AniMotion

Wearable Joint Monitor

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AniMotion is a medical wearable for rehabilitation offering value to patients, doctors, and biomedical researchers

1 The Problem

Rehabilitation from musculoskeletal joint injury typically requires long-term physical therapy (PT), which is expensive and time-consuming

2 The Solution

A low-cost, wearable device that allows self-monitoring of joint function and recovery, reducing the need for frequent PT sessions

3 Our Value Proposition

For Patients

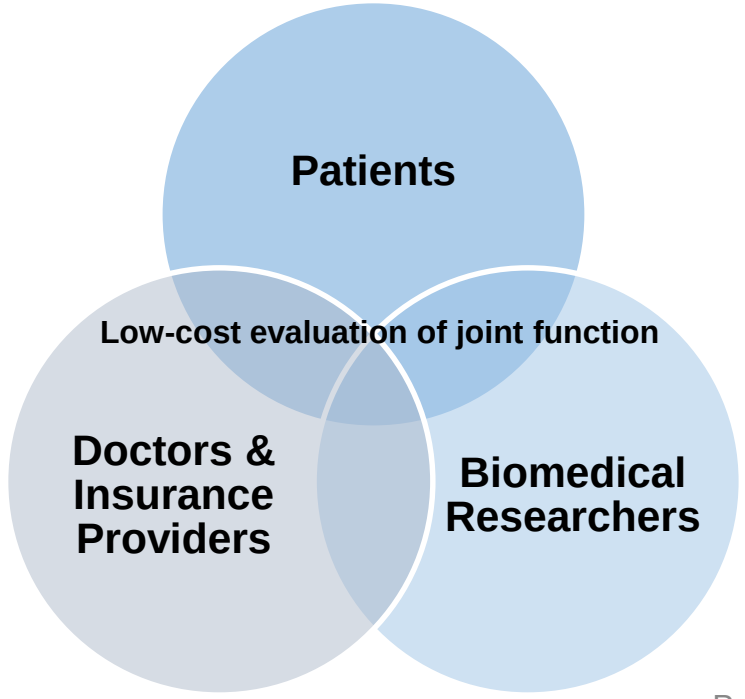
- Wearable at home
- Non-invasive and portable
- Real-time, personalized feedback on recovery progress

For Doctors and Insurance Providers

- Objective and accurate assessment of recovery over time
- Fewer and shorter patient visits due to remote monitoring
- Lower risk of re-injury due to increased patient awareness of rehabilitation protocol

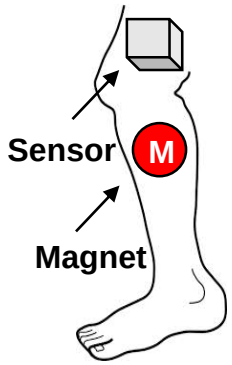
For Biomedical Researchers

- Cost effective means to obtain objective, quantitative data on joint kinematics
- Easy implementation for preclinical and clinical trials

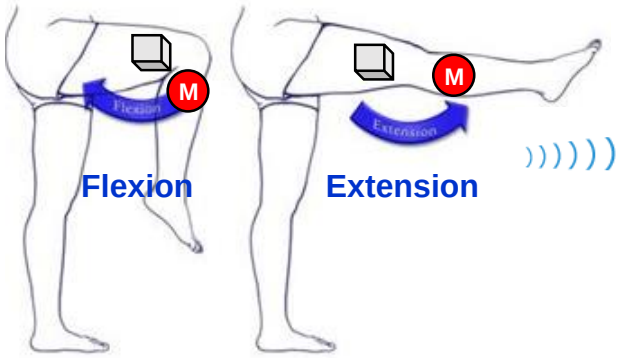


The technology behind AniMotion is inexpensive, innovative and patentable*

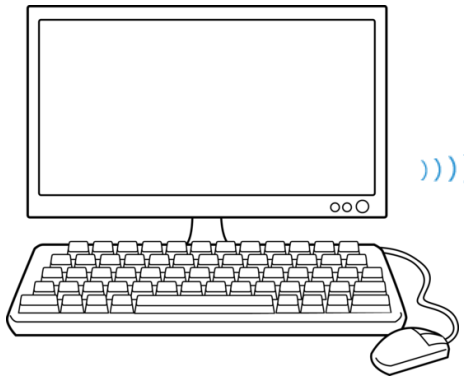
Our product is a low-cost, battery-powered device that collects data on musculoskeletal joint function§



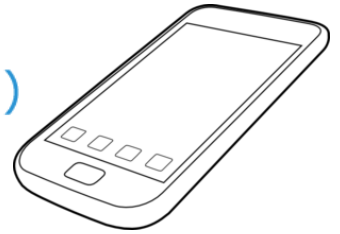
Change in magnetic field



Base station computer



User friendly mobile app



Attach and calibrate	Data collection	Data transmission	Data analysis	Data presentation
1	2	3	4	5
• Sensor and magnet span joint	• Sensor detects changes in magnetic field with joint flexion and extension	• Device sends data to remote network • Base station receives and stores information from multiple patients	• Software detects joint movement • Joint flexion angle is calculated based on change in magnetic field	• Average range of motion is plotted as a function of time • Comparisons can be made to baseline (uninjured or opposite limb)

