GenuSim

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Problem

- Many doctors are unable to diagnose knee injuries due to a lack of exposure and experience
- Medical students need to be able to practice and learn how to diagnose knee injuries before working on human patients because practicing on injury actors is insufficient
- Lack of simulation of knee injuries in medical teaching institutions and training facilities

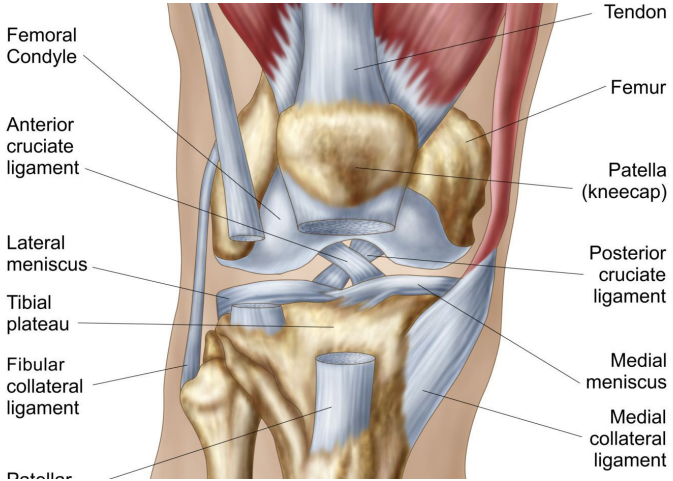
Many Cases

ACL: 200,000 injuries

Meniscus Tear: >200,000 injuries

MCL: 74,000 injuries

Septic infection: >200,000 cases



Solution

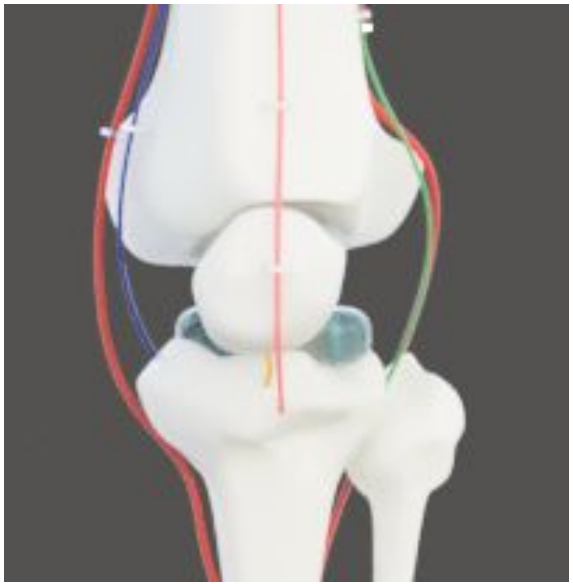
GenuSim is a knee-ligament injury simulator to help new medical students with diagnosing knee injuries

