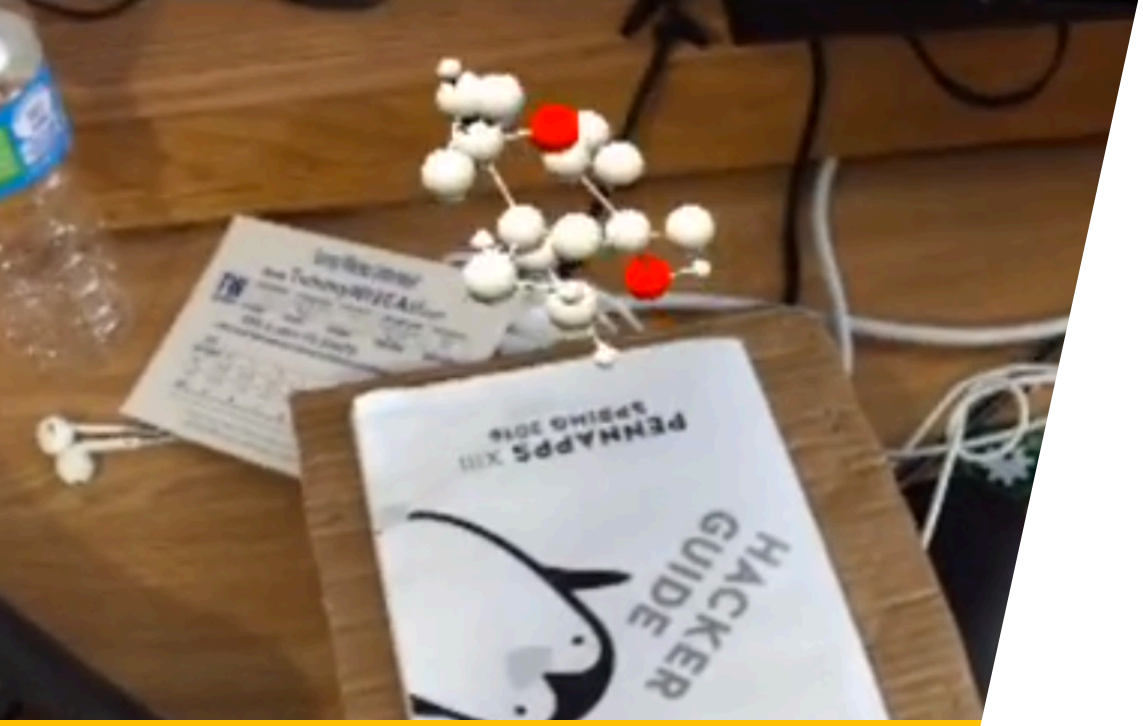
Collaborative, Socket based interaction through Augmented Reality with immediate applications in education, medicine, visualization, and accessible consumer technologies

