Pet Caller
Prototype 1

Jade Fjestad
Jesse Lim
Justin Ross
Andreas Smit

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1 Product Description

1.1 What our product is?

Our product is a device designed to help pet owners manage their pets. If a pet owner lets their pets outside they may run into an issue of not knowing when their pet wants inside without standing by the door waiting for hours. Our product seeks to solve this by allowing the pet to "notify" their owner that they would walk back inside. This is done through a transmitter placed on the pets caller which sets off an alarm when the pet gets close to the door to be let inside. This allows the pet owner to not worry about their dog or cat waiting outside their door. No more worrying that your dog or cat is cold waiting outside your door.

1.2 Use Case

This product is designed for those individuals who may not be able to hear their animal waiting outside their door to be let in. It is often that people have a walkout basement where they dont realize their animal is ready to come in. Or the individual may themselves be hard of hearing and cannot hear their quiet cat politely ask to come in.

This product comes in two parts: a hub, and a Caller Fob. The hub is a battery powered device that you place on the wall near the door your animal comes in. (Sticky tabs included) (same with batteries). There is a dial, a power button and a light indicator. To set the activation distance (the distance your animal has to be to the device to activate the alert), start by placing the Caller Fob about where your animal will want to come in, just leave it on the ground. Now go to the hub and hold down the power button for 3 seconds, you will here a sound when you first press down the button then another one once you hold it for 3 seconds. To increase the activation distance begin to turn the adjustment dial clockwise until you hear a continuous sound, the sound indicates the Caller Fob is now in the calling range of the hub. To confirm this distance press the power button once more and the device will use this distance and turn off. Now attach the Caller Fob to your pets collar. To adjust the volume just turn the dial, while the device is active. To activate the device turn on the power button, the led should turn on. The hub will now alert you when the Caller Fob is in the activation range of the device and your pet has been waiting there for 15 seconds. The sound notification will notify the user the pet wants to come in. To deactivate the device when your pet returns, press the power button once again. (and the LED will turn off). We suggest you only turn on the device when you let your animal out and then turn it off when your animal comes inside, to help prevent accidental activation of the alert.

1.3 Advantages to Similar Products

This item is superior to the cat/dog door because there are issues with this method of solving the problem. Conventional Cat/Dog doors allow all animals not only your pets into your house and in colder climates, these small openings cause your houses heating to easily escape. With this product you have more control over your animals coming and going.

1.4 User Persona

1.4.1 User life improvements from product

This product will improve the quality of life of your pet. It will allow you to have more freedom in your house when your animal is outside in the cold of winter or late at night. You dont have to worry about other rodents entering your house through a cat or doggy door, since now you have full control over your pets comings and goings.

1.4.2 Potential Users

According to the American Veterinary Medical Association 38.4% of Americans own a dog and 25.4% of Americans have a cat [1]. This gives us a large number of potential users in the area of North America.

1.4.3 Possible downsides of Product

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1.4.4 Persona

Name: Sabastian Mller He is a stay at home dad with girls of ages 5 and 3. They have a large house with a walkout basement. They have a playroom on the main floor and a young dog, Salt, that enjoys playing with the neighbor's dog since their yards are connected. They trained their dog to not bark, so she is more well behaved, but this causes an issue when to let the dog in. He worries that his girls may get into mischief if he were to spend too much time away from them. He hopes that he can get work done while he watches his girls and his dog is outside. He hears on an targeted ad that there is this device that can help him remain upstairs while his dog is outside. He thinks, Oh this would be great! So I can watch the girls and let my dog out when it gets cold and not have to worry about Salt getting too cold. I should buy this right away.. He values a product that will allow him to rest his mind while his dog is outside.

2 Technical Details

2.1 BOM and cost projection

Table 1 shows a rough estimate of our prices for the product.

Table 1: Bill of Materials

Item	Cost
PIC 32 processor	$10.00
Cortex M3 Razor Board	$90.00
Audio Equipment	$30.00
ANT transmitter	$20.00
Batteries	$5.00
Casing	$10.00
Misc Electronics	$10.00
Total	$175.00

Clearly this is an estimate of prices for a prototype. In the final product a custom built board could be made for both the hub and tag that would reduce the price as opposed to buying pre-build boards with extra functionality. For example the only need for the Cortex M3 board is for a processor on it costing a total of $4.00. It would probably be feasable to keep the total cost of production to under $100, giving an estimated unit cost of potentially somewhere from $150.00 to $200.00.

2.2 Mechanical Design

See the mechanical design documents attached in appendix A for the specifications of the mechanical design.

2.3 Electrical Design

The majority of the operation of the product is done through the PIC 32 processor. The use of the external processors is simply for the communication via the ANT wireless protocol. A rough block schematic is shown in appendix B.

