CS 5000: Theory of Computation
Assignment 9: Final Project Proposal

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1. Learning Objectives

1. Technical Writing
2. Project Planning

2. Project Proposal

I took an extra day to think whether to go with a project proposal or simply assign a final project. That is the reason why this assignment is posted 20 hours later than usual. In all previous versions of this class we had either an assigned final project or a final exam. For example, last year we had a line following robot competition. I would like to try something different this year and have you submit a final project proposal.

For those of you who have never had to submit a project proposal before, the basic idea behind a final project is to give you a chance to do something a little more significant than a regular weekly assignment. The purpose of submitting a document, in addition to giving you some practice with technical writing (graduate students, take heed!), is for both you and I to have a clear understanding of what you will work on. This will also help identify potential problems now instead of one day before the project is due (the exam week). I also want to make sure that you neither do too much or too little. In the end, I want you to have a successful project and have some fun implementing your idea or writing about it. Here are some suggestions:

- Some of you are graduate students and research-oriented undergraduates who think about going to grad school. Pick a theory topic, e.g., NFA or parsing, and investigate how it is used in a specific research area, e.g., genome analysis or information extraction.
- You are taking another class, e.g., data mining or bioinformatics, where some theory concepts, e.g., converting regular expressions into NFAs, may apply. Talk to the professor who is teaching that class and share your ideas with him. If the stars align, you may get double credit for the same project.
- Think of an idea you want to try on a Junun robot. Perhaps, you would like to investigate a formation application where one robot follows a line and another robot or two follow the leader. You already have a reasonable JAL code base to start from.
- Implement a simulated flight control package for a drone. I plan to talk more about this one in class on Tuesday.
- The Junun and drone projects are great opportunities for small teams of two students working together. I do not like teams of more than 2 students in my classes, because sometimes it is next to impossible for me to evaluate the team members' individual contributions or the famous Pareto principle kicks in: one motivated and talented individual ends up doing 80-90% of the work. This is still possible when you work in pairs but less likely.

Your proposal should describe your project in as much detail as possible. This will force you to plan and design your system ahead of when you are actually coding it. Your proposal should be written in such a way that you could give it to another developer with an appropriate skill level and they could build your application using your proposal as a guide to the design.

Your proposal for this class should contain, at a minimum, the following information:

1. **Basic Description** (2 paragraphs): A basic description of what you or your team of 2 students will do. This should be a short description describing the basic features and a typical use case.
2. **3rd Party Libraries, API's, data sources** (2-3 sentences per resource): Describe any 3rd party tools or resources you want to use. If a tool is available online, give a working URL.
3. **Risks**: List the parts of the project with which you have concerns and that may cause you potential coding or scheduling problems. All projects have risks associated with them. The trick is to manage the risks and address them earlier rather than later.
4. **Skills**: Brief description of your skills relevant to the project.

3. What and Where to Submit

Submit your project proposal as PDF through Canvas.