Flexible, Wireless EEG Systems with Cloud Computing for Epilepsy

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Motivation

- Seizure diaries are inaccurate
- 1/3 of patients: seizure rate 10× higher than reported
- Need continuous monitoring and alert system
- SUDEP

Wireless EEG

- Flexible, *thin* film electrodes hidden in cap
- Light weight, integrated electronics

CheckLight, a head impact indicator from mc10 and Reebok
Electronics Prototypes

- 8 channels
- 1” diameter × 0.35” high including battery

Version 1

Version 2

Drawn to scale

30% Smaller
# System Design

**Bluetooth EEG Cap**

- **Smartphone Application**
- **Cloud Computing and Storage**

- Dry / non-contact electrodes
- High signal quality
- Ultra-small electronics
- 24 hour battery life
- Low cost

- Seizure detection and alert system
- Cloud connectivity through 4G and Wi-Fi

- Integrated with the International Epilepsy Portal
- Real-time data review by clinicians
- Data storage, processing, and algorithm training
Additional data sources
Entrepreneurship

- Wireless communications
- Late stage startup acquired by Qualcomm

- Flexible electronics technology
- Licensed IP and Consulting

- Automotive performance electronics with $1M revenue
- Founder and owner
Collaborators

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Electrophysiology Portal
Future work: Subgaleal Implantable System

- Electrode placement under the scalp
- Minimally invasive
- Use similar technology
- Improved signal quality
- Continuous, unobtrusive EEG monitoring
- Seizure prediction?
EXTRA SLIDES
International Database
Cloud computing

• MATLAB on Amazon EC2
• Royalty-free Java applications
• Parallel Computing