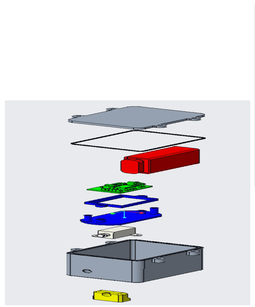


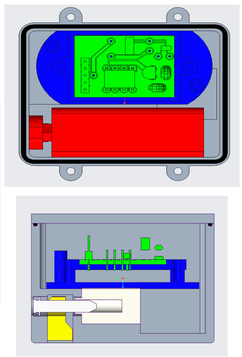


Final Design

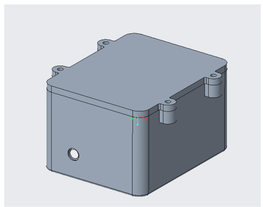
3D Models and Physical Design

- The Solenoid Lock was chosen as the final concept
- Exploded Assembly shown below featuring all the essential components.
- The essential components shown in order of appearance: Housing & Lid, Gasket, 9V Battery, Circuit Board, Board Housing, Solenoid & Pin, and the Collar insert.
- Designed to withstand a large amount of force along with resistance against light to mild rain or water.



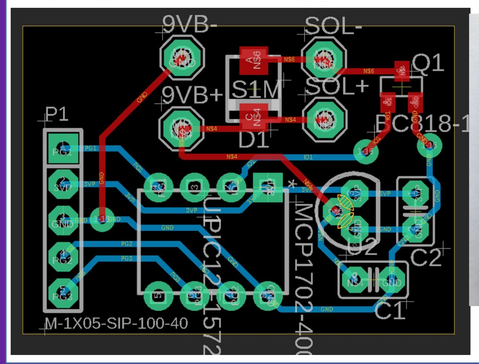


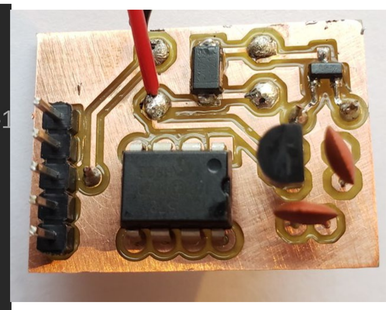
Legend	
Housing & Lid	
Gasket	
9V Battery	
Circuit Board	
Board Housing	
Solenoid + Pin	
Insert	



Electronics Design and Implementation

- Main components are microcontroller, solenoid, header pins, voltage regulator.
- Timing and Release Functionality; executed by program file held by microcontroller
- Independent power source of 9V 400mAh; capable of lasting one year.
- User interface through header pins via PICkit3 programmer/debugger.

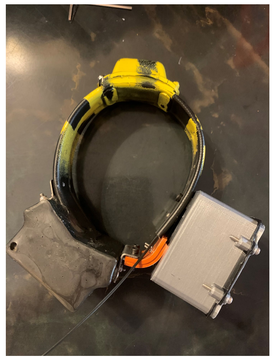




Results

Test 1 Weight Requirement: The team attempted to reach the desired weight of 50 grams but due to the battery and size constraints the device came out at 92 grams in total.

Pictures of the physical device are located below. The device is constrained to the size of the battery, which affects the size and weight.



Summary

- Team 14 was tasked with designing a low-cost and reliable release mechanism
- The final design underwent short-term tests to represent exposure in a long-term environment. The device has not been tested long-term.
- Testing was mostly observational, and the results were recorded.
- This is a first-generation design. Future improvements could be made to decrease size and improve quality.

Team & Acknowledgements

- Team: Hans Abling (BSE), Craig Cutshaw (BSE), Ryan Balda (BSET), Alex Friedley (BSET), Ethan Espin (BSECET)
- Sponsor: Dr. Aimee Rockhill, WCU
- Faculty Mentor: Dr. Wes Stone
- Assisted: Brett Banther, Shawn Lyvers