Expand the Vision

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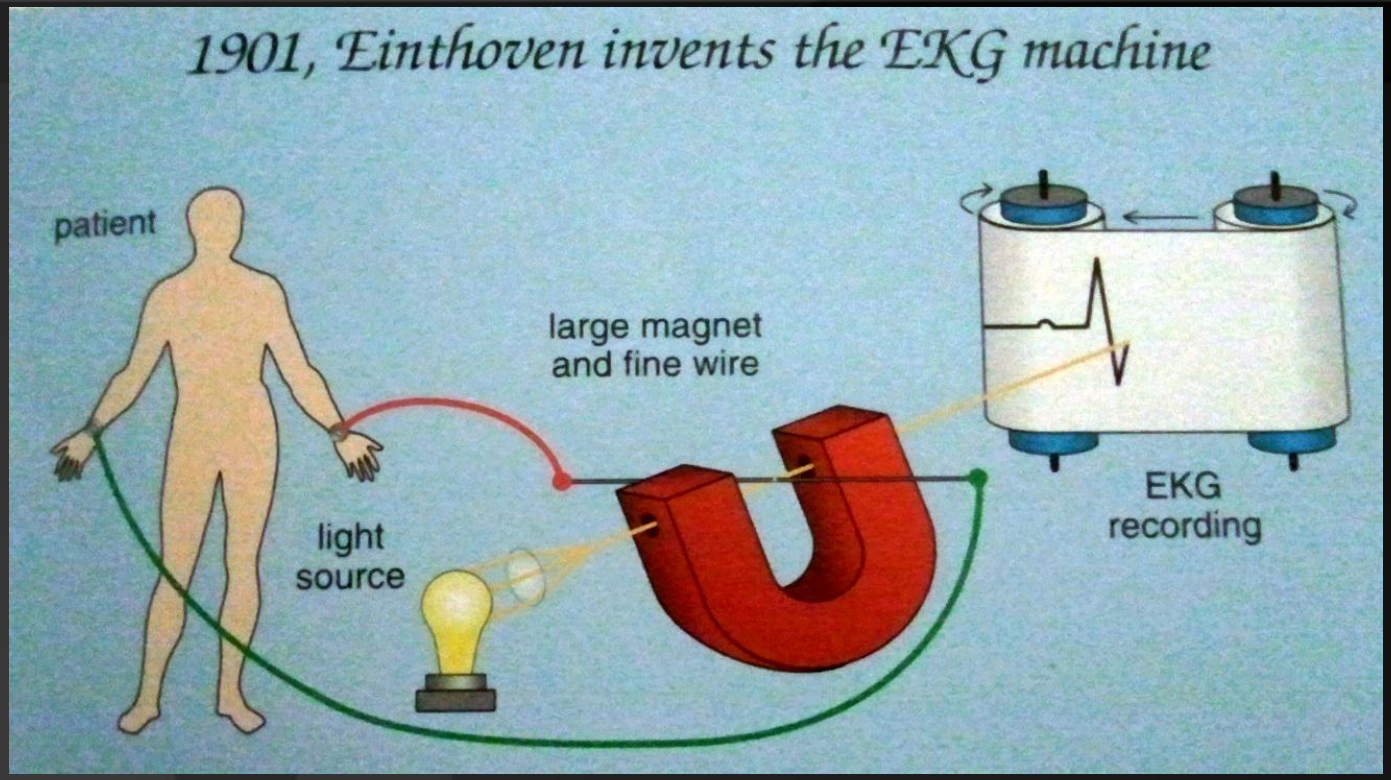
Abstract

