P1 Assignment

Team Name - AniSight

Team Members - Rina Yoo, Sridevi Kashinath Alawandi, Yeonsoo Chang

Project Description

AniSight is a project that aims to develop assistive technology for blind animals. We are currently developing this technology for dogs, but with further research, it could be adapted for all blind animals. The device's main goal is to help blind animals navigate freely and have a normal experience. The device we create is expected to perform two functions: First, detect (sense) any obstacles in the animal's path. Second, immediately alert the animal to the potential obstacle using a buzzer sound or any form of vibration. This sound/vibration would gradually serve as a cue for the blind animal to move about in its surroundings.

Motivation

1. Assistive technology for blind animals can help them navigate safely. It is supposedly one of the major issues they face (Morgan, A., & van der Linden, D, 2022). Owners who have blind pets, such as dogs and cats, must pay extra attention at all times so that their pet doesn't get potentially injured.
2. Even in a known environment, blind dogs get cautious and have difficulty navigating. We would like to bring a solution for blind animals other than the usual method where they are restricted to furniture that keeps them in the same position (PMC, E. (n.d.))
3. Owners may resort to premature euthanasia due to the popular belief that it is cruel or unkind to keep blind dogs (Biondi, et. al 2022). However, blind dogs can still live a good life with the right training and accommodations.

Significance

1. An assistive technology device for blind animals can help increase and better the quality of life for blind animals. It also will decrease the anxiety they face in day-to-day activities as simple as navigating a room.
2. The animals need not be restricted to a piece of furniture they are familiar with to ensure that they are in a safe space.
3. There are devices in the market such as the Halo (Easter, F. ,2016) produced by various manufacturers that come with a lightweight ring that is attached to protrude above the

dog's head such that it prevents the animal from bumping against the obstacle. Some drawbacks of using this device include:

a. It is attached to a vest that the animal might not feel comfortable wearing all the time (Mueller, L. ,2021).
b. There is also a fear of the tube ring being hooked and stuck to other objects.

We aim to address these two issues by developing an assistive technology that works with the help of sensors. This device would serve all the purposes of Halo but also ensure it is light-weight and can be worn at all times without the fear of it being stuck to other objects.

Related Work

There were two things we researched about to get a deeper understanding. First, we researched to understand the different difficulties that blind animals face. We did this to understand how our project could cover a wider spectrum and also to fixate ourselves on some hard goals. We found that one of the major issues that blind animals face is navigation in known surroundings and increased difficulty in navigating unknown surroundings. Some dogs lose an interest in exercise as a result (PMC, E. (n.d.)).

Second, we researched about the different ways blind pet owners combat this issue and what products are available in the market to support such animals. The existing solutions included a Halo harness (Mueller, L. ,2021) that is manufactured for both dogs and cats. Another approach was to wrap the furniture in a bubble wrap and introduce table edge protectors to ensure that the blind animal isn't severely injured while navigating. The halo harness is deficient because, according to amazon reviews for the halo harness, there are not enough sizes of the harness and dogs are not one universal size. Therefore, the harness is too small, too big, or too heavy, and unfortunately, the halo itself may break or get dented easily after some use. It was also not found to be comfortable to wear all the time or while sleeping (Mueller, L., 2021). Furniture padding may be sufficient, but owners will always have to have bubble wrap on every corner of every wall, table, chair, and more. Everytime the padding or bubble wrap falls off from impact or wear, owners will have to put it back again and again. And in outdoor environments, animals will be less safe without good precautionary measures.

Another existing solution is a device called BlindSight that uses echolocation to tell the dog where obstacles may be. A study (Morgan, A., & van der Linden, D., 2022) showed that smaller dogs did better in a maze with the Halo than the BlindSight device, while larger dogs did better with the BlindSight device. Our aim will be to make an improved prototype that can be effectively adaptable for animals of multiple sizes, and we want to explore using proximity sensors to achieve this goal. We hope with our solution, blind animals can be supported indoors and outdoors.

Experiment Approach

In order to develop an assistive wearable device for blind dogs, our initial strategy will be to create a prototype specifically designed for domesticated blind dogs in indoor environments. This approach was chosen because it provides us with a specific animal and a limited set of obstacles to start with. To kick-start the project, we have conducted research into existing work in the field of assistive technology for blind dogs. Our initial prototype will incorporate various sensors such as ultrasonic, vibration, and buzzers, as well as an Arduino board and connecting wires. Once we have a working prototype in hand, we want to experiment fixing the device in various locations on the dog's body to understand the most efficient placement of the device for accurate results. Based on the findings from this, we may need to build a revised prototype. Finally, we plan to conduct user studies with the goal of collecting feedback and identifying areas for improvement. This will be an important step in ensuring that the final product meets the needs of blind dogs and their owners.

