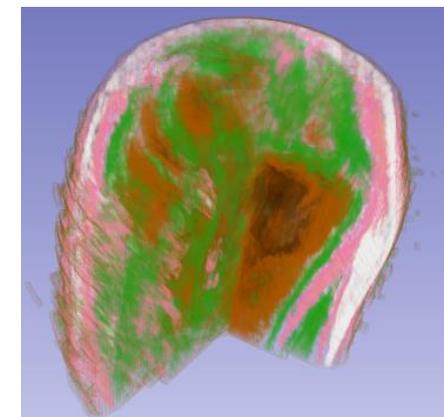
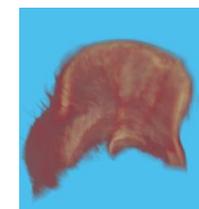
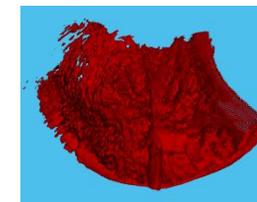
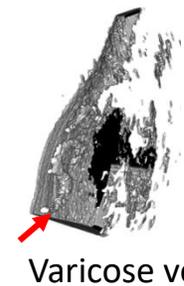




UltrascanGuide.com:

Robotic limb scanning for soft tissue, bone, and joint evaluation:
alternative to MRIs, CT scans, and X-Rays



Ted Selker: **CEO**¹



with

Austen Poteet: **CTO**², Kim Rubin: **Patent Agent**³, Shama Hoque⁴ **Software contractor**

Roman Solek⁵, David Fair⁶, Victor Philips, Md: **Advisors**

Rita Kambil, Hang Shu, Mugdh Tyagi, Suraj Roy: **Interns**

¹ CEO/advisor to dozens of companies, IBM Fellow, Professor at MIT Media Lab, Stanford, UC Berkeley, CMU

² CTO, MS ME Stanford 2019

³ Serial entrepreneur with multiple exits

⁴ CEO Interson Corporation, creator of dozens of FDA approved Ultrasound products

⁵ MS CMU, 2013, creator of dozens of software products

⁶ Phd Princeton, technology marketing for Analog Devices, Philips, Intel



UltrasoundGuide working MVP

Delivered first contract to Fuji electric for varicose veins

- Portable aqueous limb scanner
- One-button 3D scan
 - Arduino-controlled robot
 - Self-contained battery-powered
- PC-controlled
 - USBs for scanner and robot
 - 3D reconstruction of internal limb structure
 - Achilles, veins, Epicondylitis, trigger fingers, Carpal Tunnel





Problem

Medical imaging is time-consuming & difficult to interpret

- MRIs, CT scans, X-rays
 - Expensive, radiation, pre-authorization, not great for soft tissues
- Ultrasound imaging
 - Need years of training - ultrasound require structure identification to administer
 - Current ultrasound imaging systems cannot generate uniform tomographic data
- Not available in field, where injuries occur



Imaging market is billions and growing

Imaging equipment market size:

Robotic ultrasound set to cannibalize and extend this sizable industry

- Medical-imaging market in US is over **\$30 B** [1]
- MRI
 - MRI **\$5.61 B** 2016, projected \$7.19 B 2021 (CAGR of 5.1%) [2]
- Ultrasound today
 - **\$5.25 B** in 2015, projected \$6.86 B 2020 (CAGR 5.5%) [3]
- UltrascanGuide: rotational deep limb imaging
 - Better for shallow unoccluded soft-tissue imaging
 - Less intrusive first look for bone breaks
 - Inexpensive enough to be used at athletic events
 - Reduce costs over current MRI, X-ray, and ultrasound imaging
 - 100,000+ new US venues (sports, PT, chiropractic)

[1] <https://globenewswire.com/news-release/2016/06/30/852709/0/en/Global-Medical-Imaging-Equipment-Market-to-Reach-US-31-1-Bn-in-2016-North-America-to-Remain-the-Largest-Market-PMR-Study.html>

[2] <http://www.freedoniagroup.com/industry-study/3315/medical-imaging-products.htm>

[3] <http://www.marketsandmarkets.com/PressReleases/ultrasound-devices.asp>



Limb imaging needed by millions of people per year

Market opportunities

Soft tissue and joint injuries have been difficult & expensive to image

- **Soft tissue problems are prevalent in the US**

- 24%+ field athletes will hurt their Achilles tendon
- 2% of the population will get trigger finger
- 1 to 17%+ of population will get varicose veins
- 3.5+ million people have epicondylitis each year
- 350,000+ people get carpal tunnel syndrome per year
- 10% of population will get plantar fasciitis

Suchak AA, et al. The incidence of Achilles tendon ruptures in Edmonton, Canada. Foot Ankle Int 2005; 26:932.

