

## ME 370 – Lab 3 Pre-lab

The Lab 3 Pre-lab contains **three** parts, it is important to know how the grading of each part will be completed, as not all parts are directly graded.

Pre-lab 3 consists of:

1. Completing and submitting your Team Contract.
2. Watching the Google Glass TED Talk.
3. Reading the attached section, “Introduction to Prototyping.”

Part 1, The Team Contract, will be completed as a team and **MUST** be submitted for a grade. Parts 2 and 3, the TED Talk and reading, do **not** require a submission (and thus are not graded), but note that individual peer evaluation scores may reflect preparedness.

### Part 1 (graded) – Team Contract

Please navigate to the course Canvas page and find the Team Contract with the other Lab 3 resources. **As a team**, you must complete the team contract and submit **one document** for the whole team on **Gradescope**.

### Part 2 (ungraded) – Google Glass TED Talk

Watch the video “*Rapid prototyping Google Glass - Tom Chi*” from a Google engineer talking about early prototyping efforts for the Google Glass.

Video link: [https://www.youtube.com/watch?app=desktop&v=d5\\_h1VuwD6g](https://www.youtube.com/watch?app=desktop&v=d5_h1VuwD6g)

### Part 3 (ungraded) – Introduction to Prototyping Reading

## ***Introduction to Prototyping***

### ***Why do we prototype?***

The typical function of prototyping in the design process is to either....

- **To communicate** - e.g. preparing a “proof-of-concept” to show investors what your ideas are
- **To discover** - e.g. building an early version to see if your ideas are technically feasible

- **Or both!** - e.g. creating a prototype to show to potential users (communicate) and gather feedback on (discover)

Prototyping helps get concepts out of our heads and into the real-world, where we can evaluate and iterate on them.

### ***Build to Think, not Think to Build!***

We can use prototypes we create to answer questions about our design concept. Oftentimes, we can speculate all we want, but we won't be able to answer some questions until we actually try our ideas out. In human-centered design, we call this concept "*Build to Think, not Think to Build!*"

Questions about our design concepts fall into two general categories:

- **Function** - how the concept is intended to operate/the technical requirements involved
- **Experience** - how the concept is intended to be used by its intended user

Prototypes don't have to test everything about a design concept; on the contrary, it's very common for prototypes to focus on individual elements of a design concept, relating to one or both of these categories.

### ***When does prototyping come into the design process?***

One great thing about prototyping is that if we ask the right questions and build the right prototypes early on, we can save ourselves lots of time, effort, and trouble later in the design process. Imagine a hypothetical startup working on a new phone application. If they spend 2 years of development with their heads down and doors closed, they might end up with a really technically-polished final product that meets all the requirements they set out to fulfill 2 years prior. However, they might also go to unveil their new app and discover that it doesn't actually fulfill the needs of their users after all, meaning a whole lot of time wasted.

On the flipside, asking critical questions and creating prototypes to answer those questions throughout the development process can help a design team "course-correct" as they go along, ensuring that their design continues to meet the actual needs of their users.

As a result, it's often advantageous to find tools and methods for prototyping that require a minimal amount of effort to create and use. Take the Google Glass video as an example - using just a few random objects located around the office, the team was able to simulate a single, critical element of their design's user experience. As a result of that simulation, the team decided

against their initial ideas around gestural controls, potentially saving them countless hours of development time.

We call these more “minimalist” prototyping methods ***low-fidelity***, as contrasted with ***high-fidelity***, which describes a prototype with more time, effort, and care put into it. Prototypes at different levels of fidelity are useful for different situations and different points in the development process.

- **Low-Fidelity Prototype** - A prototype developed rapidly and/or using improvised materials, often created earlier on in the design process.
- **High-Fidelity Prototype** - A prototype with considerable effort and care put into it, often created later on in the design process.

**How can we prototype?** The following is an inexhaustive list of prototyping methods and tools. Take some time to familiarize yourself with this list, and start to think about how you might be able to categorize them before the lab.

- Storyboard - *a series of images that tells the story of your design concept*
- Wireframe - *drawings of a user interface design concept*
- Manual Simulation - *walking a user through your design concept, recreating intended functionality through available means*
- Video Walkthrough - *demonstrating a design concept to a user via audiovisual presentation*
- Virtual Reality Simulation - *using VR to walk a user through your design concept, recreating intended functionality via digital experience*
- Sketch - *a drawing of your design concept*
- Office Materials - *creating a physical prototype with pens, paper, tape, paper clips, rubber bands, and other common office materials*
- Craft Materials - *creating a physical prototype with pipe cleaners, foamcore, hot glue, yarn, fabric, and other common materials you might find at a craft store*
- 3D-Printed Model - *realizing a digital model of a physical prototype through additive manufacturing*
- Manual Mathematical Modeling - *using equations to theoretically predict the behavior of a design concept*

- Computer-Aided Mathematical Modeling - *using equations and the help of a computer to theoretically predict and/or simulate the behavior of a design concept*
- Engineering Drawing - *a detailed drawing showing dimensions, multiple views , etc.*
- Breadboard Circuit - *building out an electronic design concept using temporary connections*
- CAD Model - *a digital model created using a 3D modeling software*
- CAD Assembly Model - *a detailed 3D model incorporating multiple files for separate components*
- Power Point Animations – Using simple colored blocks in power point to describe geometry or animate motion
- Custom PCB - *ordering a PCB of your design concept to solder connections onto*
- Distorting an Existing Design - *taking an existing design concept that's similar to yours and making changes to it*
- Early Working Version - *a fully- or nearly-fully-functional version of your design concept*