Brain Backups

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- Outline
  - The Team
  - The Mission
  - The Market
  - The Technology

The Team

- Executive direction: CEO, CTO, CFO
- Engineering: neuroscience, physics, bioengineering
- Legal counsel for IP, patent and discovery work
- Nanotech counsel
- Neuroscientists and neuroengineers
- Mechanical/biological engineers and synthetic biology
- Imaging resources (fMRI, X-ray CT)
- Imaging collaborators from large companies (GE, Siemens, etc.)

The Mission

The human brain contains about ~100 billion nerve cells, or neurons.
On average, each neuron is connected to other neurons through about 10 000 synapses.
The actual figures vary greatly, depending on the local neuroanatomy.

100 000 000 000 neurons * 10 000 synapses = 1 000 000 000 000 000

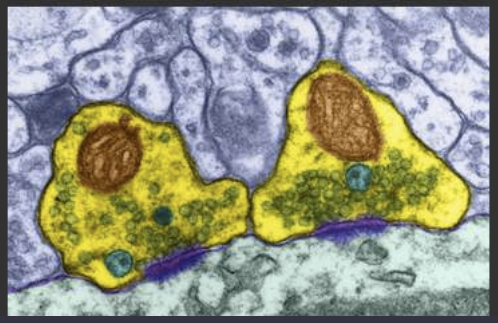
1 terabyte = 1 099 511 627 776 bytes

1 000 000 000 000 000/1 099 511 627 776 = 909.49 terabytes

1 terabyte hard drive = ~$90 → storage for all human neurons and synapses ~$90 * 909.49 = ~$81,854

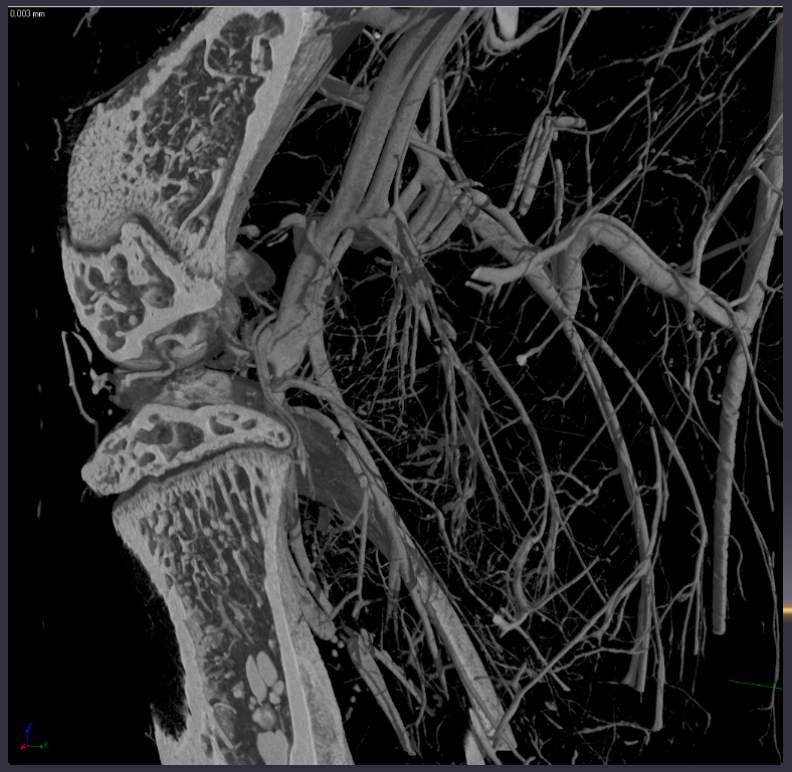
The market is the demographic who can afford the $81,000 (and decreasing) storage cost plus the cost of the scanning procedure. Flexible payment/insurance plans available.

High Resolution Imaging



Excitatory Synapses

Two axon terminals (dark yellow) form excitatory synapses on a dendrite (green). Chemical synapses are specialized "junctions" through which nerve cells signal one another or other non-neuronal cells such as muscles. At a typical synapse an axon and a dendrite flank each other across a slender gap (synaptic cleft (purple and pink). Signaling molecules, known as neurotransmitters, are contained in tiny vesicles of the axon (light yellow). Neurotransmitters pass rapidly from axon to dendrite triggering an electrical impulse.