<https://www.ncbi.nlm.nih.gov/pubmed/15723761>

<http://www.uptodate.com/contents/trigger-finger-stenosing-flexor-tenosynovitis>

<http://emedicine.medscape.com/article/96969-overview#a6>

<http://emedicine.medscape.com/article/327330-overview#a6>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3687890/>

- **MRIs, CT scans, X-rays cost hundreds to thousands to perform**

- X-rays are 50% of radiation people get in US
- Pre-authorization can impede diagnosis and treatment
- Might not work as well for soft tissues

https://en.wikipedia.org/wiki/Medical_imaging

- **Ultrasound imaging underused**

- Specialized training impedes acceptance and medical coverage

- **Mobile scanning not easily available at sports venues**



Ultrasound less invasive than current dominant techniques

Ultrasound's increasing promise

- Increases limb imaging options and frequency [1]
- Plantar fasciitis: better diagnosis & focus for treatment [2]
- Promise even in knee meniscus evaluation
- Probably not useful for imaging some things:
 - Deep penetration of joints
 - Penetrate base of swelling knee

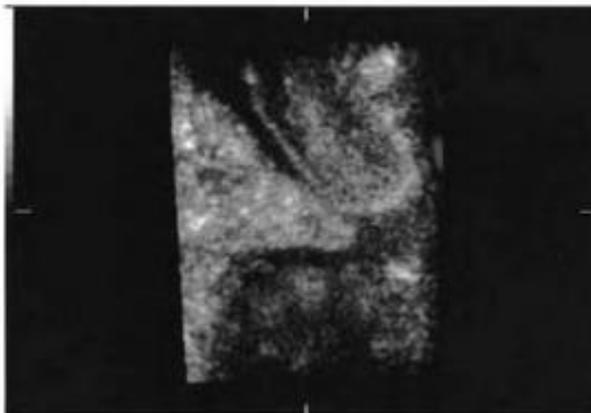


Figure 72 Three-dimensional aspect of the meniscus. Between the femur condylus and the tibial condylus the triangular shape of the meniscus



Figure 75 Three-dimensional rendering of the case illustrated in Figure 73 and 74, clearly showing the effusion and its extension

[1] Clinical Application of 3D Sonography edited by S. Kupesic, A. Kurjak

[2] Wall JR, Harkness MA, Crawford A. Ultrasound diagnosis of plantar fasciitis. *Foot Ankle* 1993 Oct; 14(8):465-70.

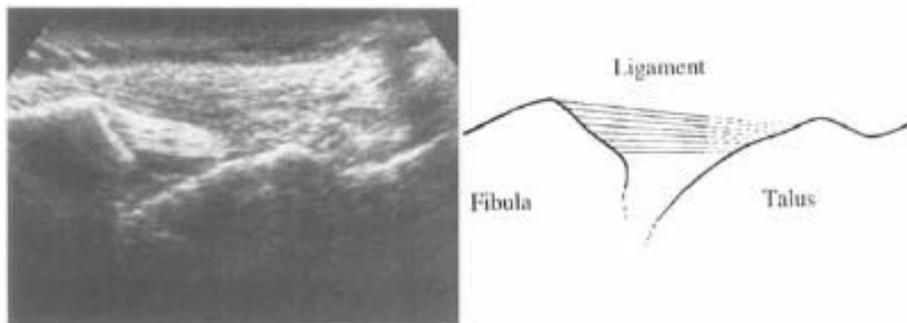


Data supports ultrasound's efficacy

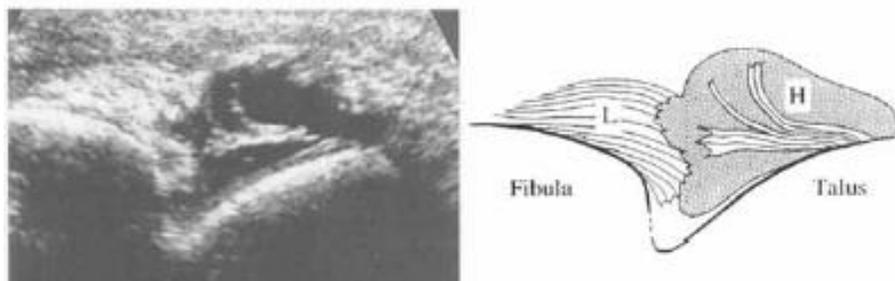
Ultrasonic vs. Magnetic Resonance Imaging

- Sonograms already alternative to MRIs, useful in detecting bone fracture

Intact



Ruptured



“ We were able to distinguish several types of fracture in which the use of ultrasound alone gave reliable information and further radiography was unnecessary. We discuss the advantages and disadvantages of skeletal ultrasonographic studies in children. ”

Lateral ankle ligaments and tibiofibular syndesmosis 13-MHz high-frequency sonography and MRI compared in 20 Patients, P Milz, S Milz, M Steingorn, T Mittlemeier, R Putz, and M Reiser, Acta Orthop Scand. 1998; 69 (1): 51-5.

