

SleePose



CONTENT

01 Problem

02 Solution

03 Budget

04 Reflections

05 References

01

Problem



Sleep quality heavily depends on pillow shape and position changes.

Current pillows are static and cannot adapt to real-time body movement.

No existing pillow offers fully 3D adaptation to a sleeper's movements.



General features

- Multi-zone (Max 3) inflatable air cells
- Embedded snore-detection microphone triggering
- Bluetooth-controlled pneumatic pump with 8-hour battery life

Solution

Key Features

- 6-Zone Pressure Array
- Six Independent Actuators
- Continuous Closed-Loop Control
- Dynamic Sleep Profiling

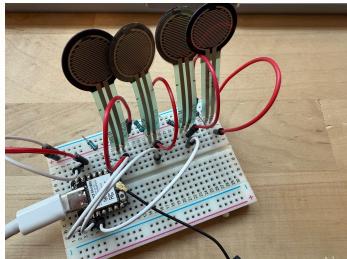
A smart pillow with a pressure-sensing array that continuously maps head orientation, sleep position, and pressure points. Six actuators reshape it in real time for personalized support all night.



Pressure Sensing

ITERATION 1

Regular pressure sensor



ITERATION 2

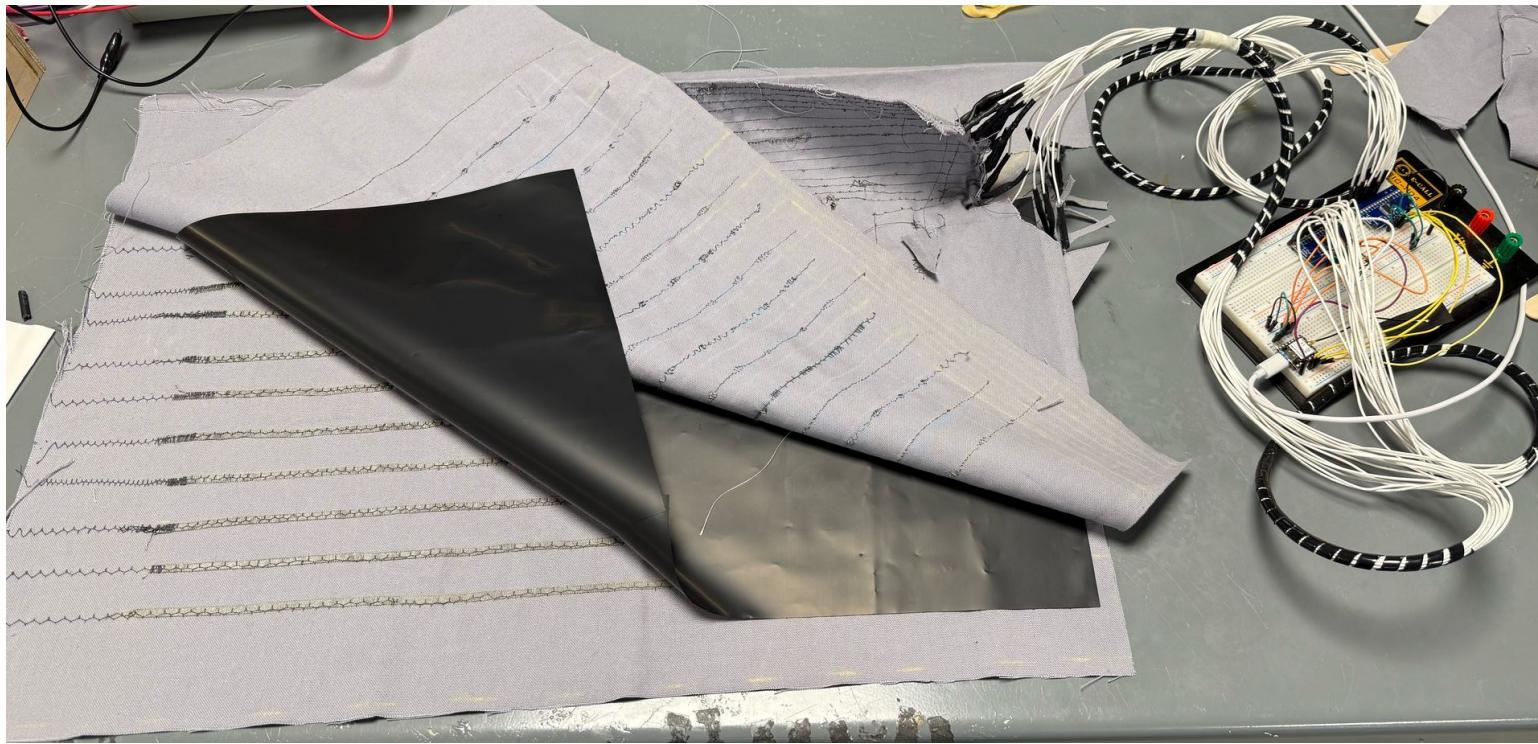
Conductive thread and
Velostate 3*3



ITERATION 3

Final Design 10*16





Actuator Design

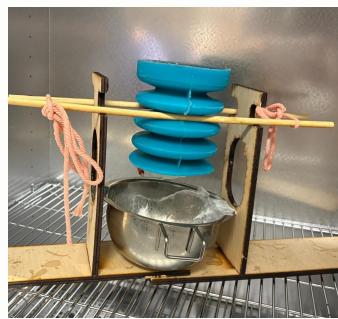
STEP 1

Mold and Soap



STEP 2

Soap Melting



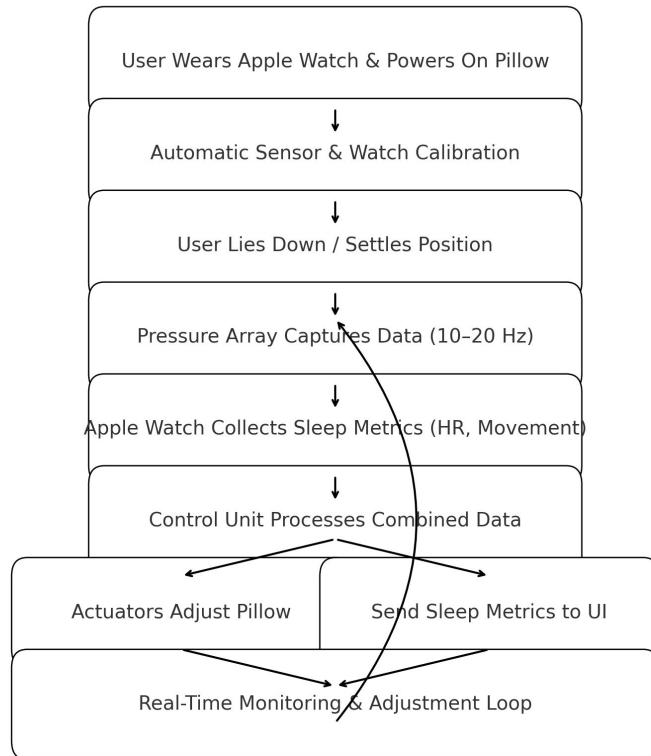
STEP 3

Capping





Use Flow



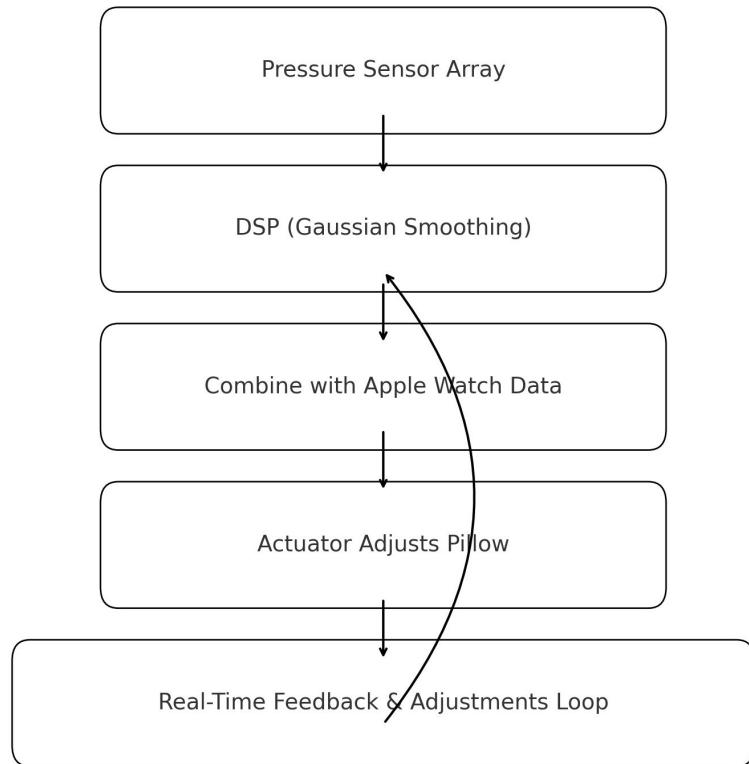
**Power On &
Calibration**

**Initial
Position
Sensing**

**Data
Processing &
Actuation**

**Continuous
Closed-Loop
Control**

Data Pipeline



**Sensing &
Raw Data
Acquisition**

**Data
Processing &
Noise
Reduction**

**Multi-Source
Data Fusion**

**Analytics and
UI data**

03

Budget

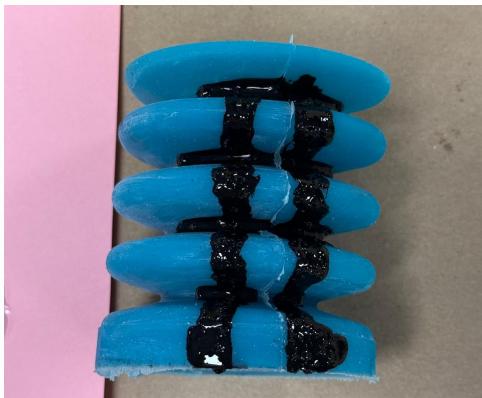


	Item	Qty	Unit Price	Total Cost