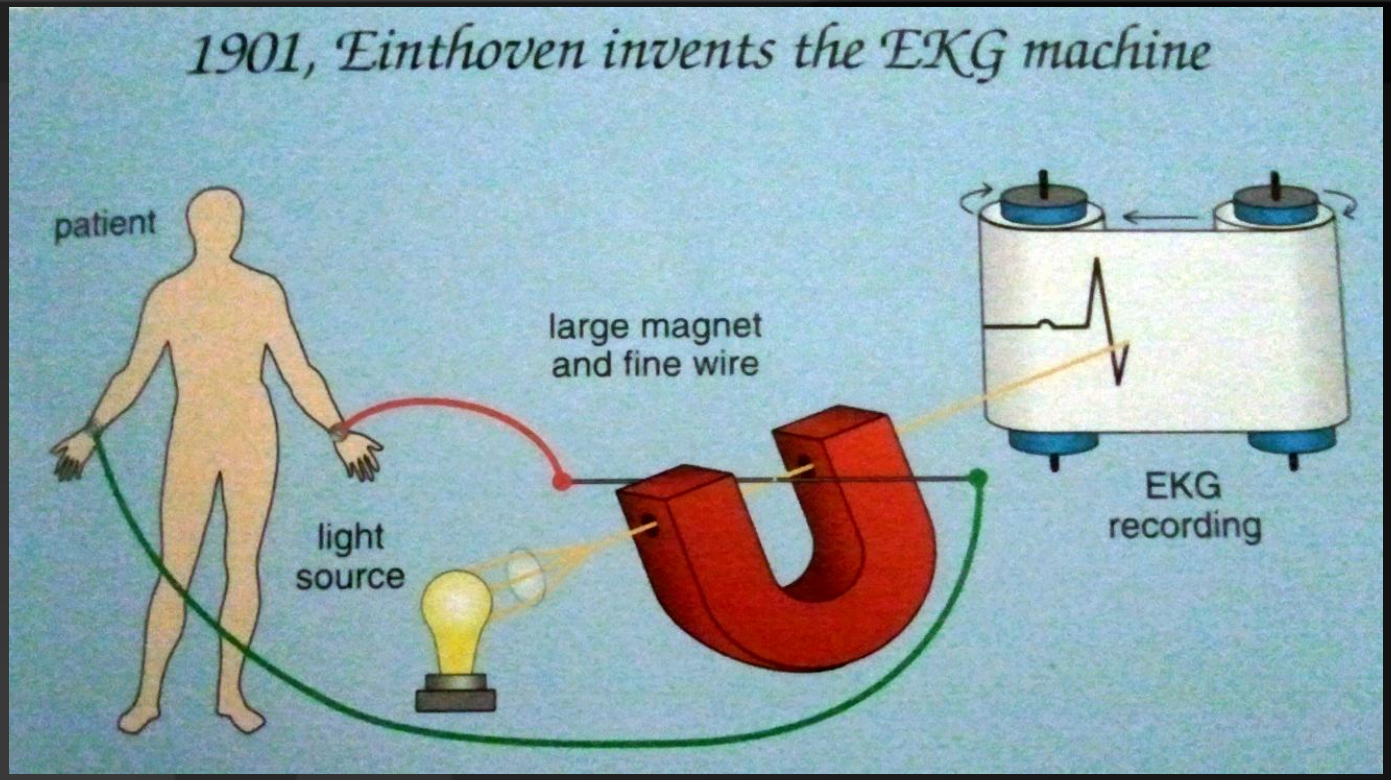
- Project will be in gallery setting
- Dimmed room with sets of headphones and laptop on a stand (1 for each wall)
- Viewers who want to participate will have to enter their information
- Image will be projected onto a wall, which is generated from participant's heartbeat

