Executive Project Summary:

The purpose of this project was to create an electronic system capable of operating without human input and granting access for a trained pet to pass through a medium (such as a door or wall) at specific times throughout the day. We approached the design of this system by first defining our overall engineering requirements; in other words, we wanted to determine how we could define a successful operation of our system and output measurable results. This initiated our design phase, which continued by defining the “blocks” of our system (which we illustrated with a block diagram) and the connections between each block which we presented in an “interface definition table”. This first draft allowed us to focus on adhering to a “black-box” design implementation, where the inner-workings of each block is inconsequential to the operation of the other blocks and instead the interfaces are the main focus. This also allows us to make incremental implementation progression and minor design alterations, as long as the new interfaces are compatible with previously implemented blocks.

Upon completion of the initial block diagram and interface definitions, the next design step was researching the components capable of meeting the defined requirements. For example, we wanted to implement a Real-Time Clock (RTC) module into the design to decrease the computational load on the microcontroller and increase the accuracy of our time-keeping but we did not actually have a specific integrated circuit or component in mind when we discussed that capability; instead we found a component afterwards compatible with our definitions. This also enables other engineers to recreate our design with different components that operate in a similar fashion.

Around this point in the project was also a workshop for giving and receiving design feedback from our peers, which gave us suggestions for minor adjustments we were capable of making to increase simplicity and improve functionality. One example of a design change we made about halfway into the implementation of the system was to remove an auxiliary microcontroller communicating with an SD card reader over a Serial Peripheral Interface while the main microcontroller communicated with an RFID scanner through the same type of interface and instead use one SPI connection to interface with both modules but at exclusive times. There was no need to read from an SD card while the system was waiting for an RFID input, and there was no need to look for an RFID input while the current one is being evaluated so the auxiliary microcontroller was increasing the complexity of the design without adding any additional functionality.

The biggest lesson we learned as a team is the importance of communication and documentation. Our academic experience generally centers on evaluating our individual understanding but the team aspect of this project required us to have access and understanding of the process our team members used to implement our design. For example, the RFID module needed a microcontroller to communicate with to program the individual block functionality but in the final design the code might query it in a different way than the initial programming to ensure the functionality of the block was created. In this case, providing documentation and access to the source code used to create the initial functionality was important because it allowed the engineer in charge of the microcontroller block to use the applicable portion of the solution already designed by the engineer in charge of the RFID block.

ECE 342 Electronic Pet Door Group 7

Oregon State University ECE
Beth, Blake, and Ben

Project Start: Thu, 12/30/2021
Display Week: 1

TASK	ASSIGNED TO	TIME TAKEN TO COMPLETE	PROGRESS	START	END
Design Phase		11.25 hrs			
Organize meeting schedule	All	.25 hrs	100%	12/30/21	1/9/22
Create Code Flow Chart	Ben	1.5 hrs	100%	1/10/22	1/15/22
Initial block diagram	All	1.5 hrs	100%	1/9/22	1/10/22
Research Components to use	All	2.5 hrs	100%	1/10/22	1/15/22
Decide on components and order	All	1.5 hrs	100%	1/14/22	1/19/22
Design interface connections	Blake	2 hrs	100%	1/14/22	1/24/22
Power supply design	Beth	1 hrs	100%	1/10/22	1/20/22
Create Phase		44 hrs			
uC Detects RFID Tags and Correct Time	Blake	4 hrs	100%	1/21/22	1/28/22
LEDs Light Up According to uC	Beth	6 hrs	100%	1/28/22	2/4/22
Motor Controller Lifts Door	Ben	5 hrs	100%	1/28/22	2/4/22
uC Talks to Motor Controller	Ben, Blake	4 hrs	100%	2/4/22	2/11/22
uC Receives input from RFID Tags, Time module and mo	Everyone	10 hrs	100%	2/11/22	2/18/22
System Runs off of independent power source (no comp	Beth	3 hrs	100%	2/18/22	2/25/22
Each engineering requirement is met	Everyone	12 hrs	100%	2/28/22	3/4/22
Present Phase		14 hrs			
System Verification	Everyone	10 hrs	50%	2/25/22	3/4/22
Create presentation board	Everyone	1.5 hrs	100%	3/4/22	3/8/22
Engineering Expo /Project Demonstration Preparation	Everyone	2.5 hrs	0%	3/4/22	3/11/22
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