

LSDesign

Design and Make Project

Group Members :

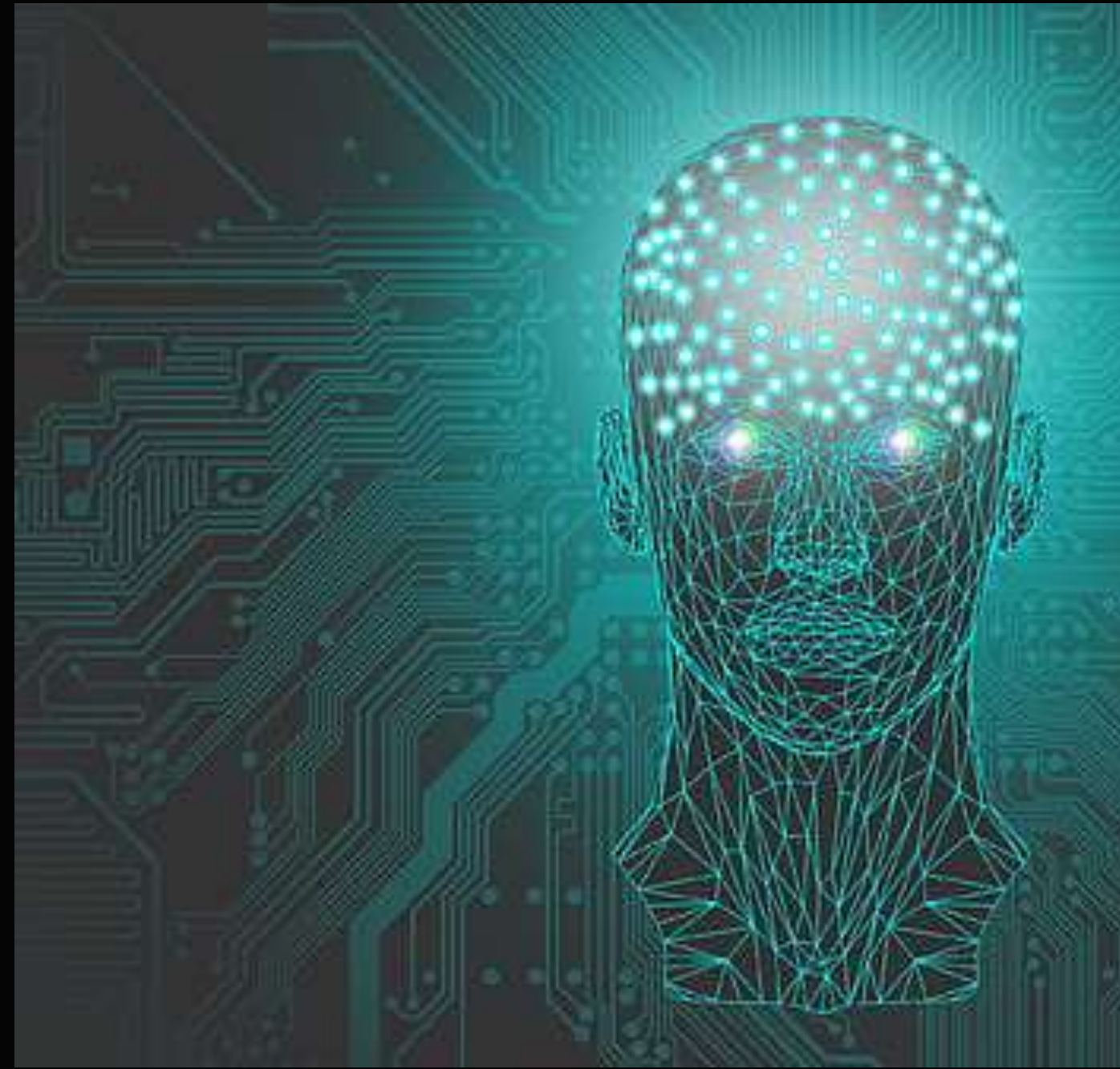
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Smarter Cooling for Hot Days

Temperature-Adaptive USB Fans



The Problem: Inefficient Cooling



Rising Summer Heat

Extreme heat waves are becoming more frequent and intense.



Constant Fan Speed

Traditional USB fans operate at a fixed speed, wasting energy.



Lack of Comfort

No temperature adjustment for optimal personal comfort.