Intro to Electrocardiogram (EKG) Waves

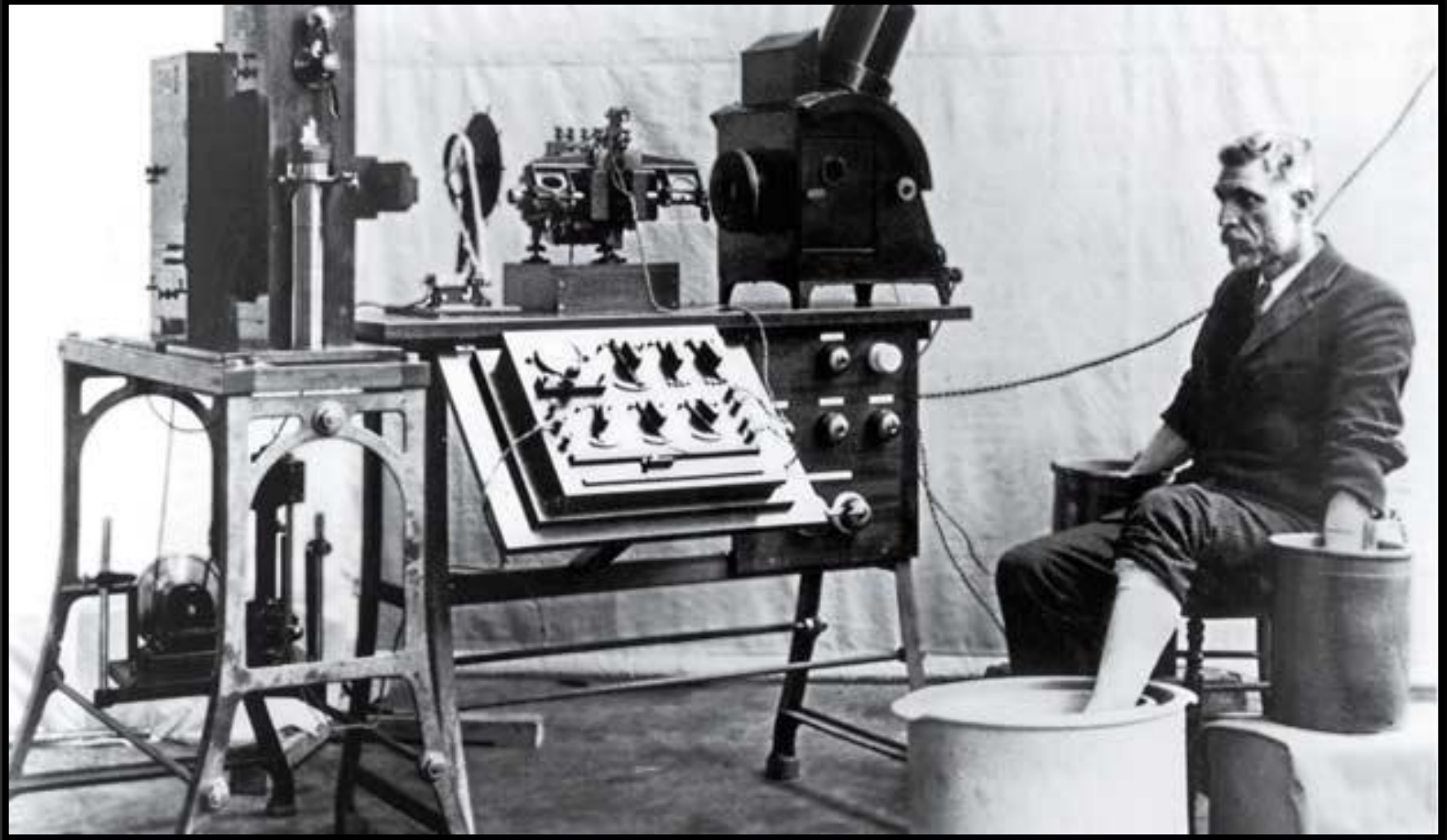


- Invented in 1901 by Dr. Willem Einthoven
- Silver-plated wire between the poles of a magnet
- The pulse caused vibration

Intro to Electrocardiogram (EKG) Waves

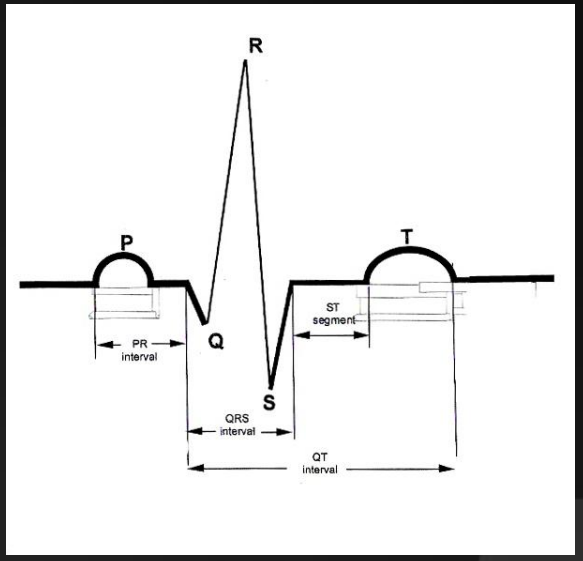


- Light beam through holes in the magnet shone across the wire
- The shadow of the wire was projected and recorded on scrolling paper