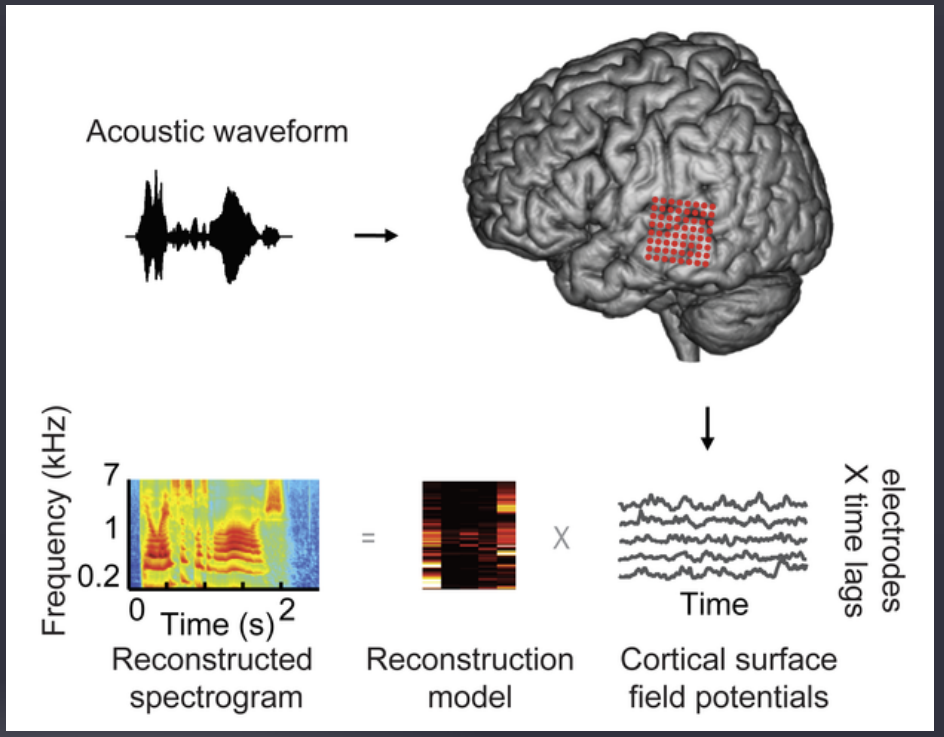
Max. tube voltage	180 kV
Max. output	15 W
Detail detectability	Up to 200nm (0.2µm)
Focus-detector-distance	150mm to 600mm
Min. voxel size	< 300nm (0.3µm)
Geometric magnification (3D)	1.5 times up to 300 times
Max. object size (height x diameter)	250mm x 240mm / 9.84" x 9.45"
Max. object weight	3 kg/ 6.6 lbs.
Image chain	7-Megapixel flat panel digital detector array
2D X-ray imaging	no
3D computed tomography	yes
Advanced surface extraction	yes (optional)
CAD comparison + dimensional measurement	yes (optional)
System size	(1980 x 1600 x 900 mm), (78" x 63" x 35.4")

Decoding the visual cortex

Presented clip

Clip reconstructed from brain activity

Decoding the auditory cortex



Development of a BrainBot

- Flash memory attached to biological sensor/ substrate
- DNA memory/cellular memories (Burrill DR, Silver PA. Making cellular memories. Cell. 2010 Jan 8;140(1):13-8.)
- Sensor, aptamer probes, etc.

Image from: Douglas SM, Bachelet I, Church GM. A logic-gated nanorobot for targeted transport of molecular payloads. Science. 2012 Feb 17;335(6070):831-4.

What we need

- Early seed stage funding
- Access to later series stage funding
- Development of Science Advisory Board (SAB) and Advisors
- Marketing and legal development and protection of inventions
- Scientific development of the apparatus and additional basic neuroscience