* Provisional patent submitted in 2014

§ Technical feasibility confirmed via pilot studies; data will be presented at the Orthopaedic Research Society Annual Meeting in 2015

The market for AniMotion is large and growing, and not served well by existing competitors

*MARKET SEGMENTATION**	Uses	Market Size and Growth
Arthritic patients	1) Recovery from and prevention of injury 2) Diagnosis of musculoskeletal disorders 3) Evaluation of joint function	❖ 27M adults suffer from osteoarthritis (OA). Population with OA forecasted to grow to 25% of US population by 2030.[1] ❖ Annual expenditures to diagnose and treat OA is ~$4,500 per person, multiples of the cost of an AniMotion device.[2]
Athletes		❖ 4M people admitted annually for sports-related injuries.[3] ❖ Sports medicine devices market valued at $6.1B with estimated 5-year average growth of 4.4%.[4]
Companion animals (dogs and horses)		❖ 59.5M pet owners have dogs or horses, animals likely to suffer from arthritis as they age.[5] ❖ Total vet care estimated at ~$15B and growing.[6] ❖ Global market for wearable technology for animals expected to reach $1B by 2025.[7]
Commercial and academic researchers	1) Evaluation of novel treatments in preclinical and clinical trials	❖ Growing public and private funding for musculoskeletal research, with NIH alone awarding ~$320M in grants annually.[8]

COMPETITORS	Inexpensive	Portability and ease of use	Accurate measurement of joint movement	Designed for humans and animals
AniMotion	✓ (~$150)	✓	✓	✓
BioSensics	✗ ($4,000+)	✓	✗	✗
Medi-Touch	✗ ($2,000+)	✗	✓	✗
Fitbit	✓ (~$100)	✓	✗	✗

* Target market determined through first-person interviews with people who previously had musculoskeletal injuries, physicians, veterinarians, and biomedical researchers

Sources: (1,2) Disabled World, (3) CDC, (4) Research and Markets, (5,6) American Pet Products Association, (7) IDTechEx, (8) National Institute of Arthritis and Musculoskeletal and Skin Diseases

A basic version of the product will be tested in the next few months with a reasonable budget

Spring 2015

Refine data analysis algorithm

Validate proof of concept with large animal study

Summer 2015

Extend design for human activity

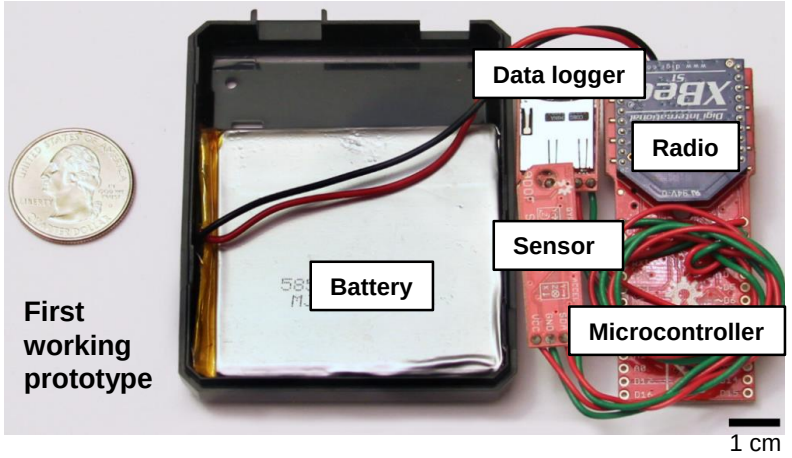
Submit Patent Cooperation Treaty (PCT) application

Fall 2015

Integrate user interface with mobile app

Design and manufacture custom hardware

ESTIMATED DEVELOPMENT COSTS	
Animal study (3 pigs)	$20,000
Legal fees (PCT application)	$10,000
Hardware customization	$5,000
TOTAL	**$35,000**



First working prototype

Our team members have complementary skillsets and have known each other for years

Team

Peter Gebhard (Duke ’07)
Inventor
Senior Programmer at UPenn
MS candidate in Embedded Systems
Role: Hardware and software development

Feini Qu (Duke ’09)
Inventor
Studies orthopaedic injury and repair
VMD-PhD (Bioengineering) candidate
Role: Device design and testing; liaison between scientific and medical communities

Amrith Krushnakumaar (Duke ‘07)
Chartered Financial Analyst
MBA candidate at The Wharton School
Role: Market analysis and business plan development

Mentors

Robert Mauck, PhD
Associate Professor of Orthopaedic Surgery and Bioengineering
Specialty: Orthopaedic Tissue Engineering
Role: Scientific advisor

Miltiadis Zgonis, MD
Associate Professor of Orthopaedic Surgery
Specialty: Sports Medicine
Role: Physician consultant