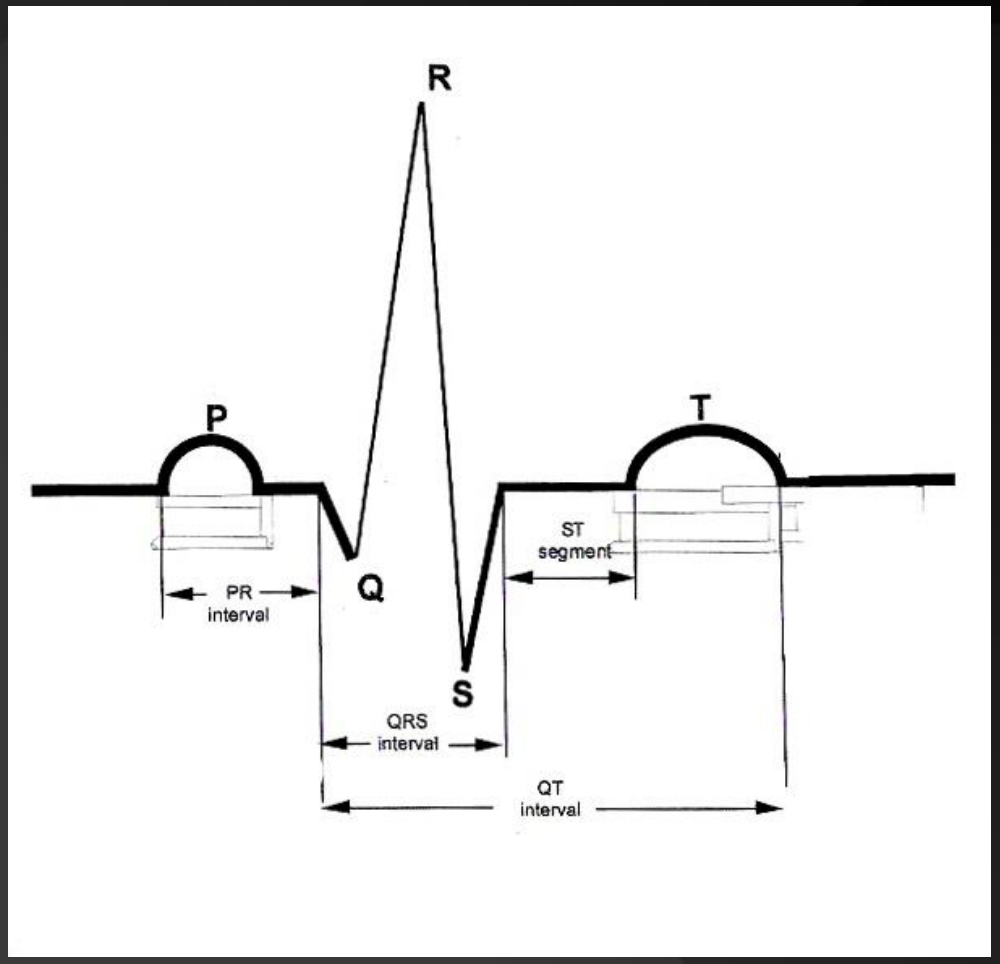


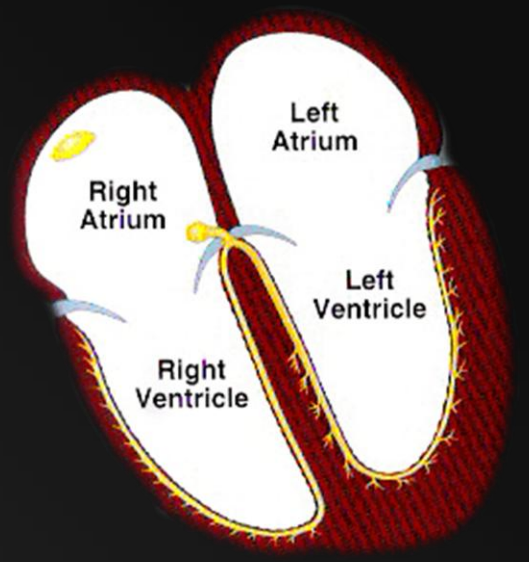
Understanding EKG Waves

- EKG waves can be divided into separate waves, which show what different parts of the heart are doing during ONE beat.
- The wave components are known as P, Q, R, S, and T. QRS is one wave.