2.3.1 Wireless Communications

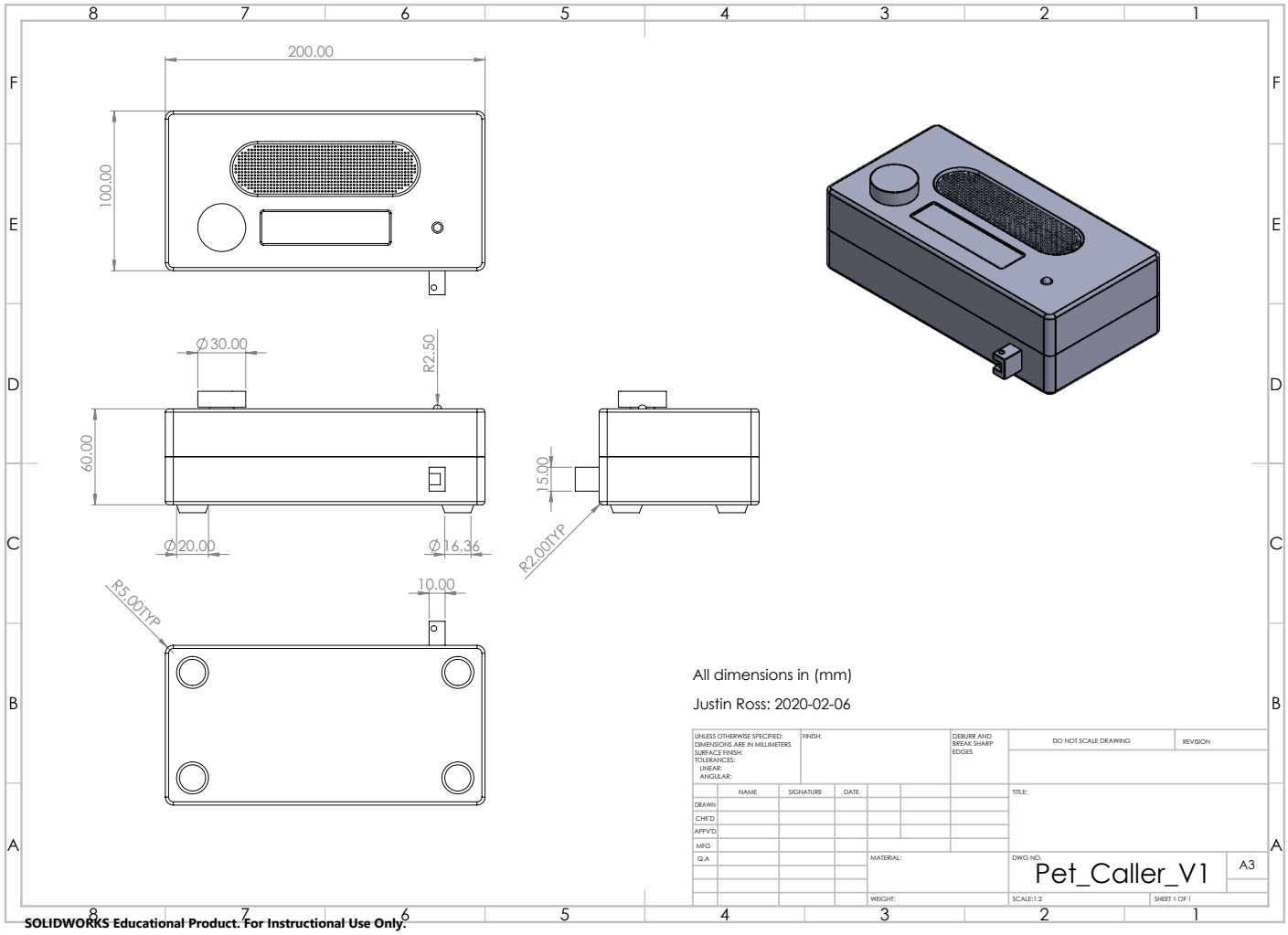
The ANT wireless protocol was chosen for the wireless communication between the collar tag and the base station. The wireless base station will most likely be driven by the Cortex M3 board if approved. The transmitter will most likely be driven through the use of a SparkFun NRF52832 breakout board (SparkFun product number 13990). The ANT wireless protocol is chosen for multiple reasons. The largest one is three of our group members are currently learning ANT through the Embedded in Embedded program offered by Jason Long. Secondly ANT has multiple advantages as a low energy wireless protocol given from the ANT website [2] including,

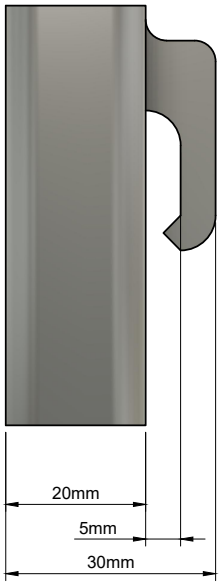
- Ultra Low power, can be run on a coin cell for years
- Easy to use - The protocol specification is only 100 pages long
- Low Cost

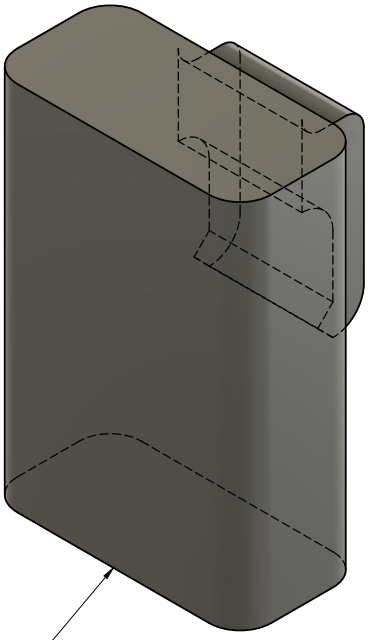
For these reasons especially the ease of use and cost we will use ANT. Should ANT not be possible RFID or some sort of physical interaction could be used to trigger the device.

