# Semester Project Proposal

CMPT 440

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A deterministic finite automaton (DFA) can be represented by any device that performs a set sequence of actions in response to events that occur. A real-world example of a DFA is a dial combination lock. This finite state machine takes input through an individual turning the dial to a certain position. To successfully open a combination lock, the dial must be turned three times to the right, stopping at the first number. Next, the dial must be turned to the left and stop at the second number. Third, the dial must be turned to the right, landing on the last number in the combination. Only then can the shackle be pulled up and the lock opened. Though the combination lock may seem simple, there are a number of mistakes that can be made along the way resulting in an error state instead of an accepted state. If any part of the combination is incorrect, the user must begin again from the start state. For this DFA, the alphabet would include all the numbers that are on the combination lock. Since there are many different types of combination locks, the one to be used contains a circular dial with the numbers zero through thirty-nine on it along with an indicator arrow in the top middle of the lock. The only possible end state for the combination lock is a correct combination entered, although there are some types of combination locks that come with a master key in case the combination was forgotten. Through the analysis of the workings of a dial combination lock, I hope to understand the complexity of what seems to be a simple locking mechanism, but has been used for many years to protect items from those who are unaware of the correct sequences of states required to open the lock.