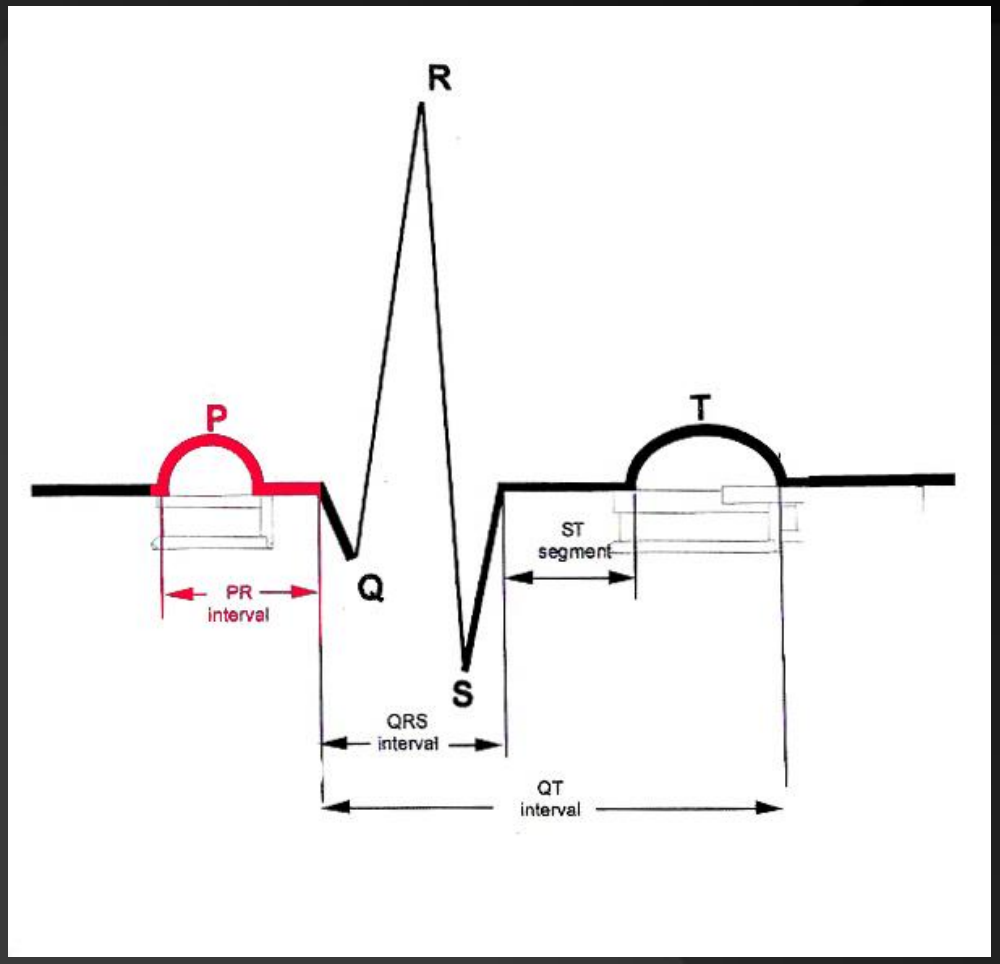


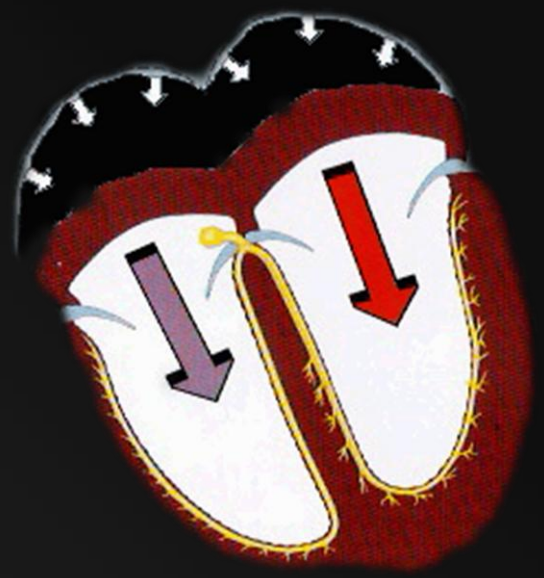
EKG Strip


R
P
T
Q
S
PR
interval
ST
segment
QRS
interval
QT
interval


Left
Atrium
Right
Atrium
Left
Ventricle
Right
Ventricle

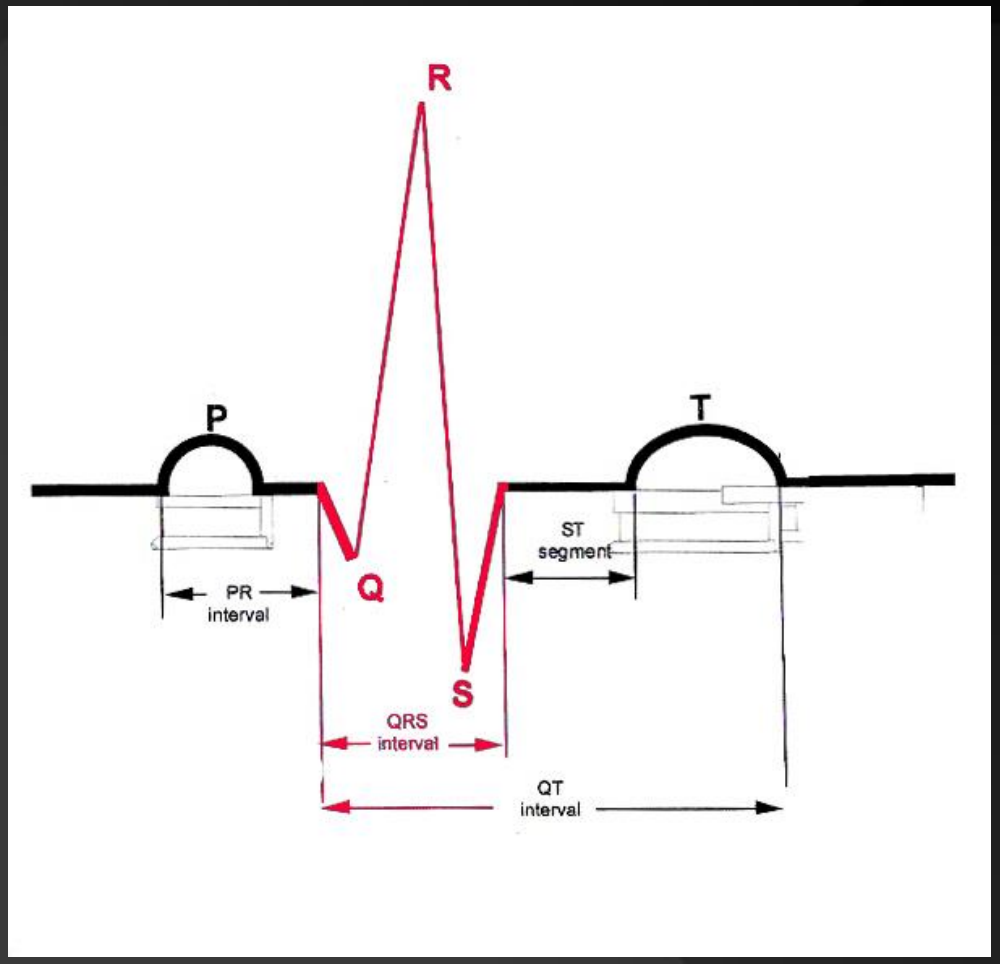
EKG Strip

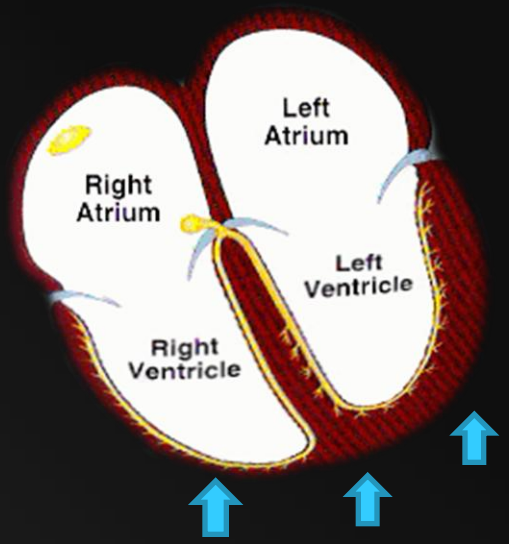