PROBLEM

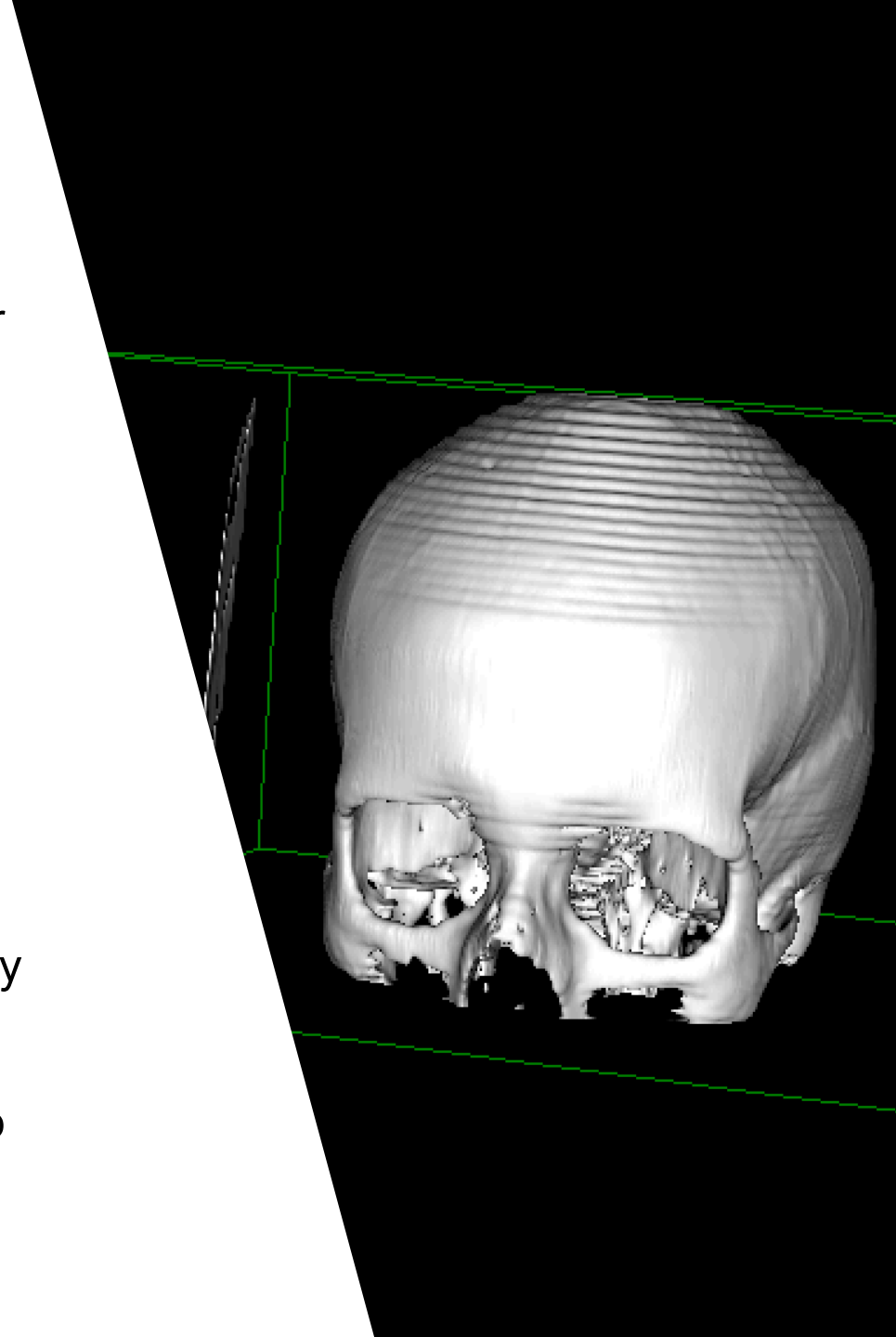
- Technology has allowed us to visualize data and concepts in many different ways
- Currently there is no way to efficiently visualize 3-dimensional objects short of 3D printing the objects or creating static animations
- Devices which come close to having this functionality are not available to the public yet or cost thousands of dollars and are not easily accessible
    - These devices often are not able to allow multiple users to view the same 3D environment in a collaborative fashion

