CPE 301 Team Project

Fall 2020

Project Overview

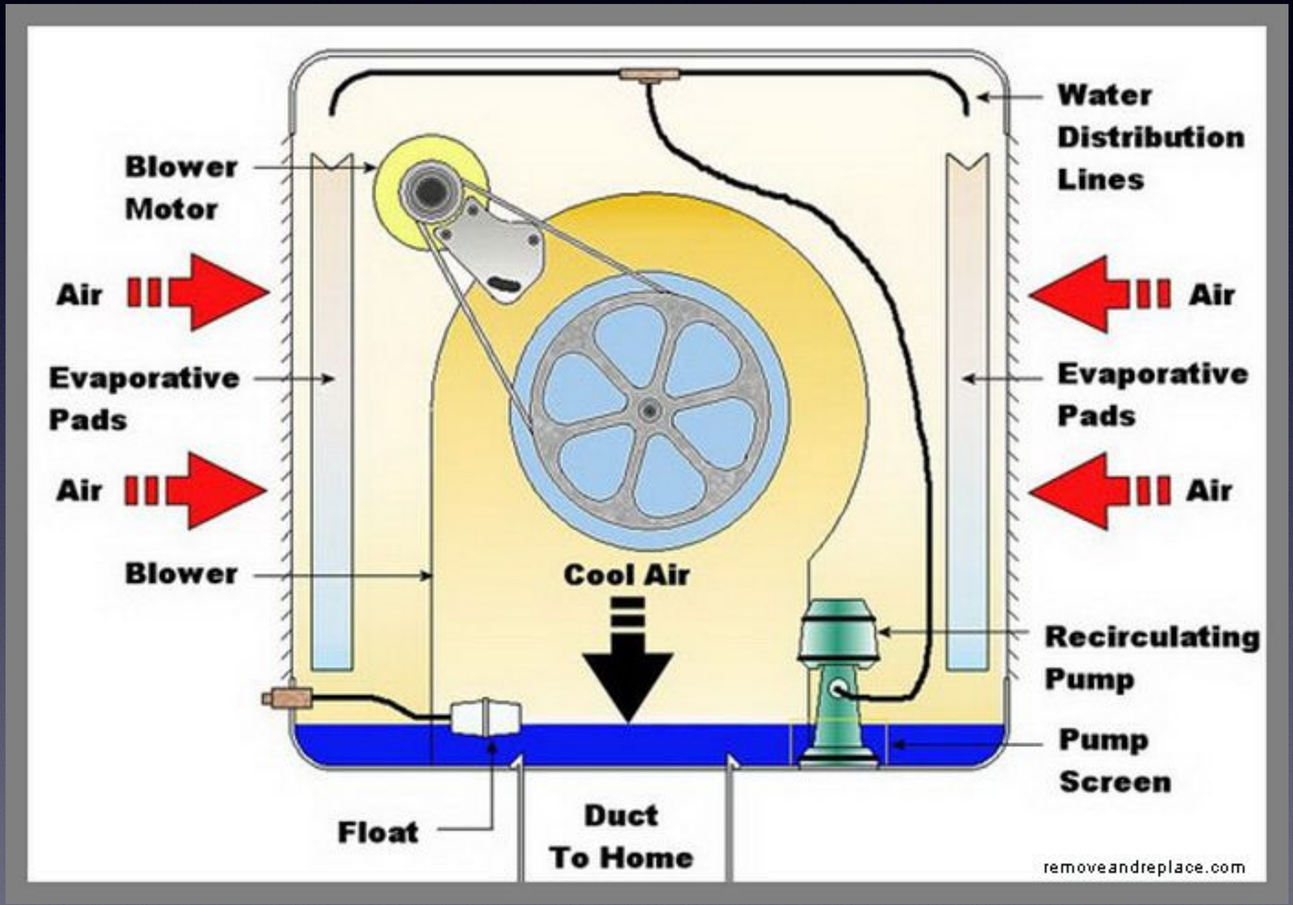
- The goal is to create an evaporation cooling system (aka a swamp cooler)
- Teams will consist of two students
- Each student in the team will receive the same grade*
- The project is designed to allow you to create a realistic embedded system that encompasses most of the technologies discussed in class
- As an added bonus, you will use Git to manage source code
  - Instruction will be provided!

* This assumes equal contributions!

What is an Evaporation Cooler?

- In dry, hot climates, evaporation coolers provide a more energy efficient alternative to air conditioners
- Air is pulled in from the outside through a pad that is soaked in water.
- The evaporation of the water cools and humidifies the air
- They are *not* recommended for environments where the air is humid

