# Final Project

[*Submit on Blackboard*](https://blackboard.usc.edu/)

## Goals

* Create a connected device prototype of your own design
* Device should demonstrate mastery of the concepts discussed in the course
* Device should include elements not explicitly covered in class

## Overview

The project is to create a prototype of a connected device. The final submission does not need to be “ready for manufacturing” but it must work and demonstrate the key functioning elements.

Project Requirements

* Be designed and built by the student solely. Inspiration may be taken from online and other sources, but sources must be cited and final project must be substantially different.
* Use at least two sensors we discussed in class
* Use at least two actuators (e.g. switch, button, etc.)
* Use cloud / internet connectivity in a meaningful way
* Must send data to a cloud system or storage
* Must receive feedback from cloud system to produce effects in the physical world (i.e. control device remotely)
* Must have an interface app to enable communication between a user and a device. It is recommended to use Losant but other systems may be used
* Comment your code and follow consistent coding convention
* Developer and user documentation (see below)
* Your project has to compile and run *(projects that fail to run will receive a 50% penalty)*
* No late submission will be accepted
* Note: in the coming weeks we will discuss the following components in case you want to include them in your project
  + Losant IoT cloud framework (for interacting with and making web apps)
  + Digital temperature and humidity sensor,
  + Ultrasonic distance sensor
  + accelerometer

Possible Project Ideas

* Head-mounted collision-detection and navigation wearable
* Earthquake monitor
* Retrofitted children’s toy
* Home monitoring station

## Deliverables

**Proposal – due 11/11/19 at 11:59 pm**

* Write a proposal document with following details:
  + Describe the problem or need you have identified, why you believe it is necessary to address, and how your device would address this need.
  + Describe the target audience
  + List the key features, sensors, interaction patterns (e.g. how will users interact with the device), and internet / cloud platforms
  + Rough budget for how much it would cost to build your device. You should include items in your kit as well as items not in your kit (e.g. building supplies, other sensors, etc.)
* *Note: If you later modify your project from your original proposal, you* ***must*** *submit a revised proposal which describes any changes. Failure to do will lose 10%*

**Project Milestone – in-class 11/26/19**

* Requirements
  + Fritzing diagram

**Project – final deliverables and demonstration due 12/12/19 @ 4:30 pm**

* In-person demonstration
* Photograph / video or device
* C++ source code (on Blackboard)
* Interface app (provide link on Blackboard)
* Device prototype (bring to class
* Developer documentation
  + Assume a future ITP348 student is taking the course and told to make a specific change to your project (add a feature, fix an error, etc.).
  + Provide instructions how to setup your device and then explain key elements (include any other helpful documentation like sequence diagrams, Fritzing diagrams, etc.)
  + Consider the following:
    - What would they need to know to setup your project and get it running?
    - What would they need to know to modify it? (Assume that they don’t want to read through all your code - they want some sort of a quick start guide that will help them identify where they should start looking/working first)
    - Give a general overview of all aspects of your project with sufficient detail for them to know where to look to make modifications.
* User documentation
  + Assume a non-technical person would like to use your device. What do they need to know to get started and to use specific features? (You can omit initial setup)

**Submission**

* Submit all documents via Blackboard
* Bring device to in-person project demonstration

Required naming convention (replace # with the current assignment number)

* **Project Name** 
  + itp348\_project\_lastname\_firstname
* **Zip File** (include entire project folder)
  + itp348\_project\_lastname\_firstname.zip

## Grading

|  |  |
| --- | --- |
| Item | Points |
| App proposal |  |
| Motivation / Need / Audience | **4** |
| Features | **4** |
| Budget | **4** |
|  |  |
| Project Milestone | **10** |
|  |  |
| Final Device |  |
| Sensors | **5** |
| Actuators | **5** |
| Sending data to cloud platform | **10** |
| Controlling device from cloud | **10** |
| User-Interface | **10** |
| In-person demonstration | **10** |
| Coding style and organization | **5** |
| Developer documentation | **5** |
| User documentation | **5** |
| Device fulfills original proposal features | **10** |
|  |  |
| Total | 97 |

Acknowledgements

* Thanks to Bill Siever for project format ideas (<https://classes.engineering.wustl.edu/cse222s/schedule/>)