Injuries Simulated by GenuSim

- ACL tear
- MCL tear
- PCL tear
- LCL tear
- Meniscus tear

Product

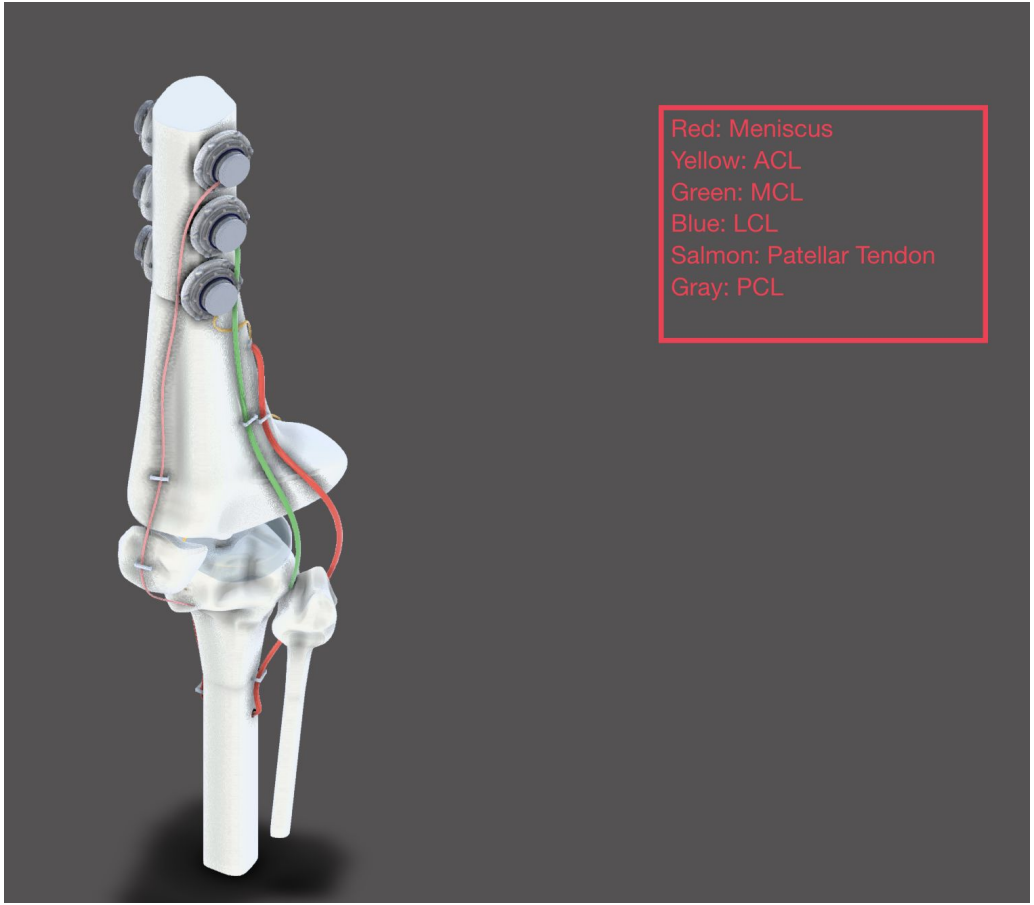
GenuSim vs Real Knee



Public Link

https://a360.co/36Nh2sT

CAD Model

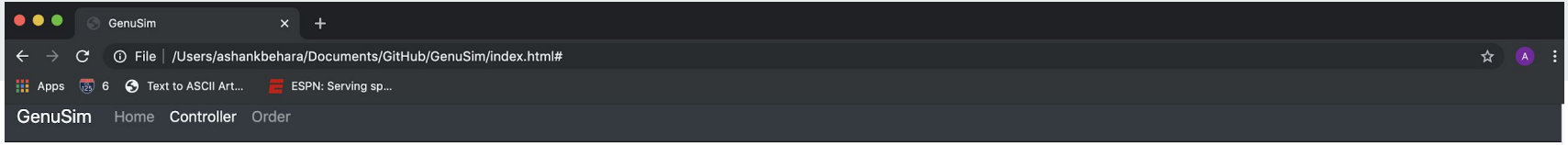

Red: Meniscus
Yellow: ACL
Green: MCL
Blue: LCL
Salmon: Patellar Tendon
Gray: PCL

How GenuSim Works

- This product is a skeleton/mannequin and is not implanted in humans
- Harmonic Drive motors are positioned at the top of the femur and are connected to cables; when driven, they increase tension in cables
- **Tight = Healthy** and **Loose = Torn**
  - Cables simulate tension from ligaments
  - Motors drive to multiple positions to simulate a gradient of tears

Controlling GenuSim

Each GenuSim model has a model number assigned with it. There is a **GenuSim web app** that will adjust the motors on GenuSim to simulate different injuries. By implementing this, multiple injuries can be automatically simulated at the same time with a simple click of the mouse.



GenuSim Controller

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Injury Simulation Controller

This is the web controller for the GenuSim device with model number `00000001` . On each card select the injury you want to simulate. Multiple injuries can be replicated at the same time.

MCL Injury Adjustment

Selecting buttons will adjust the motors to tighten or loosen the strings on the simulator to mimic ligament health and injury.

Healthy | Partial Tear | Complete Tear

ACL Injury Adjustment

Selecting buttons will adjust the motors to tighten or loosen the strings on the simulator to mimic ligament health and injury.

Healthy | Partial Tear | Complete Tear

Septic Infection Adjustment

Selecting buttons will adjust heat at infected areas to mimic symptoms of septic infections

Healthy | Early Stage Infection | Late Stage Infection

Meniscus Injury Adjustment

Selecting buttons will adjust the motors to tighten or loosen the strings on the simulator to mimic cartilege health and injury.

Healthy | Partial Tear | Complete Tear

Enhancements to GenuSim

- Create an outer casing to the bone structure to mimic muscle and fat on the leg
- Pump fluids into pockets around the patella to simulate swelling when pressure is applied
- Pass heated fluids into pockets around the whole leg to simulate septic infections
- Easier accessible bones to replace with different materials i.e. replace patella with “rice crispy” patella for fractures

Enhancements to GenuSim Web Application

- Have a feedback system which guides the student during simulation
- Create automated proficiency test
  - Changes injury every 10 minutes on the actual device
  - Enter the correct injury to get points
  - If 100% of your diagnoses are correct you are GenuSim certified
- Create authentication for users so there is one access to each model
- Create online ordering store and homepage

Conclusion

Thank you for your time and if you have any questions we would love to answer!