Our Solution: Adaptive Cooling

Temperature-Based Adjustment

Fan speed automatically adjusts to the surrounding temperature.

Temperature Sensor

Embedded to read the ambient temperature.

Maintains Portability

Compact and easy to use, just like a standard USB fan.

Design Evaluation & Justification

We are considering the following improvement directions before choosing this one:

Idea	Benefits	Drawbacks
USB Fan with Cooling Gel Inserts	Temporary relief, passive cooling	Bulky, messy, not reusable, not feasible
Solar-powered USB Fan	Eco-friendly, uses sunlight	Not usable indoors/night, not feasible
Temperature-controlled USB Fan	Energy saving, user comfort, responsive	Slight increase in circuit complexity

- **Selected Idea - Temperature-controlled fan, offers high impact for low cost and technical feasibility**
- **Reason – The only financially feasible option, that would not increase the price of the product significantly and saves energy**

How It Works: Temperature Control

1

Temperature Sensor

Sensor accurately reads the surrounding temperature.

2

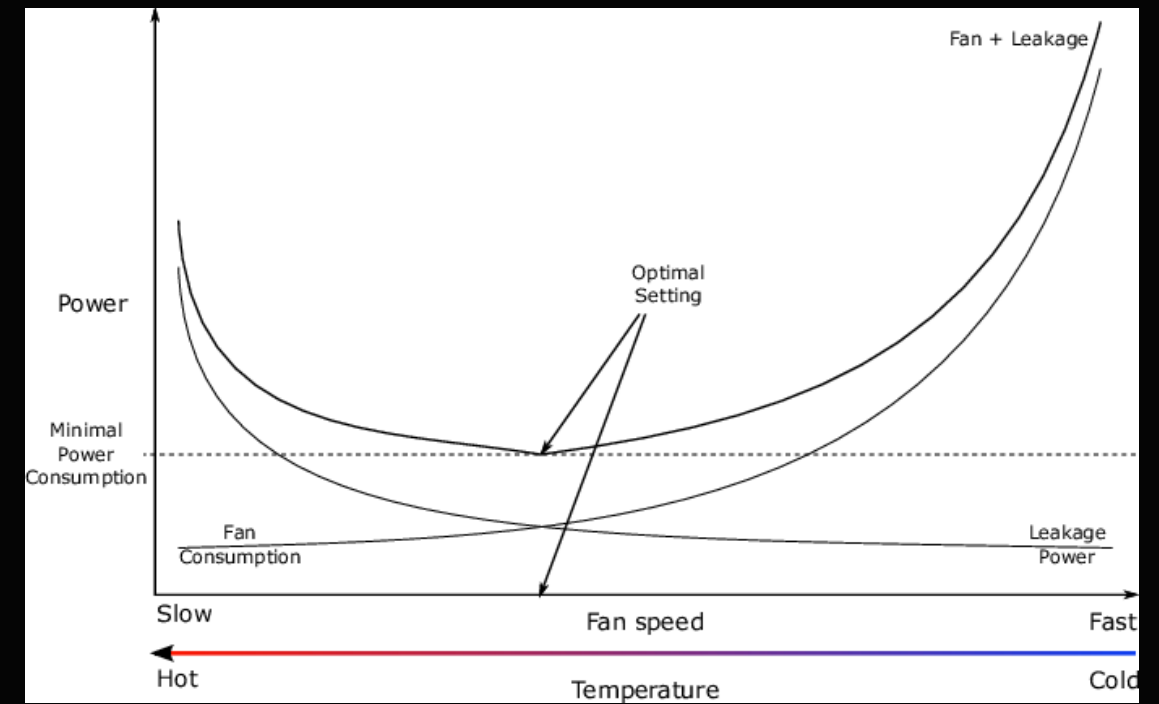
Microcontroller

Adjusts the fan speed by changing the PWM signal.

3

Fan Motor

Fan speed increases in heat and decreases in cooler conditions.



BOM (Bills of Material)

Component	Function	Material	Process	Qty	Notes
Fan Blade	Airflow	Polypropylene	Injection molded	1	Flimsy
Motor	Spins blade	Copper/metal	Assembled unit	1	5V DC motor
USB Cable	Power input	PVC + copper	Extrusion	1	Reusable
Arduino Uno	Control system	PCB + plastic	Assembled	1	External chip
DST Temp Sensor	Temp sensing	PCB + metal	Assembled	1	DHT11 or similar

Prototype Showcase

Modified Components

- Temperature sensor added
- Microcontroller integrated
- PWM circuit implemented

The prototype showcases the integration of a temperature sensor and a microcontroller into a standard USB fan. These modifications enable the fan to adapt its speed based on the ambient temperature. At 25°C, the fan runs at low speed. Above 30°C, speed ramps up linearly.