0	3 Way Valve	8	4.0	32.0
1	Air Pump	1	6.95	6.95
2	Connectors	3	4.5	13.5
3	Tubes	8	2.5	20.0
4	2 Way Valve	8	2.95	23.6
5	1 Way Valve	1	2.95	2.95
6	Velostat Sheet	3	4.95	14.85
7	Nano Carbon Powder	1	74.99	74.99
8	Spandex Fabric	1	13.9	13.9
9	Foam Cushion	1	24.24	24.24
10	Memory Foam Topper	1	22.0	22.0
11	Ferric Chloride	1	15.0	15.0
Total				263.98
Remaining Budget				86.02000000000000

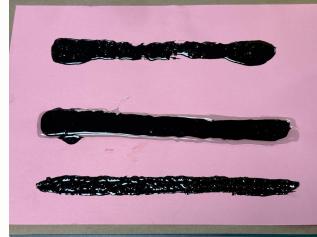


Reflections

Material Embedded
Feedback



Mechanical Multiplexer

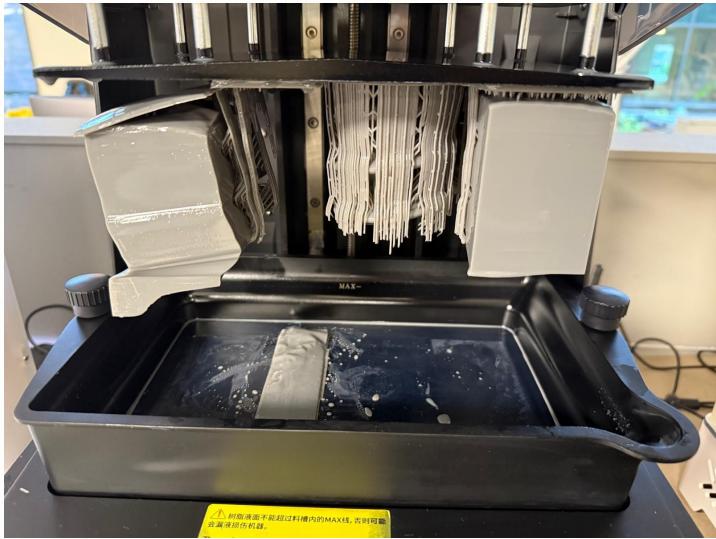


- Embedded sensors without rigidity
- Multiplexer reduced ADC channels
- Gaussian filter balanced speed/noise
- Synced Watch and sensor data
- PID tuning prevented actuator oscillation

References

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Fails



Honorable Mention