Ultrasound in the diagnosis of fractures in children, Hübner U¹, Schlicht W, Outzen S, Barthel M, Halsband H., J Bone Joint Surg Br. 2000 Nov;82(8):1170-3.



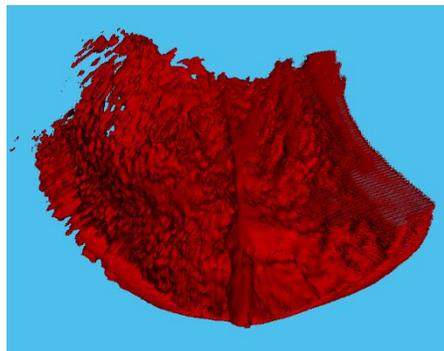
Inexpensive reliable soft tissue imaging

UltrascanGuide

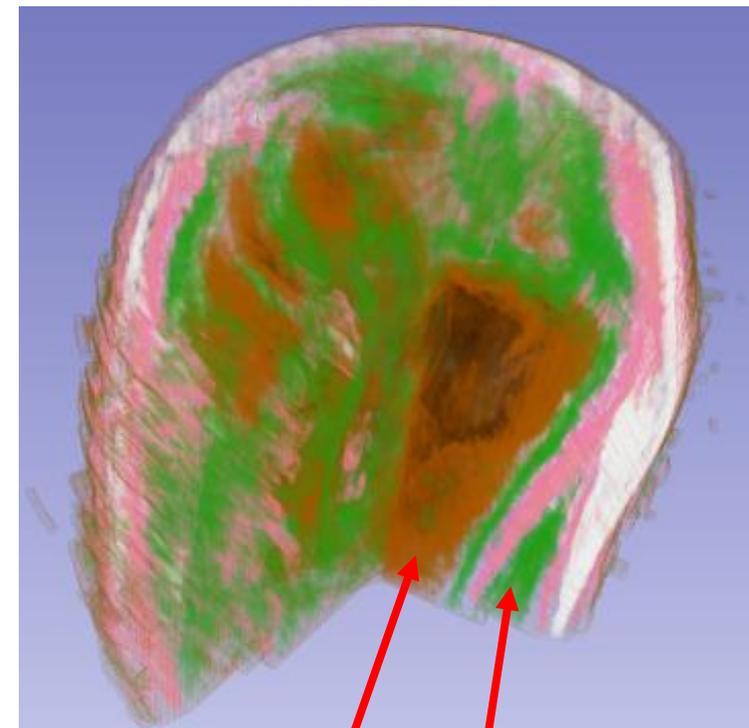
Ankle



Achilles



Elbow



Ulna

Extensor carpi ulnaris

- Simple robotic limb-scanning ultrasonic imaging system for breaks & soft tissue
- UltrascanGuide creates uniform images around limb and creates 3D reconstruction
- UltrascanGuide machine ~ \$10,000
 - MRI machine ~ \$2,000,000
 - \$ per scan payment model also attractive
- Stabilized repeatable imaging for
 - Tendons, ligaments, breaks, vascular, foreign objects, infections, cancer
- 3D sonic image of arm or leg in a tub of water
 - Hand, wrist, lower arm, elbow
 - Foot, ankle, lower leg, knee



Market numbers

- Plausible UltrascanGuide purchases per current imaging system per year
 - 16.2K MRIs USA (45%) of 36K worldwide USA [1]
 - 96000 osteopaths [2]
 - 210,000 physical therapists [3]
 - If 12K x-ray machines [4]

- 103.5K schools
 - ~100,000 public schools
 - ~2000 4 year institutions
 - ~1500 2 year institutions

[1] <http://www.magnetic-resonance.org/ch/21-01.html>

[2] https://en.wikipedia.org/wiki/Osteopathic_medicine_in_the_United_States

[3] <http://www.bls.gov/ooh/healthcare/physical-therapists.htm>

[4] <http://www.ibisworld.com/industry/x-ray-machine-manufacturing.html>,

<https://www.fda.gov/Radiation-EmittingProducts/RadiationEmittingProductsandProcedures/MedicalImaging/MedicalX-Rays/ucm118196.htm>