P wave - this is the electrical output given by the heart when the atria contract.

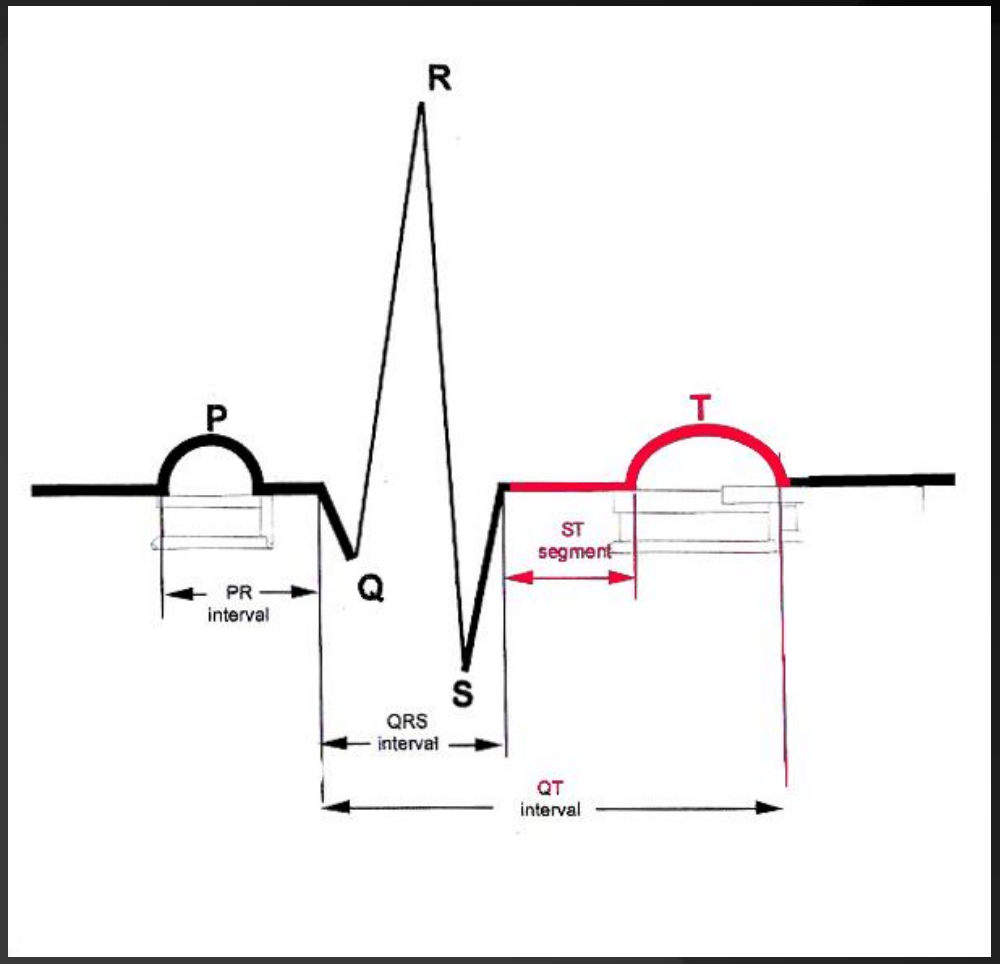
EKG Strip

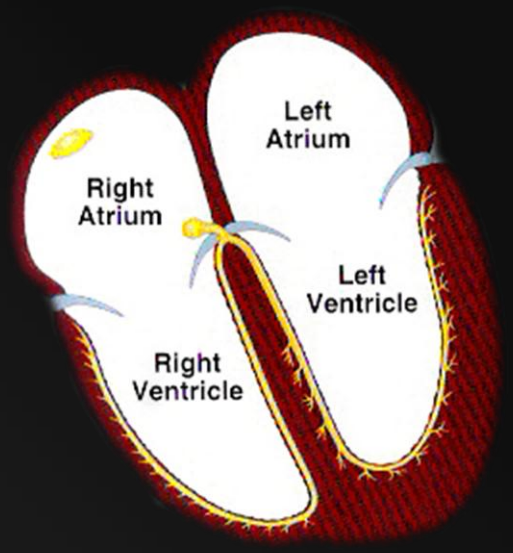




QRS waves - this shows the electrical output given by the heart when the ventricles contract.

