Project title

(Insert your team logo here if you have one)

IoT Project Proposal/Report

Team name

Member 1

Member 2

Member 3

Date:

1 Executive summary (1 paragraph; 5 points)

The executive summary is a brief description of the project, and should include a quick overview of (1) project background, (2) need, goal and objectives, (3) design and implementation, and (4) expected results and benefits of the project. Since the executive summary is a summary, it should be written last.

2 Introduction (1 page)

2.1 Problem background (5 points)

The problem background section should provide any information necessary for the reader to fully appreciate the need for this project. Start describing the general scope of the problem, then the specific problem that your project is addressing. The need statement should follow logically from the problem background section.

2.2 Needs statement (5 points)

After you have introduced the problem domain, it is time to define a specific need that your project will address. This should be a short statement of the form: "*There is a need for …*"

2.3 Goal and objectives (5 points)

The *goal* is a single, brief, general, and ideal response to the needs statement. The need describes the current, unsatisfactory situation; the goal describes the future condition to which we aspire. The goal statement establishes a general direction of the project. Each project should have only one goal.

In contrast, the *objectives* (there will likely be more than one) are quantifiable expectations of performance. The objectives should also include a description of the conditions under which a design must perform. Specifying the operating conditions will allow you to evaluate the performance of different design options under comparable conditions. Vague criteria such as "user-friendly" or "attractive" are hard to quantify and therefore are not suitable as objectives. Neither are criteria that would be hard for you not to meet: "our design will cost less than $100,000," or criteria that are irrelevant to your goal: "the system will be painted in green."

2.4 Design constraints and feasibility (6 points)

Describe the constraints (e.g., technical, physical, economical, temporal) that you have to work with. In many cases, your needs statement will have already identified some of the constraints that your design will have to meet. Assess the extent to which your project objectives can be accomplished.

3 Literature and technical survey (0.5-1 page; 10 points)

Describe prior research and development efforts that are specifically related to your problem, your needs statement, and your goals and objectives. This is not meant to be a comprehensive survey of an engineering discipline, but a concise overview of the most significant results that are tightly related to your project.

As a guideline, this section should include a review of *not less than two commercial products or research projects*. This review should conclude with a statement that explains the extent to which your proposed design relates to these other products/projects (e.g., is it better? or faster? or cheaper? does it target a new niche market?).

- Existing product or project 1
- Existing product or project 2

4 Proposed work

4.1 Evaluation of alternative solutions (0.5-1 page, 15 points)

This is a critical aspect of your proposal. For any goal there are likely many alternative solutions. In most cases, the alternative solutions will emerge from your literature and technical survey. What you have to do here is analyze the pros and cons of each of these solutions (and hopefully additional solutions you come up with), and justify your decision to opt for a particular solution.

As a guideline, this section should include *not less than five alternative solutions*:

- Alternative solution 1
- Alternative solution 2

Note that these alternatives should be related to your stated goal. So if your goal is to design a camera system to for some particular application (e.g., track users), using some other type of sensing system (e.g., radar, GPS) is NOT a valid alternative. Neither would it be to consider a camera system that is out of specs (e.g., because of cost, size). Likewise, discussions of programming languages, operating systems or hardware platforms don't provide good alternatives, since those choices are *generally* not critical to your design. Lack of alternatives in a project proposal is *generally* an indication that you have not done a thorough literature review and that you have not given the project enough thought.

4.2 Design specifications (2 pages, 15 points)

Once you have identified a solution that addresses the needs of the project, it is time to present the specifics of your design. Start with a high-level block diagram of the system (i.e., 5 building blocks or modules), followed by a description of each module. This description should include techniques (e.g., algorithms, devices), parts (e.g., hardware, software), and the "glue logic" that will make the *system* work. Your proposed design should build support for the *feasibility* of your project.

Below are some examples of good and bad block diagrams.

