**To:** Jie Yang

**From:** Team 5, EE-286 Section 1

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**RE:** P3 Design Survey

**Assignment:**

The teams will submit a memo detailing five possible designs for this project. For each design, I expect a discussion of how it fits the requirements for the project and what additional materials you might require. Express whether you think it would be feasible in the time remaining for this semester. You do not have to provide diagrams, though I am not discouraging them. The purpose of this memo is to show your research for selecting the design you will actually try to implement.

**Introduction:**

In this memo, five prospective design ideas for the upcoming project will be discussed. General parameters, materials and details will be provided for each idea. Additionally, the feasibility of each idea will be commented on, and this memo will help determine what ideas might be more appealing for our team.

**Design Concepts:**

1. Option: Launcher
   1. Launch an object towards a target
   2. This device would utilize two motors, one to adjust launch angle and one to adjust launch direction. These motors would be adjusted using a joystick. A button would be pressed to launch the object. The LCD and seven-segment display would be used to display launch angle and direction. Additional materials that would be required would be an object to launch, such as a ping pong ball, and something to create a bucket of some sort to hold the object. This project would be feasible within the time frame because we have already used some of the materials in previous projects. However, we would have to spend some time learning how the seven-segment display, joystick, and motors work.
2. Option: Team’s Choice - Digital Metronome/8-bit Music Player
   1. Build a device that will serve as a metronome for someone wanting to learn an instrument, or listen to some simple songs.
      1. This device will run two rhythms simultaneously - one as a fundamental rhythm, and the other as a simulated time signature, such as ¼ time, ¾ time, or ½ time. The two rhythms will be simulated by two stepper motors, the LEDs will be used to display the time signature, an LCD could be used to write additional details, and a joystick, remote, or potentiometer could be used to change what time signature will play. As an addition, a piezoelectric buzzer could be utilized to provide an extra signal for a drummer, as they require more concentration and attention to rhythm. The piezoelectric buzzer could also be used to play different simple melodies, in which case the stepper motors would accompany as rhythms. Our team would probably be able to complete this idea within the time frame allotted, since we have already done some work with buzzers, LCDs, and LEDs before. The biggest difficulty here would probably be the synchronization of motors with the piezo buzzer.
3. Option: Team’s Choice - Drone Simulator
   1. Build a device that will serve as a framework for an RC drone (?)
      1. This machine will utilize four (most likely) stepper motors that would simulate the flight of a drone. LED lights would be used to simulate direction of flight, and corresponding motor speeds would be controlled by the use of the directional joystick. Additionally, an LCD screen could be utilized to output readings such as motor speed (in RPM), and direction and tilt of the theoretical drone. This idea could be completed by the team in the time frame allotted, since we have already worked with LEDs and LCDs, and the stepper motors would be fairly easy to work with once we have an understanding of the working principle of a stepper motor.
4. Option: Team’s Choice - Clock
   1. Build a device that will tell the time
      1. This device would have two motors that would change according to the time. Additionally, at certain times different LEDs would light up and the time would be displayed on an LCD screen as well as a seven-segment display. The device would be able to be turned on/off with the use of a button. The only additional material we would need would be paper to draw out a basic analog clock that way we can make sure the reading from the motors is the same as the LCD and seven-segment display. We would need to figure out how to use the motors and the seven-segment display, but we have already used all of the other materials in previous projects so this would be a feasible project to complete within the time frame. However, we may come across some difficulty in making sure the timing is correct.
5. Option: Team’s Choice - Autonomous Rover
   1. Create a rover that is fully autonomous and can avoid obstacles
   2. What will this machine do?
      1. This rover would be a challenge to create. It would require the use of many different sensors to ensure it functions properly. For example a sonar sensor would be used up front to keep the rover from slamming into objects. LEDs, the LCD, or the 7-segment display could be used to provide feedback to the user from the rover. Side sensors would be required to ensure the rove does not bump into items while turning as well. These could be buttons or limit switches. This rover would be fairly easy to assemble and should not be too difficult to code. While the code will be lengthy, it should just contain a large amount of “if” statements. The rover option will mainly have a focus on troubleshooting code. Additional materials we would need are: wheels for the robot, a frame, and limit switches. For extra credit we could use the IR sensor to enable the autonomous feature or turn off the rover.

**Conclusion:**

In this memo, five possible ideas for the upcoming project were dissected and discussed. Moving forward, this memo will allow us to being narrowing down our list of ideas, to one idea. With the information given here, we can also begin doing more extensive research, as well as begin to prototype initial designs and learn how to use parts that we are unfamiliar with.

Attachments: none