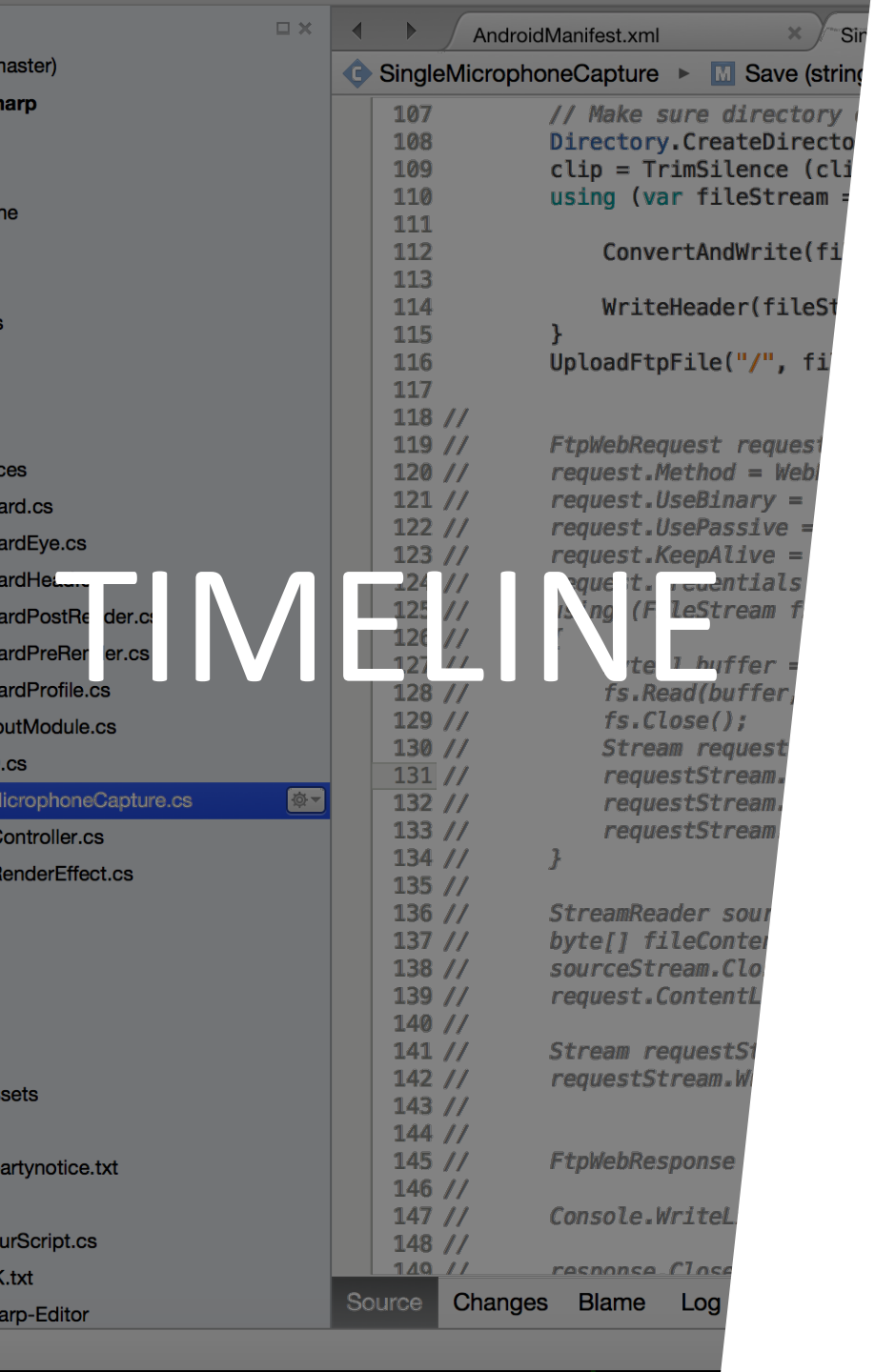


All the user needs is a phone, an optional Google Cardboard, and the app. Just load a 3D model into the website and aim the camera at a target image. The 3D object will overlay on the image for anyone to see

- Utilizing the cheap technology of Google cardboard, we can achieve <1% of the estimated cost of Hololens with most of its capabilities
  - Truly immersive AR experience grounded in the real world
  - User by User spatial object tracking allows for interaction
  - Common websocket IO for session users to import and remove object as well as manipulate
  - Ability for each individual to have their own experience

- Education:
  - School budgets are being cut by an average of $4,389/yr/school
  - This means that it will be much more difficult for teachers to buy lab equipment, anatomical figures, physics models, etc. for students to interact with
  - Over 80% of students have or have access to a smartphone or portable device
  - Using leARn, teachers can allow students to interact with such models as we demonstrated at PennApps XIII
  - Only limited by what can be 3D modeled.
    - Current functionality: physics simulations, chemistry molecules, MRI viewing
    - Planned functionality: ability to highlight regions of 3D objects, create and view 3D objects in web browser, customize base reference image
- Medical:
  - Both medical schools and clinical physicians are struggling way to portray complex structures
  - leARn can load in a variety of medical data and construct 3D objects for easy visualization of anything from broken bones to tumors





TIMELINE

- Product Timeline
  - +1.5 months: finish server side implementation of multiple concurrent sessions and client side rendering of models
  - +0.5 months: Port to multiple operating systems and fix compatibility issues as they arise
  - +1 month: Begin testing at the University of Pennsylvania with SAIL classes
    - Physics 150 has agreed to do a demo in the SAIL class
  - +0.5 months: incorporate feedback and fix issues as they arise
  - +1.5 months: build preset 3D models and case specific functionality ready for use in high school curricula
  - +1 month: Continue spread of application to other universities and local Philadelphia school systems
  - +3 months: Continue development and launch to general public

- TEAM:
  - Hunter Lightman (SEAS, 2019)
    - Computer Science, Hack4impact developer, Dining Philosophers
  - Anton Relin (CAS, 2019)
    - Computational Linguistics, FRESH founder, PennApps XII Grand Prize Health
  - Abhinav Suri (SEAS, 2019)
    - Computer Science + Biology, Apps for Aptitude founder, PennApps XII Grand Prize Health, Hack4impact developer
  - Joe Azar-Williams (Univ of Rochester, 2019)
    - Computer Science + History Major, Prom.ly founder, PennApps XII Grand Prize Health
- Awards:
  - PennAppx XIII:
    - Grand Prize: Virtual/Augmented Reality
    - Top 10 out of 1000+ overall
      - Only entirely freshmen team to make it to this stage