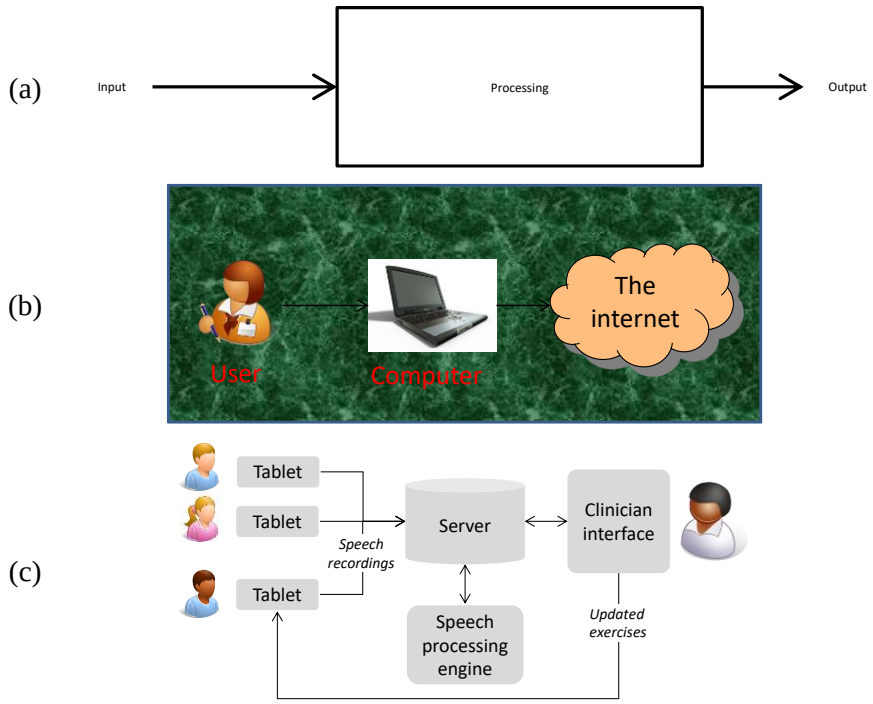

Figure 1. (a) A really bad block diagram. First, the text is practically unreadable. Second, the diagram is so generic it could represent anything. (b) Another bad block diagram. Why? (c) A

good block diagram. Do you get an idea of what the system depicted is about, and what its main components are?

4.3 Approach for design validation (1 page, 10 points)

This is a very simple but important aspect of your project. How will you test that your system does what it was designed to do? Does it solve the stated need? The validation tests should be consistent with the conditions under which your design must perform, as stated in the project objectives.

This section should include unit testing, system testing, user studies (if appropriate) and, *most importantly*, a description of how you plan to demonstrate your final implementation on the "demo" day.

5 Engineering standards

5.1 Project management (0.5 page, 10 points)

Briefly list the qualifications of the team members and decide who will be in charge of each of the different areas in the project (team leader, systems design, software design, hardware design, finance and purchases, testing, technical reporting, etc.) Describe the mechanisms that will be used to manage the project as a team (e.g., brainstorming sessions, tracking progress). A regular work schedule should be included here, showing the times when the team will meet in the lab to work on the project (in addition to meeting times).

NOTE. Each person in the team should have technical responsibilities. For instance, it would not be acceptable that one person handles only purchasing and documentation but does not perform any development work. Please include a Task Matrix (see Table 1) describing all the tasks required to complete the project and the team member in charge of that task. Each task should be assigned to exactly one person, even if multiple people will work on it.

Table 1. Task matrix. Each task should have be assigned to exactly ONE person

		Team members			
Task	Description	Pete	Ann	Mike	Sue
1	Lorem ipsum	X			
2	Lorem ipsum		X		
3	Lorem ipsum	X			
4	Lorem ipsum			X	
5	Lorem ipsum			X	
6	Lorem ipsum		X		
7	Lorem ipsum				X
8	Lorem ipsum				X

5.2 Weekly schedule of tasks, Pert and Gantt charts (0.5 page, 5 points)

Break down the project into clearly identified sub-tasks, analyze dependencies among them, identify critical paths, and design a feasible schedule for accomplishing these tasks. Can you guess what's wrong with the Gantt chart below?

Figure 2. A really bad Gantt chart. First, the task decomposition is too coarse to be of much use. Second, it assumes that none of the tasks can be developed in parallel.

5.3 Economic analysis (0.5 page; 2 points)

Some economic issues were already considered during the analysis of constraints and the itemized budget. Here you provide a further economic analysis, were your system to become a commercial product:

- Economical viability: potential marketability of the system, expected volume production costs (as opposed to prototyping costs)
- Sustainability: are system parts available from more than one vendor? What maintenance and support will the product require?
- Manufacturability: what is the effect of component tolerances on system performance?, worst-case analysis, expected production yield, testability and compliance to regulations (e.g., FCC)

5.4 Itemized budget (0.5-1 page; 3 points)

Detailed budget of all costs expected to be incurred during the project (e.g., parts, fabrication services).

6 References (2 points)

Here you acknowledge all the documents that you used as references throughout the text. Please use the IEEE reference format (http://www.ieee.org/documents/ieeecitationref.pdf). Documents that don't follow these guidelines or that include incomplete references will be returned without review and will incur a late-submission penalty –refer to syllabus.

7 Appendices (2 point)

7.1 Product datasheets (optional)

Include product datasheets that may be particularly relevant to your proposed work. Say you want to use a certain type of microcontroller, because it has just the right combination features (e.g., types of I/O ports, or power consumption, etc). You would then attach datasheets for this product.

NOTE: including a data sheet does not replace the need for explaining how the component works and how it will be integrated in the system (section 4.2).

7.2 Bio-sketch (one paragraph)

Include a brief bio-sketch that describes your strength (software or hardware) and project related experiences.