Schedule

Project Deliverable 1 (1/30 - 2/10)
- Determine what devices we need to research on and our experimental approach (2/10)
- Write this document (1/30-2/10)

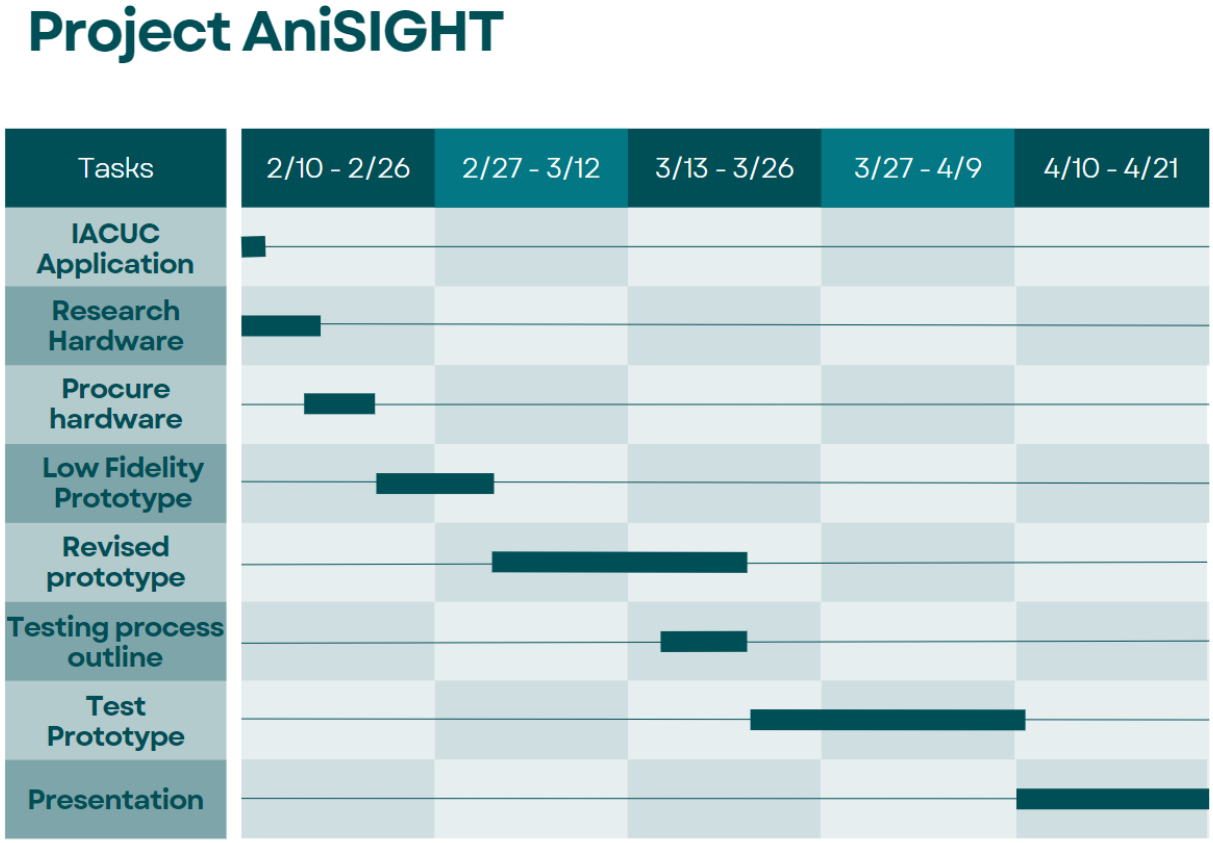
Project Deliverable 2 (2/10 - 2/24)
- Complete the IACUC application (2/10 - 2/13)
- Research and understand the hardware required (2/10 - 2/18)
- Source hardware and order new ones if required (2/15 - 2/20)
- Low fidelity prototype (2/20 - 3/07)
- Write P2 (2/10 - 2/24)

Project Deliverable 3 (2/24 - 3/17)
- Low fidelity prototype (2/18 - 3/03)
- Build a revised prototype(3/03 - 3/17)
- Write P3 (2/24 - 3/17)

Project Deliverable 4 (3/17 - 4/10)
- Test prototype on dogs in the area (3/17 - 4/03)
- Make improvements to prototype (3/17 - 4/10)
- Write P4 (3/17 - 4/10)

Project Deliverable 5 (4/10 - 4/21)

- Write presentation slides (4/10 - 4/21)
- Write P5 (4/10 - 4/21)



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