

sPEEK™ - Voice controlled surgical loupes



Sagentia Innovation

Fatigue in surgical staff is attributed to many factors of modern, global healthcare systems; increased procedure frequency, more onerous OR protocols, increased cognitive load and physical strain, and logistical challenges from advanced surgical procedures.

We sought to understand specific equipment challenges that cause issues in open surgery.

Expertise and domain knowledge

- Surgical procedures and OR environment
- User experience
- User centred design
- Mechanical engineering
- Voice recognition and control
- Data management
- Optic technology



reddot award 2021
best of the best



The problem:

We sought to understand specific equipment challenges that cause issues in open surgery. Interviews with practicing surgeons revealed significant pain points due to visualisation and lighting complications, the main issues being:

- Eyestrain using standard single magnification surgical loupes that can't shift between macro and micro views
- Stooped posture causing back, neck and shoulder strain due to poor illumination
- Surgical loupes do offer macro and micro views but are operated by either a pause in surgical flow (as the surgeon adjusts settings potentially breaking sterility), nurse intervention (often changing the position of loupes), or a cumbersome foot control.

The project story:

Our multi discipline team created a headset with voice control features enabled by a battery-powered microcontroller running onboard edge processing on audio captured by embedded microphones. The local edge processing means there is no need for Wi-Fi connection and therefore no transmission of sensitive data over hospital networks or to the cloud.

Voice commands activate the headlight with 3 different brightness settings, and increase or decrease the magnification level between 3x, 4x and 5x. Unlike existing powered surgical loupes, everything is contained on the headset to avoid trailing cables and belt/body mounting issues that arise when used alongside surgical gowns and other PPE. The system elements have been arranged to achieve balance with weight distributed to spread load equally across the ears and crown, and there are interchangeable top straps for tied up, long hair.

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Results: deliverables and outcomes

In developing sPEEK, we empower clinicians to deliver uninterrupted quality of care in surgical procedures.

sPEEK is a commercially viable concept that could see market release in 2 years. It has been considered from 3 core lenses:

User-centred design - Considerations such as under-mounted motor housings that don't impinge on peripheral vision, placement of an illumination source on distal tips, and an in-built accelerometer to turn the light off when the head is above horizontal orientation to avoid colleague illumination.

Commercial viability - In consulting optic manufacturers, the system has been conceived on a TTL (Through The Lens) surgical loupe configuration. The left and right optic modules are independent ensuring compatibility with standard fitting practices enabling the optics position to be customised to a bespoke declination angle. Also, the focal distance can be set for specific dental and surgical applications.

Technical feasibility - The concept has been prototyped to give confidence in the mechanical and voice recognition performance.

The design concept has won a Red Dot: 'Best of Best award and nominated for the Red Dot: Luminary award.