

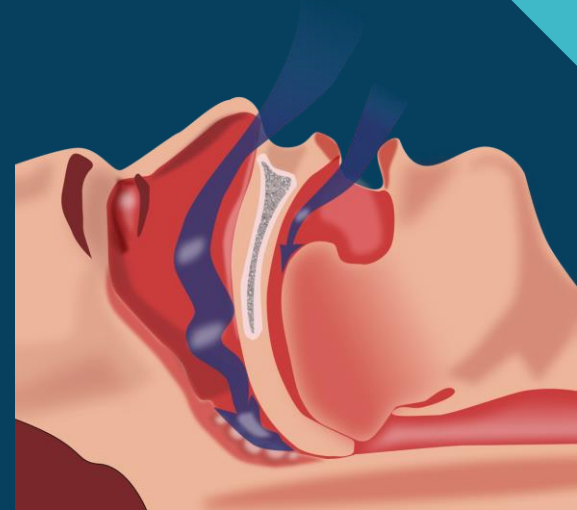
[1]

# Sleep Apnea Implant Device

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# What is Sleep Apnea?

- Obstructive Sleep Apnea (OSA) is a very common and serious condition that affects millions of patients worldwide.
- It occurs when the muscles in the airway relax during sleep resulting in airway narrowing depriving the reach of oxygen to the brain.
- Results in high blood pressure, strokes, heart attacks, and many more dangerous side effects.



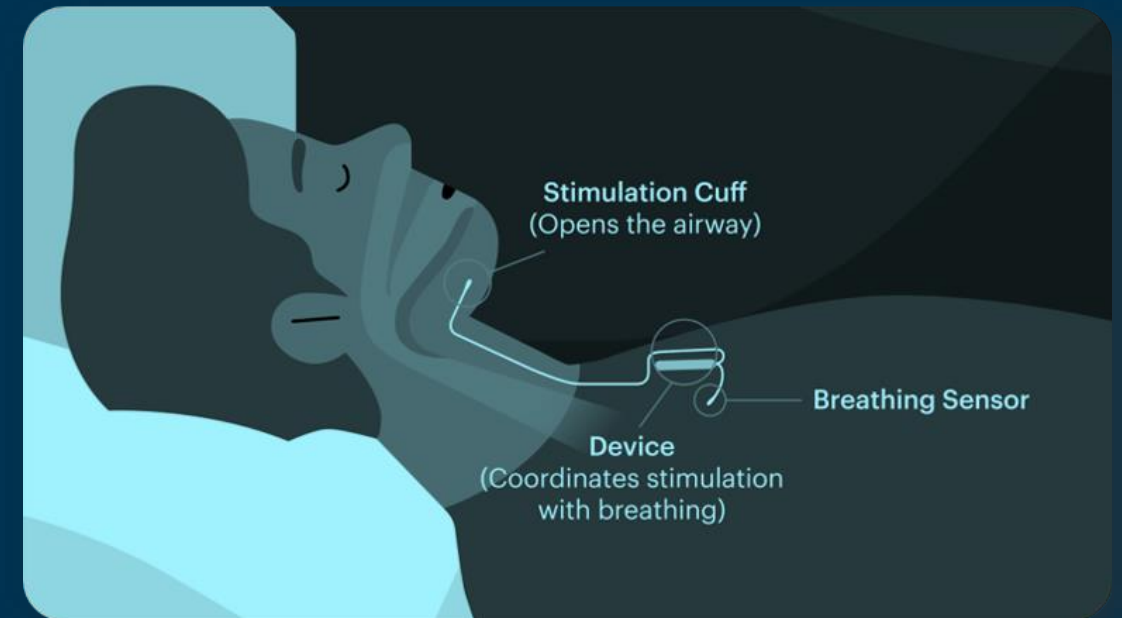
[2]

# Sleep Apnea Implant Device

- Provides therapy through neurostimulation of the hypoglossal nerve activating the tongue muscles ensuring an open airway during sleep.
- It is surgically implanted with 2 to 3 incisions during an outpatient procedure performed by ENT surgeon.

