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100 million adult Americans live with a musculoskeletal injury

(Bone & Joint Initiative, 2015)
65% physical therapy patients don’t follow up after their injury

(National Center for Biotechnology Information, 1993)
What is the gap in physical therapy?

Lengthy commute times in:

Suburban, rural, & under-served areas
Existing solutions are risky

Don’t go to the doctor

Try to follow PT videos or articles
What is the gap in telemedicine?

Use cases **limited to simple conditions** like the flu

Communication over video call can be unclear
What does PT need?

Physical therapists need to actively monitor patients.

PT telemedicine must enable this communication.
Apollo is the solution

Guidance through exercises

Appointments from home

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Meet Chris - Needs PT

Injured rotator cuff

Struggles to commute because of 9-5 job
How do we know when a pose is “correct”?  

- Hard code matching based on body angles  
- