

Joshua Pitts

CS312: Exam 1

The machine simulated by this DFA/regular expression combination is a Dryer with a digital display and a selection of buttons.

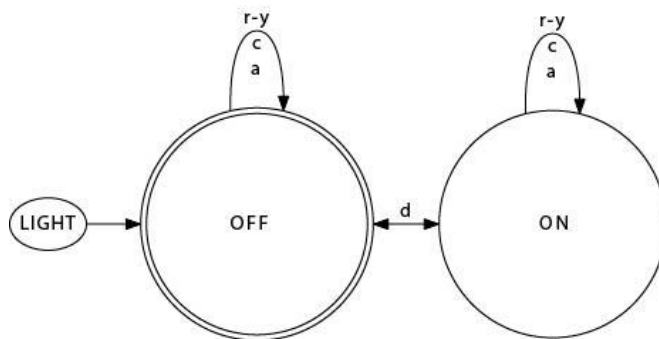
The Language:

a	auto
c	clear
d	door
r	Wrinkle remove
s	start
t	timed
u	Tmode up
v	Tmode down
w	Time up
x	Time down
y	on
z	Decrease timer

Light:

$[acr-y]^*d(d[acr-y]^*d|[acr-y])^*d[acr-y]^*|[acr-y]^*[acr-y]^*d(d[acr-y]^*d|[acr-y])^*$

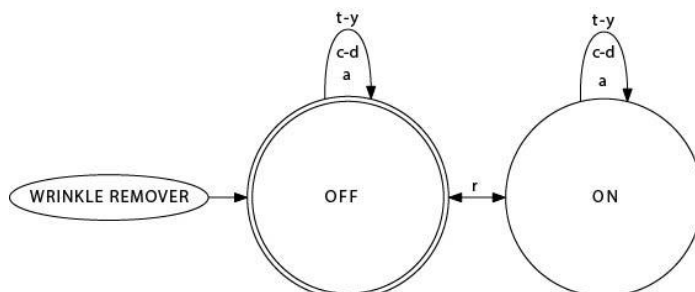
The light on the machine only engages when the door to the dryer is open. So we have an expression that defaults to the off position and making a transition between states as the door is opened and closed.



Wrinkle Remover:

$[acdt-y]^*r(r[acdt-y]^*r|[acdt-y])^*r[acdt-y]^*|[acdt-y]^*[acdt-y]^*r(r[acdt-y]^*r|[acdt-y])^*$

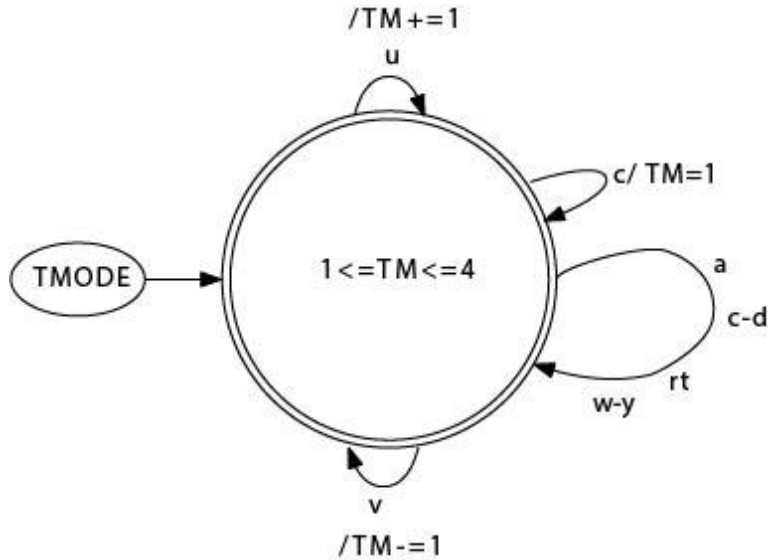
The wrinkle remover is a special mode added to the end of a drying session to address any wrinkles in the clothes, it can be toggled on/off by the user at any time.



Drying Temperature Modes:

$([acdrstwxy]^*(u|v))^*$

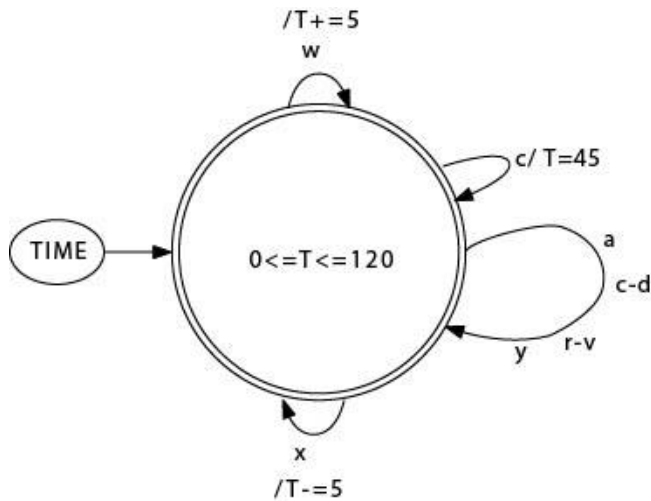
The 4 different drying Tmodes are simulated using numbers 1-4. Pressing the mode up/down button will cycle through the Tmodes and output the TMode variable.