Appendices

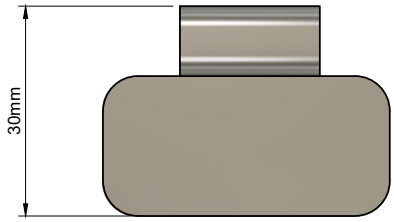
A Mechanical Design Drawings







Signal originates from within block



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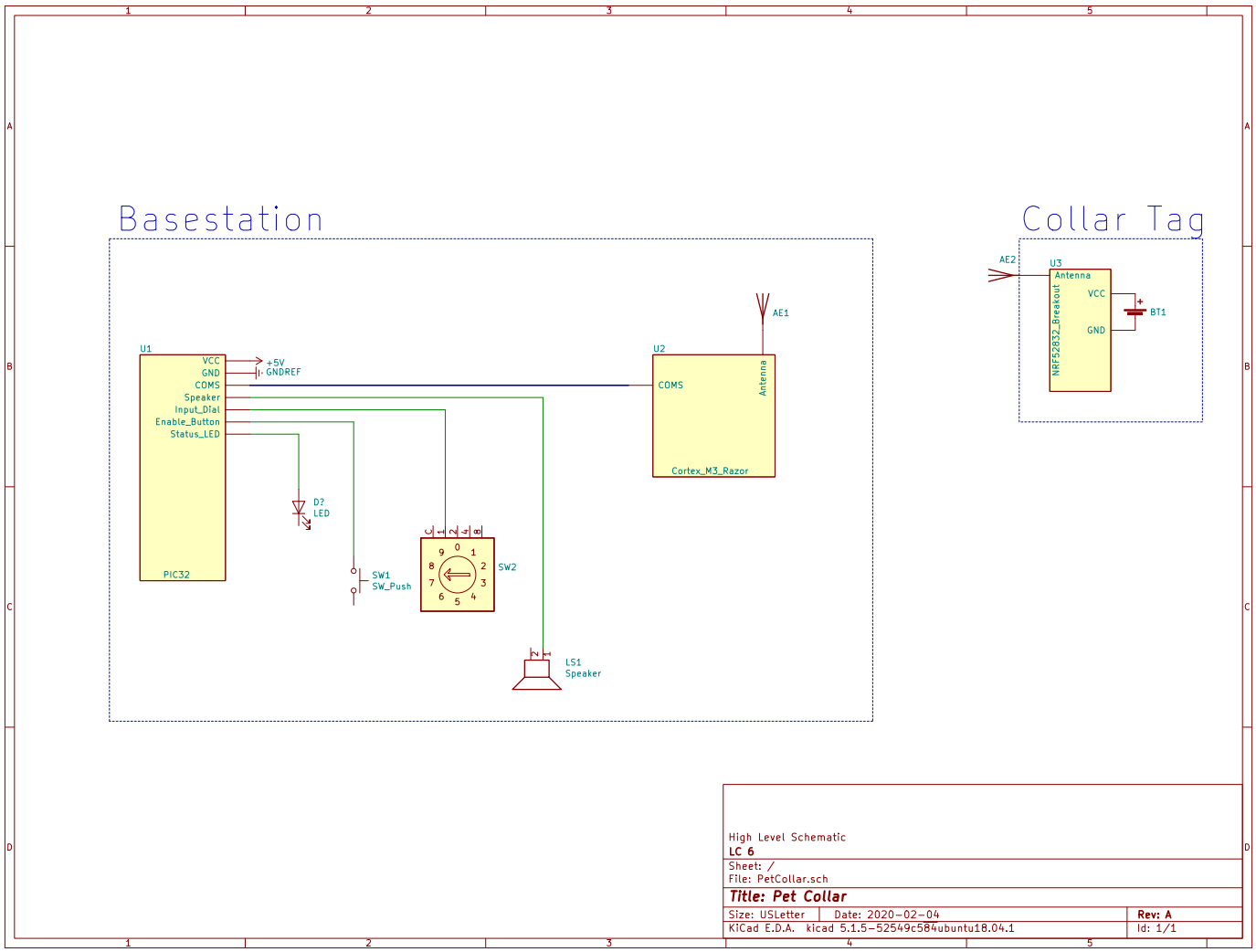
B Electrical Design Drawings



C References

[1] AVMA, *Pet Ownership & Demographic*. AVMA, 2017-2018. [Online]. Available: https://www.avma.org/resources-tools/reports-statistics/us-pet-ownership-statistics

[2] "Ant/ant+ defined." [Online]. Available: https://www.thisisant.com/developer/ant-plus/ant-antplus-defined/