

CSE 30151 Theory of Computing

Spring 2018

Extra Credit Options

Version 1: March 21, 2018

1 Overview

The list of extra credit problems listed below are all optional, and to be done by individual students unless otherwise specified. Only one extra credit project will be accepted per student. If completed satisfactorily, the submitting student will receive credit approximating one half of any of the required projects. Typically this will be enough to raise a student's grade by a letter grade.

Extra credit will be considered only after all required grades are accounted for, so that extra credit points WILL NOT distort the grading scale for students who do not attempt any extra credit.

The extra credit projects should ideally be chosen so that the resulting experience will materially improve the student's understanding of topics relevant to this course.

2 Extensions of Class Projects

A valid extra credit project is to take one of the required class projects, and perform activities that would have been required if there had been one more student in the team size. Thus, for example, if a student did a single-person DFA for the required project, then building an equivalent NFA to DFA converter is an acceptable project.

Several students have already done this, and thus have already satisfied the extra credit process.

3 Arduino FST

A particularly interesting project to the instructor is to design an FST to run on an Arduino. This FST should accept inputs from some sort of sensors and do something interesting as a result (light a light, start a motor, ...). Console inputs can be part of this.

The instructor has a wide variety of such sensors and effectors available, which will be posted as a list.

Unlike the FST from the class project, this implementation need only support a single machine file representing the FST's delta function. Thus the transitions could be "hard-coded" into tables defined at startup of the Arduino.

Part of the documentation for this project shall be a description of the “language” accepted by your FST.

4 SAT Solver

Also posted on the web site is a project from the Fall 2017 that determines if boolean clauses are satisfiable. Any one of the three projects described there are acceptable extra credit projects.

5 Bipartite Matching

Another extra credit project choice would be to design a program that determines if a bipartite graph has a perfect matching where all vertices have exactly one edge to a vertex of the other class.