Time(for timed drying):

$([acdrstuvy]^*(w|x))^*$

The time DFA defaults the time variable T to 45 minutes. The time up/down buttons increment/decrement by 5 minutes the amount of time the dryer will run in timed drying mode.



Main System:

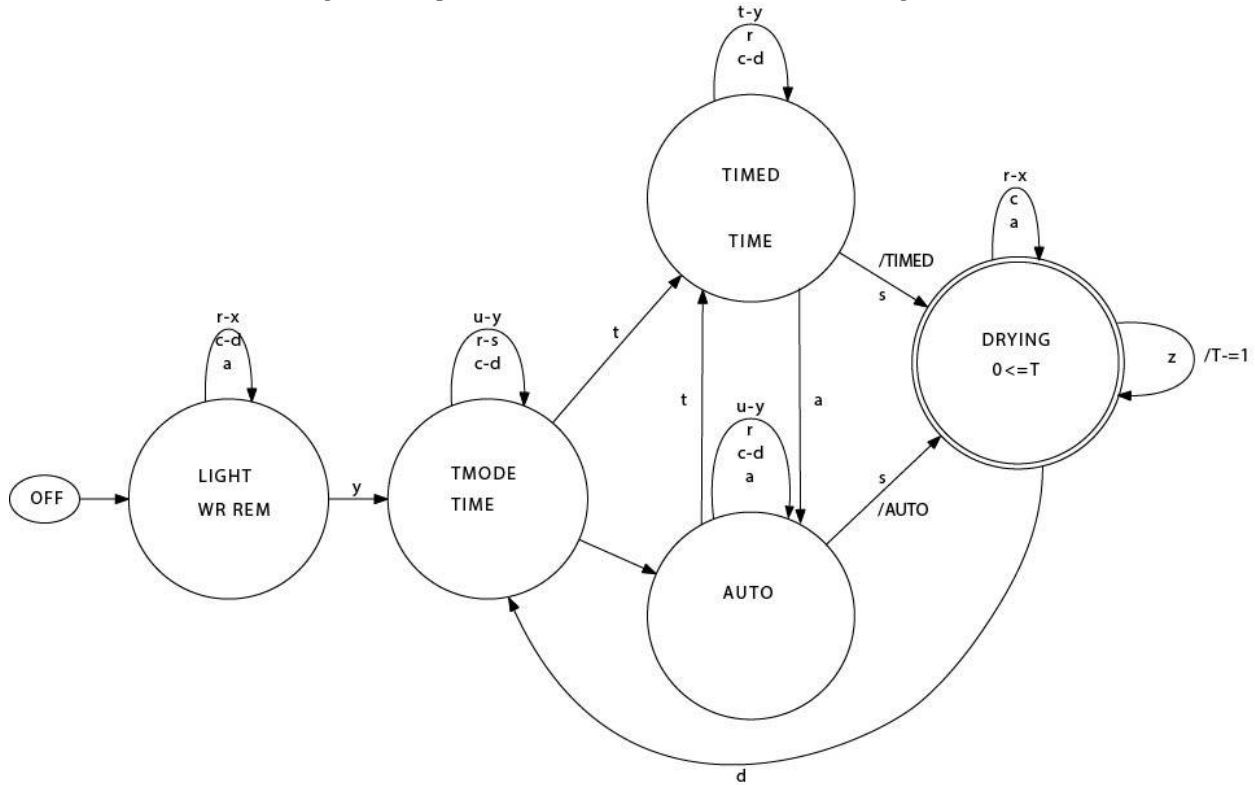
On: [acdrstuvwx]*y Regular expression for turning the machine on.

Auto: [cdrsuvvwx]*a[acdruvvwx]*s Set drying mode to Automatic.

Timed: [cdrsuvvwx]*t[cdrtuvvwx]*s Set drying mode to Timded.

Combined: on(auto|timed)

The combined regular expression results in the following DFA:



This DFA of a model shows the states and transitions that control the system. The user is able to input a number of commands allowing them to control the mode in which the dryer will dry the clothes. These two modes are timed, which will run the dryer for an amount of time set by the user, and auto. The auto mode will run until the dryer has determined that the clothes are dry. In the timed mode, the drying state will gradually reduce the time variable until it reaches 0. The user may open the door at any time which will reset the settings and transition the state back to setting the Tmode and time for the operation.