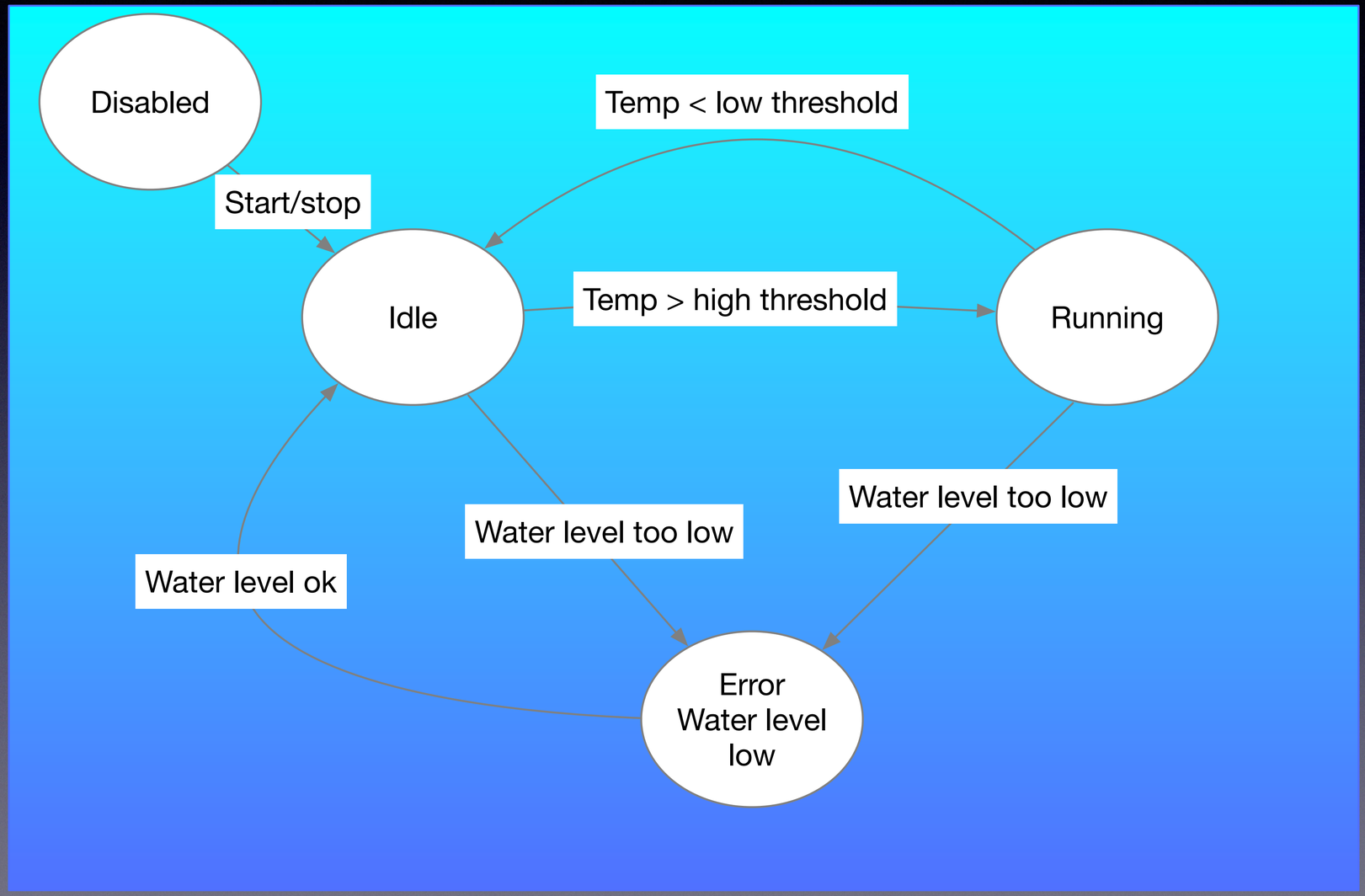
Swamp Cooler



System Requirements

- The completed system will
  - Monitor the water levels in a reservoir and print an alert when the level is too low
  - Monitor and display the current air temp and humidity on an LCD screen
  - Start and stop a fan motor as needed when the temperature falls out of a specified range (high or low)
  - Allow a user to use a control to adjust the angle of an output vent from the system
  - Allow as user to enable or disable the system using an on/off button
  - Record the time and date every time the motor is turned on or off. This information should be transmitted to a host computer (over USB)

Partial Project State Chart



State Details

- All States
  - Humidity and temperature should be continuously monitored and reported on the LDC screen
  - System should respond to changes in vent position
  - Stop button should turn off motor (if on) and system should go to disabled state

Disabled State

- YELLOW LED should be lit
- No monitoring of temperature or water should be performed

IDLE State

- System should monitor temperature and transition to running state when temperature > threshold (you determine the threshold)
  - Exact time stamp (using real time clock) should record transition times
- Water level should be continuously monitored and state changed to error if level is too low
- GREEN LED should be lit

Error State

- RED LED should be turned on (all other LEDs turned off)
- Motor should be off and not start regardless of temperature
- System should transition to IDLE as soon as water is at acceptable level
- Error message should be displayed on LCD

Running State

- BLUE LED should be turned on (all other LEDs turned off)
- Motor should be on
- System should transition to IDLE as soon as temperature drops below lower threshold
- System should transition to ERROR state if water becomes too low

Deliverables

- Project Overview Document
- Github repository holding all source code
- Video of the system in operation

Project Overview Document

- Document Contents
  - An overview of the design and any constraints on the system (example: operating temperatures, power requirements, etc)
  - Pictures of the final system and a link to a video of the system in operation
  - A complete schematic, and links to all relevant specification sheets for the components used
  - A link to the Github repository
  - A test plan based on the system requirements

Github Repository

- Github will be used to store the source code for the project
- Checkins must include reasonable comments
  - “asdf” and “we are sunk” are not reasonable comments :-)
- There should be evidence of contributions from both team members

Video of the System

- Video should show the completed system in operation
- There should be some narration explaining the operation (ok if only one team member does the narration…)
- Maybe some nice background music - not too loud, and ***no Nickleback***