

6.170 Project 4.1 Design Document

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Purpose, Motivation & Goal

Urop.io is a web application that connects students to the UROP supervisors and projects that are right for them. 85% of MIT undergraduates do a UROP during their time at the Institute; yet, the process of finding and choosing a UROP can be daunting. Though there are many parts on the path to obtain a UROP -- including find the right project, filling out the formal UROP application through the UROP office, and submitting onboarding documents for a particular department -- our application focuses on the first stage, that of finding the right match.

Identifying UROPs of interest

There are hundreds, if not thousands of postings spread over department websites, individual lab websites, joblists, and the official UROP office website. Students can spend hours culling through all the postings by hand, trying to find a project they are interested in. At the same time, Supervisors struggle with finding the right means to publicize their openings to reach as many students as possible.

Reaching out to professors

Assuming a student does find a potential project, many students, especially under-classmen tend to feel intimidated at the prospect of emailing the supervisor to express interest. The need to write many, separate emails for each opening is tedious as well, and supervisors can have a hard time keeping track of all the interest applicants.

Selecting who to work for

Finally, after a student has a UROP offer in hand, he or she rarely has enough information to make an informed decision on how good of an experience they will have with a supervisor.

Goals

Urop.io goal is to solve these problems by providing a central repository UROP postings. Supervisors reach a broad audience by submitting their postings to urop.io, which are viewable and searchable by all students at MIT. Urop.io also provides a means for students to apply directly to postings they like, eliminating the need to write tedious introduction emails, and a means for professors to see all the applicants in one place. Finally, urop.io provides an outlet for student feedback on the UROP experience, where students write and read useful student-generated reviews of past experiences with specific supervisors to help them decide who to work for.

Key Concepts

- **Supervisor:** A supervisor is anyone at MIT who is eligible to sponsor a UROP project, such as a professor, post-doc, or research scientist.
- **Student:** Any undergraduate student at MIT.
- **Review:** A review is written by a Student to review their overall UROP experience, after their UROP project with the Supervisor is completed. A review has numerical ratings, as well as room for free-form comments. A review's function is to help other students decide which projects they should take on, and who they should work for; accordingly, reviews are viewable only to other students.
- **UROP:** A project, usually spanning a semester or summer that is sponsored by a faculty member under MIT's Undergraduate Research Opportunities Program.
- **Posting:** An advertisement of a UROP project, posted by a Supervisor. It contains a brief description of the project, the prerequisites/skills required, the name of the lab/group, and contact info of the supervisor.
- **Application:** An application, submitted by a Student for a particular Posting, makes the following available to a supervisor: a student's profile, with optional resume, and an optional text box where the student can write a personalized note to the Supervisor.

Feature Descriptions

- **Central repository for UROP postings**
 - Supervisors can submit postings for UROP projects, viewable by all students.
- **Search for UROPs**
 - Students can search for a preferred UROP based on interest, skills and ratings of the previous UROP experiences sponsored by a faculty member.
- **Simple application process**
 - Students drop their profile, short note, and resume for UROP postings they are interested in
 - Applications are instantly available to supervisors, who can get in touch (outside the application) with the students that are right for them.
- **Review UROP experiences**
 - Student will be able to write reviews of their previous UROP experiences, viewable to all students and all supervisors. Reviews may be anonymous.

Security Concerns

- **Fraudulent reviews:** Students should not write fake reviews for UROP experiences they did not have, and should not use the app to retaliate against professors they did not like.
- **Impersonation of roles:** Students should not be able to impersonate faculty members and

advertise for fake UROP postings.

- **User data privacy:** Users will only be able to access their personal profile and not that of other students.
- **Password exposure:** Password fields (rather than text fields) are used on login and signup forms to reduce the likelihood of exposed passwords. In the database, passwords are stored in hashed form, so that accidental database exposure does not put user passwords at risk.
- **SQL & JavaScript injection:** Attackers may attempt to include SQL and JavaScript code in any input in our app. To avoid the likelihood injection attacks, the app will sanitize all inputs before processing them (only needed parameters accepted in required form).
- **Packet sniffing:** Attackers may attempt to collect user's login details or cookies via packet sniffing. To prevent this, the app will utilize SSL for requests (HTTPS protocol)

Design Challenges

One major design challenge was to make the review system useful and secure for students and supervisors.

In order to achieve this, reviews must be authentic and honest. However, there is potential for fraudulent review. For example, a student might write a fake review to bad-mouth a professor they had a bad class experience with, or a student may impersonate another student to ruin their online reputation. At the same time, we want to make sure students who genuinely have negative, but constructive feedback are not deterred from making themselves heard. To balance these concerns, we made the following design decisions.

Anonymous reviews & verification

Students have the option to be anonymous when they submit a review. These reviews are visible to all students and supervisors in the system. On balance, we assume most students are not malicious and will post honest reviews, believing that the information will be useful to other students. Furthermore, if there are many reviews aggregated over multiple semesters from many different sources, a single review has less influence, and students can use their own judgment to make a decision about how to use the information. Thus, we accept that it is ok to be anonymous if one does not feel comfortable posting a negative review.

An alternative was to require everyone identify themselves in a review, but we decided this would make the barrier to entry too high and discourage negative, but honest feedback, ultimately negating the purpose of the review system. Though it would deter people from posting fraudulent reviews and make verification easier, we decided it was more important to encourage participation, assuming the risk of the occasional fake review.

As a check against fraud, however, the application will send students an email verification link upon profile creation, making it more difficult for students to impersonate other students. An alternative was to require MIT certificates for students to access the site, but we decided that if a student wants to post an anonymous review, the fact that they were identified with their certificate

would deter them from doing so.

Who should see the reviews?

We also decided to make the reviews available to supervisors as well. Though this was a controversial decision, we decided that feedback should be available for everyone to view. An alternative was to hide the reviews from the supervisor, but we realized that supervisors would likely find it strange if they were unable to see feedback specifically relevant to them.

Additionally, though making reviews only available to students would achieve the primary purpose of helping students choose the right UROP, by making students feel more comfortable to comment, we realized that supervisors could also benefit from candid feedback about their effectiveness as a UROP supervisor. This way, we better the UROP experience in two ways: students can find the right UROP based on reviews, but supervisors also have an incentive to improve as well.

A challenge, however, is that we recognize that this could increase the barrier to comment for students; when one reviews a UROP experience, though they may be “anonymous,” it is often easy to narrow down who they might be -- for example, if a supervisor had only 2 UROP students in a semester. However we assume that if a UROP student had a bad experience with a supervisor, the supervisor was likely aware of the situation and had resolved the conflict offline. The negative review would not be written to inform a supervisor of a problem he/she was unaware of, but instead to provide guidance to other students considering UROPing for the supervisor. Thus, negative reviews do not surprise supervisors and should not deter people from commenting.

Should the reviews be project, or supervisor focused?

Another challenge was to decide what questions the review form should ask. We could ask about project specific questions (e.g. how difficult was the project, what languages did you code in?) or more supervisor-focused questions (e.g. how accessible was your supervisor, did they help you succeed, etc). We decided students would be interested in both, so we included questions addressing both aspects. However, we weigh supervisor-specific comments more heavily, as ultimately, the effectiveness of a supervisor will make or break a successful UROP experience.

To balance these, we have a mix of numerical and free-form ratings: overall 1-5 rating of experience, 1-5 rating of supervisor, time commitment/week, and whether or not a student would recommend the experience to others. To make sure students could easily access supervisor reviews, we decided to tie each review to a supervisor.