## Main Elements

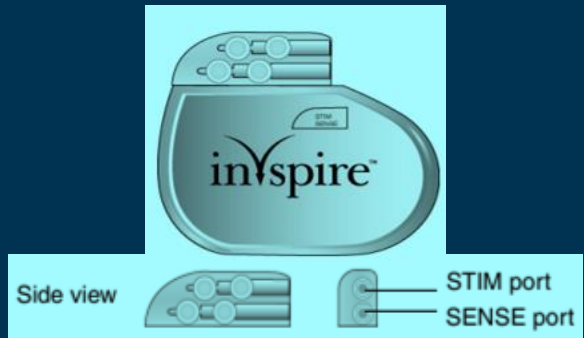
- OSA Patients
- Doctors and ENT Surgeons



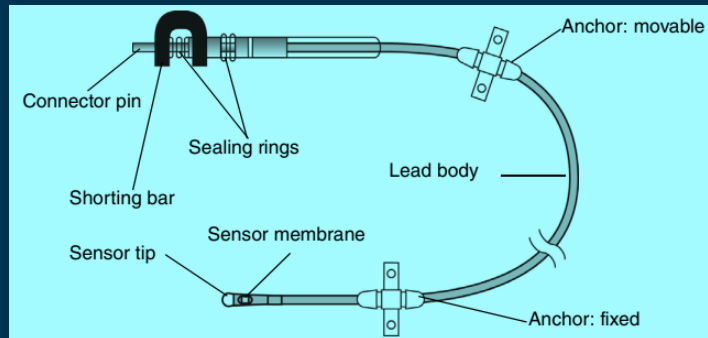
[3]

# System (Hardware) Components

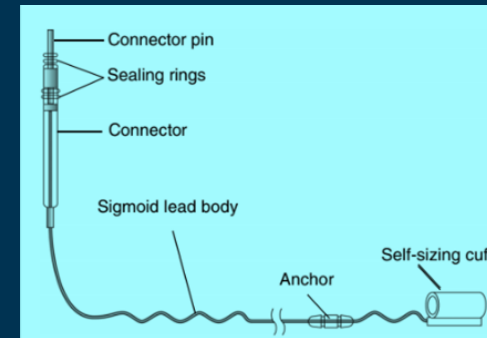
- Internal (Implanted):



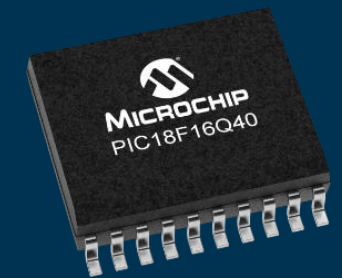
Battery-Powered Implanted Stimulator [4]



Respiratory Sensing Lead [4]



Stimulation Lead [4]



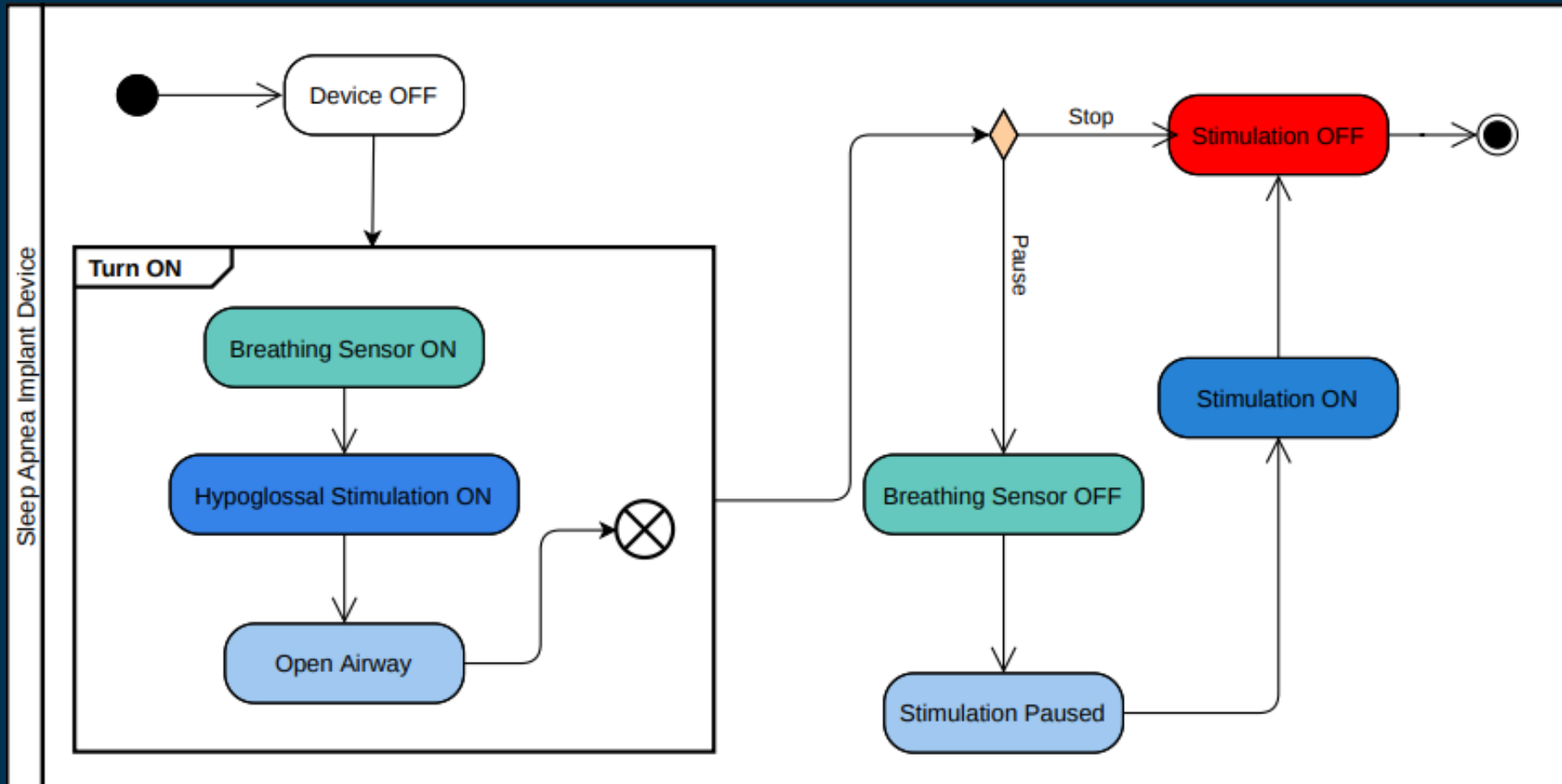
Microcontroller [5]

