



## Dynamic real-time Feedback for Ligament balance

### Overview

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Computer navigation technique developed by the client is the latest revolution in orthopedic treatment. This technology is used for replacement of arthritic knee, hip joints, ligament balancing and etc. Computer navigation provides the experts with the real time 3-D images of the mapped patient's affected joint and the surgical instruments during treatment. The life of the implant can be extended by precise alignment of the implant materials with more ease and improve the outcomes of the treatment. By harnessing the digital powers (Sensors, micro-electronics and wireless communications) orthopedic surgeons are getting actionable data that can be used to achieve soft tissue balance like ligament balancing and limb alignment.

The instrument and accompanying system developed by the client provides real-time, intra-operative, quantifiable data about joint kinematics to surgeons and hospitals, improving healthcare outcomes and reducing the long-term cost of treating musculoskeletal disease.

### Challenges

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The client wanted Optra to develop software that runs on a Windows 8 touch screen display where an USB RF reader streams data to the program. The GUI walks the user through the steps of syncing the RF receiver with the transmitter, and calibrating the instrument. Then the data is displayed for: RF signal strength, battery voltage, instrument pressure, knee flexion angle, and three instrument measurements (mediolateral tilt, anteroposterior tilt, and gap distance). The ligament balance needs to be analyzed and displayed by the computer system in real-time as deviation from the optimal tracking pattern of the prosthesis calculated by the computer during numerous flexion-extension cycles at 0°, 30°, 60°, 90°, and 110°. There were no readily available controls fulfilling the GUI needs and requirements.

# Solution

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Optra team developed a software application for Dynamic real-time feedback of ligament balance, where Ligament balancing was measured through various angles during the flexion-extension cycle relative to tibia and given mechanical axis. This application was also measuring the dual flexion angle data, mediolateral measurements, anteroposterior measurements, displacement height, and real-time feedback during adjustments and also confirms adjustment. The necessary GUI controls like curved line showing the flexion angles were developed. The GUI also depicted the tolerance limits with different colors to quickly show the visual display. To analyze the previously recorded data, record and play functionality (with various speeds) also developed. The implemented GUI displayed all the data in a complete visual mode so as to give minimum user interactions helping surgeons to operate with an ease.

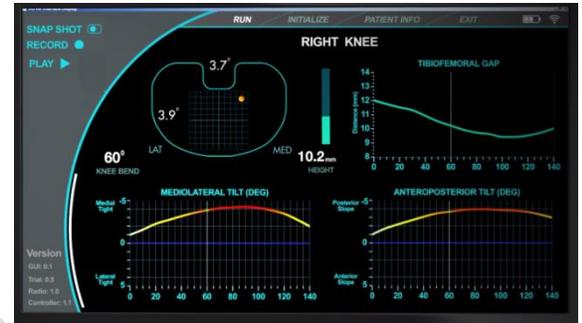


Figure 1. Screen shots of the software developed

## Technology Used

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- Operating System – Windows 8
- Programming Languages – .Net, WPF, Infragistics controls
- Version/Source Control Tool - VSS
- Drop box for data sharing

## Benefits

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- Provides evidence-based adjustments to soft tissues, alignment and implant placement to optimize clinical outcomes and enhance patient satisfaction.
- Reduce the long-term cost of treating musculoskeletal disease.
- Increase in the degree accuracy for treatment and decreases the treatment errors with more precision and control.

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# About Optra Health

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