



A SENSOR EMBEDDED ARM SLEEVE

TO TRACK REHAB PROGRESS IN TENNIS ELBOW PATIENTS

Unmet Needs

Every year, 1.5 million patients are admitted to rehab for arm-related injuries.

In many rehabilitation clinics, clinical outcomes are determined by subjective measures. This is demonstrated by the fact that there are over 50 utilized techniques to determine that a shoulder is fully recovered, and over 40 to demonstrate this in the knee. Because these indications are not standardized, it is likely that a patient may not recover completely, hence leading to reinjury or greater future damage.

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This is also true in the case of tennis elbow, or lateral epicondylitis, which claims up to 200,000 patients every year. Tennis elbow rehabilitation is tested just as any other forearm or wrist injury is: by testing the movement of the arm either by applying pressure to it or by more technical yet also expensive means.

Furthermore, despite performing the exercises at home, patients may only determine the effectiveness of their progress when they go to the physical therapy clinic. Seeing as insurance only covers a given number of consultations, patients may spend a good majority of their rehab process in doubt about the progress of their treatment.

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200,000 tennis-elbow injuries requiring therapy

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8.5% two-year reinjury rate

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\$5000-\$8000 per strain injury

:

\$55M

Total cost of tennis-elbow reinjuries

3

\$2.2B

Total cost of tennis-elbow injuries

Our Solution

The team came up with an athletic armband called Kynetech, which contains three sensors on critical parts of the arm with respect to tennis-elbow.

These sensors should track patient progress on a daily basis while they perform their routine exercises.

Both patients and doctors will have access to these graphs, which will provide patients motivating visual feedback about their performance.

Doctors can analyze data in advance, letting them give feedback to the patient and allowing both sides to maximize their sessions.

Flex Sensor: Determines flexion of the arm by measuring resistance on the bend. Helpful in finding range of motion of elbow.

Gyroscope: Determines rotation of the arm through wrist. Finds tension in ERCB as a result. Helpful in finding range of rotation.

Frontal origin of ERCB

EMG Sensor: Detects motion in the muscle by passing electrical signals, determines whether sleeve is being used.

Battery: Contains Bluetooth connection to connect with server.

Primary Competitor

Although there are several techniques physical therapists use to determine the extent of recovery in the forearm, one of the most common ones is a product called a **dynamometer** produced by a company called **Biodex**.

List Price: **\$48,000.00**

Weight: **1,350 lbs**

Features:

1. Measures 360-degree rotation.
2. Provides accurate range of motion analysis, rotation analysis.
3. Useful for tendonitis and bursitis.



Limitations

The readings, at this point, are not entirely accurate. Accuracy can be improved, but will require advanced calibration algorithms.

Also, the product may be very useful for epicondylitis, tendonitis, and fracture rehabilitation (that involve muscle strengthening) but not for bursitis seeing as that is nerve-oriented. Our primary competitor, however, can account for this.

Advantages and Future Directions

The Kynetech Arm Sleeve is far more affordable, convenient, and comfortable than its alternatives.

Seeing as doctors are the target audience (seeing as they can find a more user-friendly and interactive alternative to the Biodex), there is a better chance of standardizing among clinics and collecting more data.

More than tennis-elbow, the product's function is to increase muscle strength by analyzing range-of-motion, giving it a number of alternative uses in detecting forearm-rehab-progress.

For the future, we intend on perfecting the range-of-motion measurements. In addition, we seek to accumulate aggregate means over the course of physical therapy, allowing patients to track activity over the long-term. We also want to use these graphs and data to create long-term thresholds for doctors for future analysis.

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