



**IDENTIFY**  
OBSERVED ABNORMAL FISH  
BEHAVIOR → INVESTIGATING  
AI'S EFFECTS ON ENVIRONMENT



**FINDING CLIENT**

SONYA PANTINO, MICROSOFT  
TECHNICAL PROGRAM MANAGER  
PRESENTED ISSUES MODERN  
TECH BRINGS



**RESEARCH**

FOUND THAT AI DATA CENTERS  
OVERHEAT WATER SOURCES  
(THERMAL POLLUTION) AND  
STRAIN RURAL COMMUNITIES



**EXPERIMENTING W/ DESIGN**  
BUILT TOFU COOL : A SOLAR-POWER  
WATER TEMPERATURE REGULATION  
SYSTEM; MULTIPLE ROUNDS OF  
TESTING

**BRAINSTORM & CREATE**  
THOUGHT OF SOLUTIONS THAT  
WOULD ADDRESS THE NEEDS OF  
COOLING WATER AND BEING  
SUSTAINABLE; FIRST  
PROTOTYPE



**FEEDBACK**



RECEIVED FEEDBACK FROM OUR CLIENT AND COLLEGE  
STUDENTS; FURTHER INTEGRATED FEATURES RESULTING IN 2  
MORE ITERATIONS AS WELL AS SCHOOL BOARD PRESENTATION

## user requirements

Explicit

Implicit

Sustainable

- Minimal maintenance
- Low environmental impact

Scalable

- Easy installation
- Compact and modular

Autonomous

- If statement loop code
- Arduino uno

Energy Efficient

- Solar panels used to power the radiator

## conclusion

This device meets our user needs as well as address the problem statements we identified. It is affordable as well as sustainable and self-sufficient. It will regulate the temperature of lakes, rivers, and municipal water sources that are used to cool AI data centers. It can be used in public parks, reservations, or even people's backyards in addition

"Guau! You all really did great pulling the prototype together and the proposal has a lot of great information!" - Sonya Pantino



# TEAM MAPO

Seniors @ Early College High School, Salem, OR  
Melissa Miranda | Abu Balogun | Panha Sen | Oscar Amaro  
Advisors: Devon Reeseburg | Jo'lynn Espinosa