Key Benefits: Comfort and Efficiency



Adaptive Comfort

No more reaching for the switch – automatic speed scaling enhances convenience.



Rechargeable Battery

Optional – can add a 18650 battery for off-grid operation.



Reduced Noise

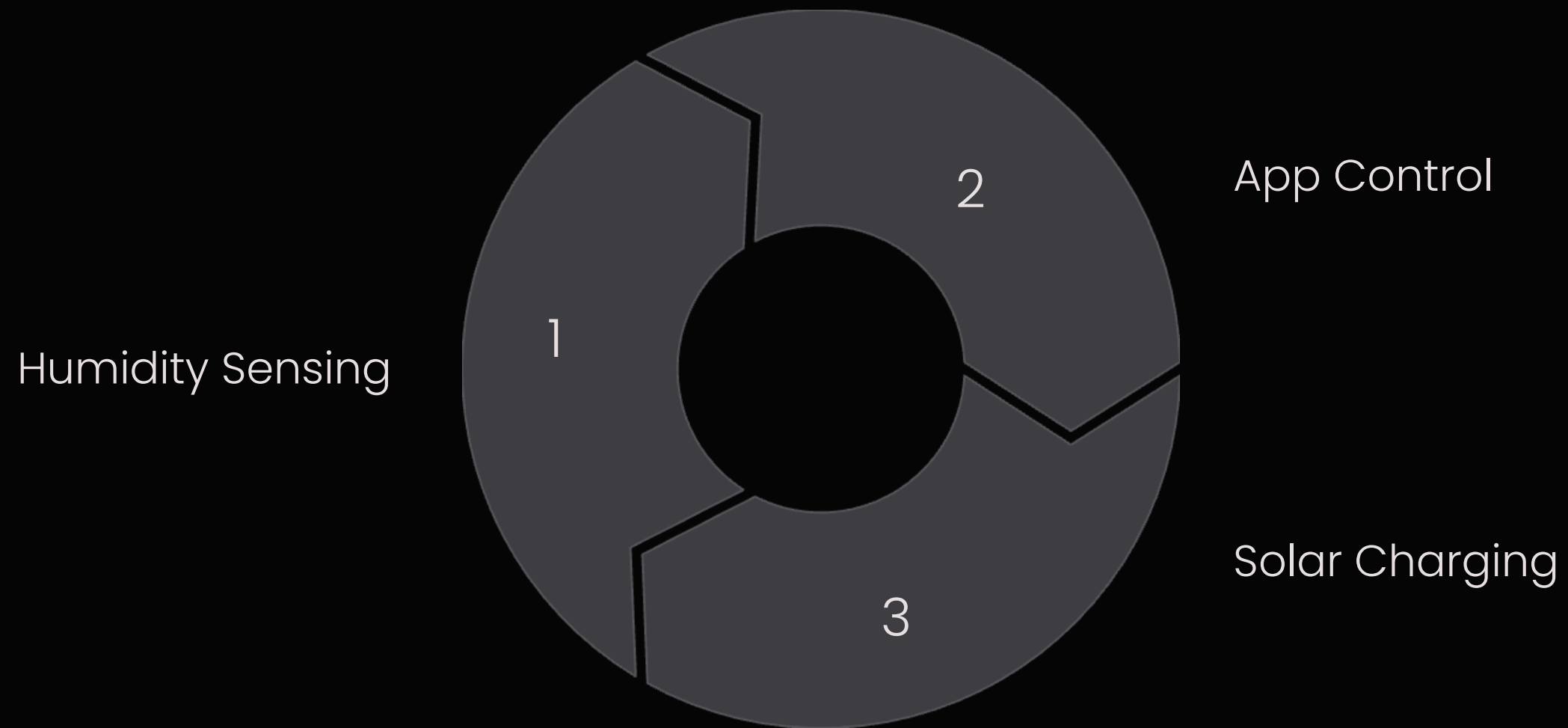
Runs quieter at lower speeds when temperature is lower – great for night use.



Eco-Friendly

Lowers average energy use by 30–40% compared to always-on fans.

Future Innovations



Thank You !