Now that you know the rules and objectives for this year’s ME72 Design Contest, perform the initial steps of the design process (by yourself, without your teammate) for a team’s contest devices for the contest. Include the following:

**Specifications and Constraints:** how fast?, how high?, how durable?, etc. (put numbers here) Justify your requirements and specifications.

**Functional Requirements:** Consider the most general functions that the devices must perform, without considering how the functions might be accomplished. As we will discuss in class, at the very highest conceptual level, your device must accomplish a defensive function and an offensive function (consisting of at least the functions “score” and “block the opponent”), as well as many other important functions such as device safety, contest setup (such as swapping of power supplies, servo control unit). Please break down the offensive function and the setup-for-the-contest function into as many subfunctions as possible. Avoid thinking of solutions to the design task, instead think about clarifying the task into a set of functions (and sub-functions) that the devices must perform in order to accomplish the task.

Do not “parrot” back the details of the rules, but if there are one or more rules that you feel are important to amplify, as they relate to requirements and constraints, feel free to do so.

You may think of “Functions” as being separate from “Requirements”, i.e., “Functions” are what the device(s) must do; “Requirements” are the numerical specification on how much of each function the device must perform. Here, “Functional Requirements” are both the functions (and sub-functions) that the device(s) must perform, along with the numerical quantity of each function that must be performed. After decomposing the main functions into sub-functions, make sure that you have specifications and constraints for each of the identified subfunctions and their constraints.

**Morphology Chart:** develop a set of alternative embodiments to accomplish the offensive function and its subfunctions that was analyzed above. Present these alternatives in a graphical chart form. Include a discussion of the pros and cons of the alternatives. A broad range of alternatives (a large design space) here will provide you with many alternatives as you proceed through design, fabrication, and testing of your device.

Keep a copy of this assignment so you can expand on it, together with your teammate, in the next assignment.