EKG Strip

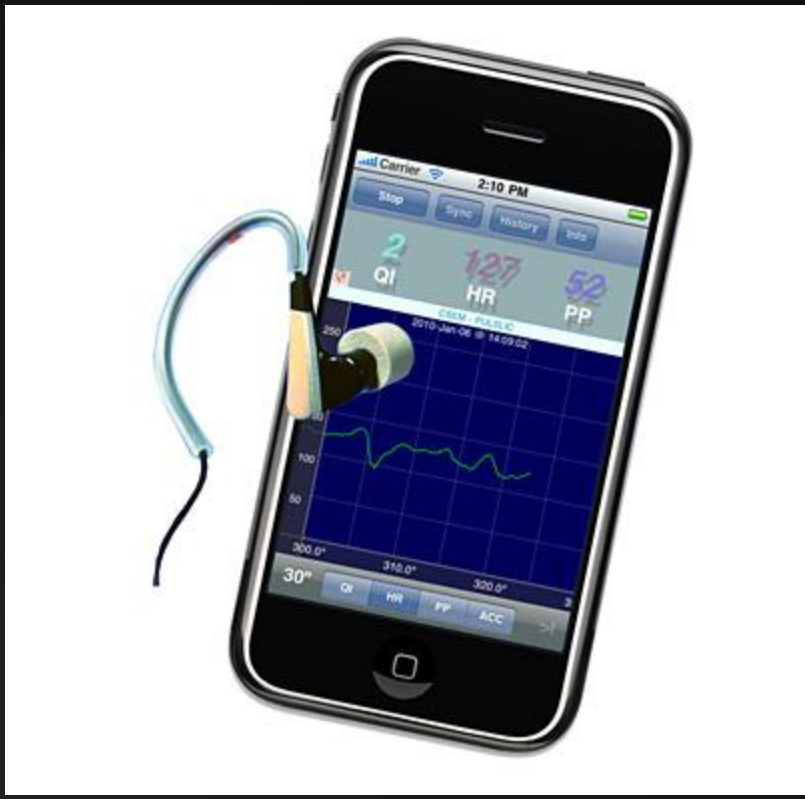




T wave - this shows the ventricles "repolarizing" or going back to their original state. The cycle then starts over.

Pulsear Headphones

- Created by CSEM, a Swiss technology-transfer system company
- Done through tissue in one's ear using infrared technology
- An EKG recording can be obtained and saved (if desired)



RealFlow Program

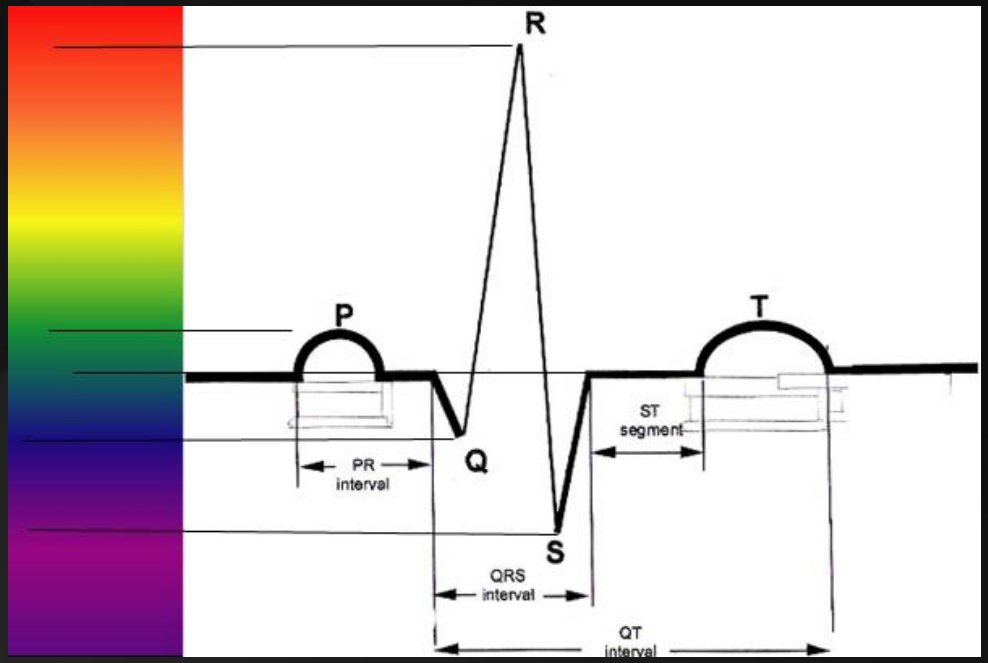
- Used for animating liquids
- Particle-based simulations
- Influenced by point-based nodes (“daemons”) which can
  - Simulate gravity
  - Create vortexes
  - Change viscosity and speed