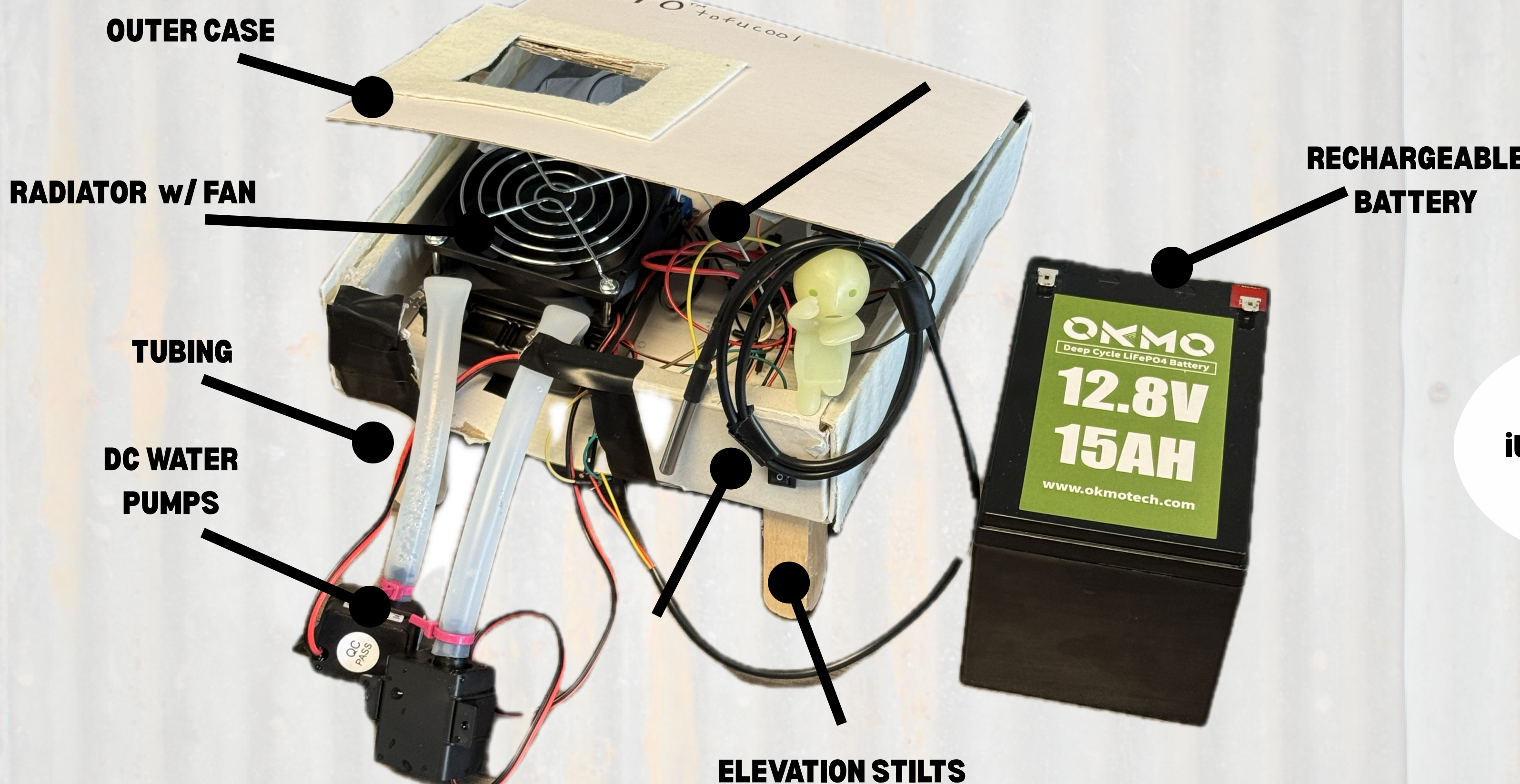
# tofucool

A Solar-Powered Water Temperature Regulation System Designed to Offset Thermal Pollution and Water Scarcity

## problem statements

- AI and quantum data centers use excessive energy
- Heat discharge causes thermal pollution in water sources
- Aquatic ecosystems are negatively impacted
- Addressing U.N. Sustainable Development Goals: 6, 7, 11, 14:
  - Clean Water & Energy, Sustainable Cities, Life Below Water

## CURRENT PROTOTYPE



### first iteration



- STRENGTHS**
- Quick visualization of layout and water flow concept
  - Helped team map input/output relationship early
- WEAKNESSES**
- Non-functioning
  - Not durable

### second iteration



- STRENGTHS**
- Functionally complete; system turned on/off based on temp
  - Demonstrated successful sensor logic and automation
  - Compact, reliable circuit
  - Real-time testing possible
- WEAKNESSES**
- Housed in simple enclosure; lacked structural elevation
  - Fan cooling effectiveness was limited due to poor ventilation
  - No solar controller or LCD implemented
  - Aesthetic and durability were still low

### current iteration

- STRENGTHS**
- Elevation improved gravity-fed flow + cooling efficiency
  - Better air circulation around radiator/fan
  - User control enhanced with switch
  - Appearance more aligned with deployable device
  - Modular form easier to install in field sites
- WEAKNESSES**
- Still lacks integrated solar controller and panel
  - LCD and data display not yet added
  - No long-term field data
  - Not waterproofed for extended outdoor deployment

### code

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2 #include <Arduino.h>
3 #include <Wire.h>
4 #include <Adafruit_GFX.h>
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447 #include <Adafruit_MCP23452.h>
448 #include <Adafruit_MCP23453.h>
449 #include <Adafruit_MCP23454.h>
450 #include <Adafruit_MCP23455.h>
451 #include <Adafruit_MCP23456.h>
452 #include <Adafruit_MCP23457.h>
453 #include <Adafruit_MCP23458.h>
454 #include <Adafruit_MCP23459.h>
455 #include <Adafruit_MCP23460.h>
456 #include <Adafruit_MCP23461.h>
457 #include <Adafruit_MCP23462.h>
458 #include <Adafruit_MCP23463.h>
459 #include <Adafruit_MCP23464.h>
460 #include <Adafruit_MCP23465.h>
461 #include <Adafruit_MCP23466.h>
462 #include <Adafruit_MCP23467.h>
463 #include <Adafruit_MCP23468.h>
464 #include <Adafruit_MCP23469.h>
465 #include <Adafruit_MCP23470.h>
466 #include <Adafruit_MCP23471.h>
467 #include <Adafruit_MCP23472.h>
468 #include <Adafruit_MCP23473.h>
469 #include <Adafruit_MCP2347
```