- External:

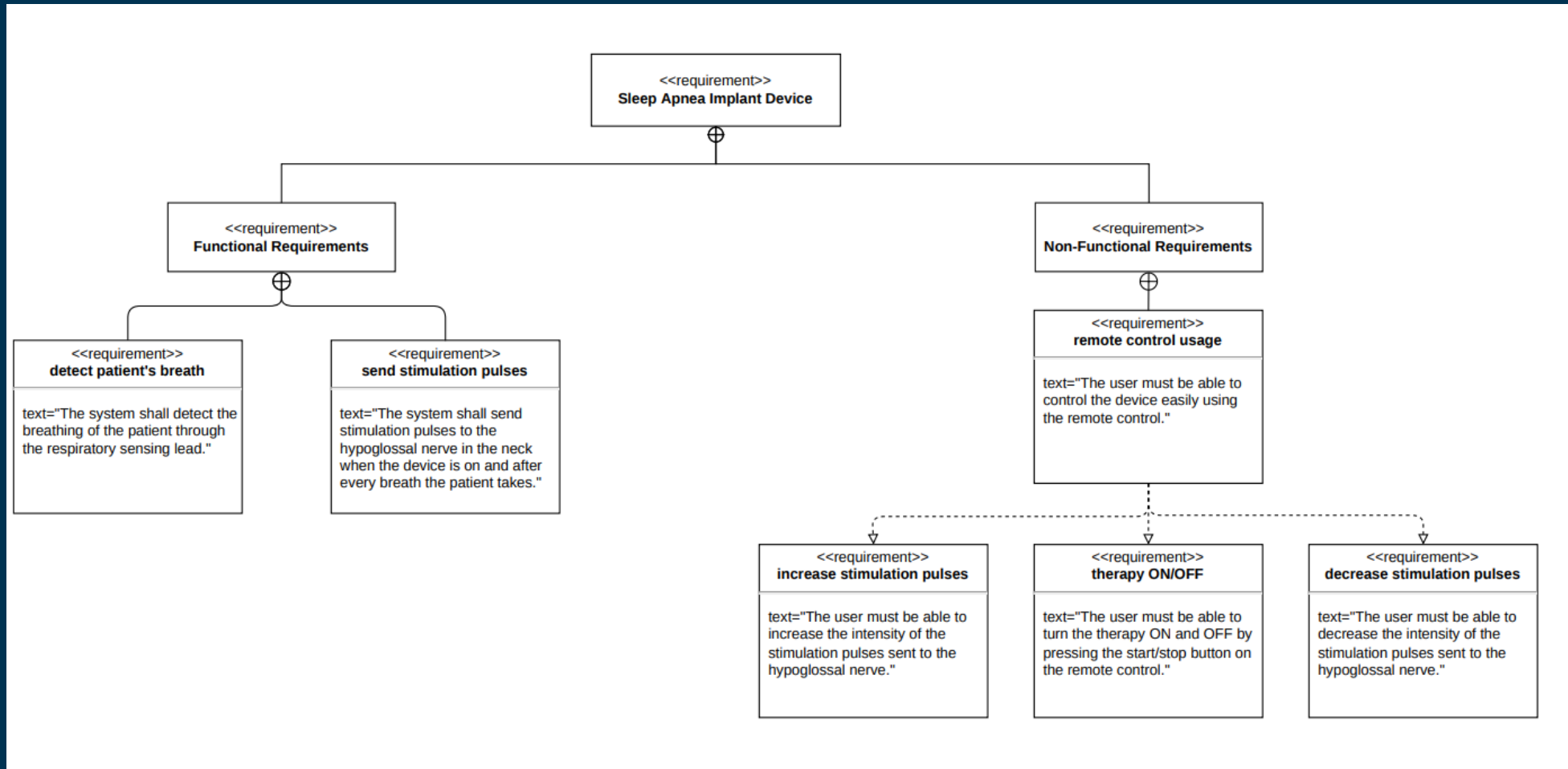


Remote Control [1]

# Activity Diagram

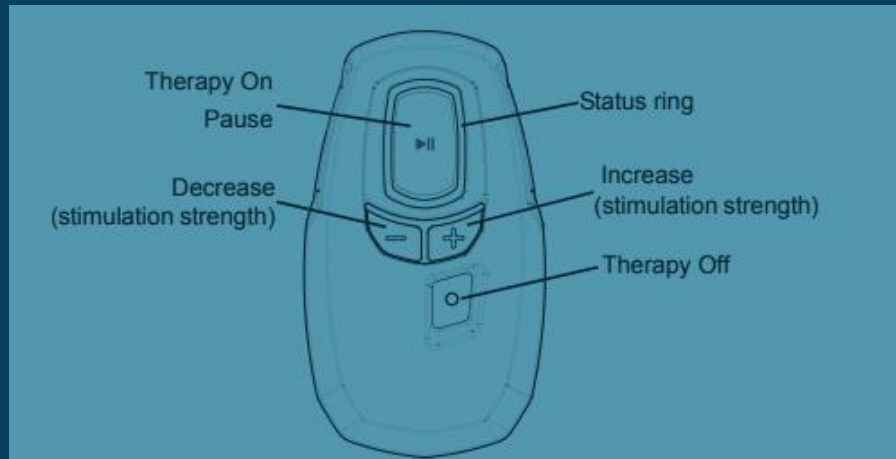


# Requirement Diagram



# User Interface

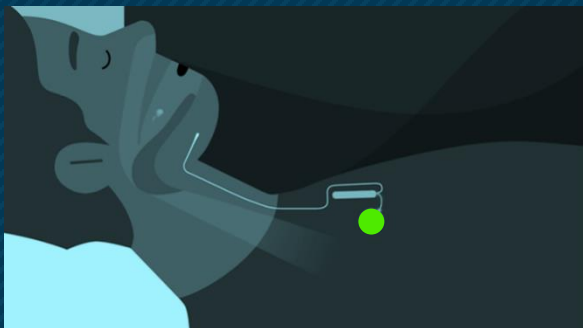
- The patient controls the implantable device using a remote control allowing the user to start, pause and stop the therapy.
- The device monitors the patient's breathing, and every time the patient takes a breath a gentle pulse moves the tongue out of the way ensuring an open airway.



[6]



[1]



[1]



[1]



[1]



# References

[1] Inspire Sleep. 2022. *Learn - Inspire Sleep*. [online] Available at: <<https://www.inspiresleep.com/learn/>> [Accessed 4 June 2022].

[2] En.wikipedia.org. 2022. *Sleep apnea - Wikipedia*. [online] Available at: <[https://en.wikipedia.org/wiki/Sleep\\_apnea](https://en.wikipedia.org/wiki/Sleep_apnea)> [Accessed 4 June 2022].

[3] Professionals. 2022. *Homepage - Professionals*. [online] Available at: <<https://professionals.inspiresleep.com/>> [Accessed 4 June 2022].

[4] Accessdata.fda.gov. 2022. [online] Available at: <[https://www.accessdata.fda.gov/cdrh\\_docs/pdf13/P130008d.pdf](https://www.accessdata.fda.gov/cdrh_docs/pdf13/P130008d.pdf)> [Accessed 4 June 2022].

[5] Microchip.com. 2022. [online] Available at: <<https://www.microchip.com/en-us/product/PIC18F16Q40>> [Accessed 4 June 2022].

[6] Usermanual.wiki. 2022. [online] Available at: <<https://usermanual.wiki/Inspire-Medical-Systems/2500.User-Manual-Part-1-2868959.pdf>> [Accessed 5 June 2022].



**Thank You for  
your Attention**