RealFlow Program

- Used to create:
  - *Watchmen*
  - *The Curious Case of Benjamin Button*
  - *Sweeney Todd: The Demon Barber of Fleet Street*
  - *300*
  - *Ice Age 2: The Meltdown*
  - *Charlie and the Chocolate Factory*
  - *Lost*

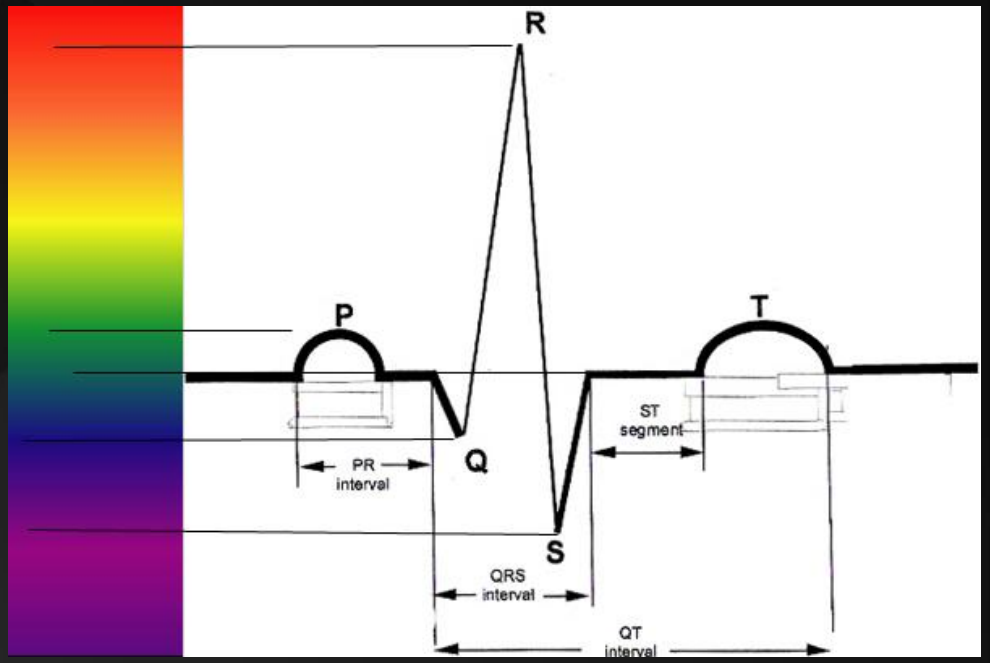
Variables for the Algorithm

- Wave height of EKG determines color. Each heart beat has 3 waves, but can have at least 5 high/low points (P, Q, R, S, T). These points would correspond to the color spectrum.
- An example is shown in the next slide…



Variables for the Algorithm

- Here, a splash of green paint would appear on the screen (for the P wave), then we would see a blue splash (Q), a red splash (R), a purple splash (S), and another green splash (T). T waves are not necessarily the same height as P waves.



Variables for the Algorithm

- Wave width of EKG - strength of the splash.
- Beats per minute (BPM) - how fast a new splash occurs

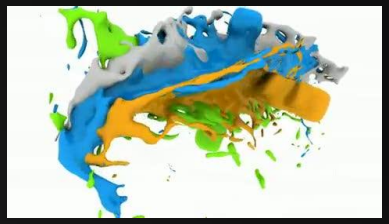
Variables for the Algorithm

- Age - viscosity of the digital paint (older person gets thicker paint)
- Name - a person's name would be turned into numbers and formulated to determine number of particles used in the digital image (more particles = finer, grainier image; less particles = chunkier paint, etc).

Video Examples

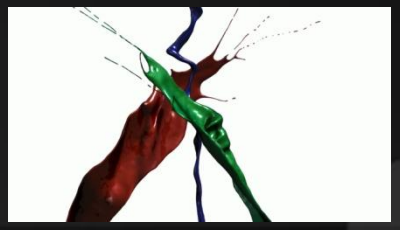
- Video 1
  - http://www.mediafire.com/?obfdsv5k57dq29q

- Video 2
  - http://www.mediafire.com/?bi9ngb0qwqt3l2g



- Video 3
  - http://www.mediafire.com/?6zfj7tcsxl60os0

- Video 4
  - http://www.mediafire.com/?jlnq6h0l4cofqq8



Conclusion

Even though a person might have a normal EKG (known as a “normal sinus rhythm,”) paint visualizations will still be unique because of different variables. Each person would have their own individual digital paint simulation, like a digital thumbprint. Many abnormalities can occur in an EKG, which adds to the variety of images produced. The EKG can change with activity (it is not constant and can be different from one minute to the next), and might encourage different behaviors in the gallery.

Sources

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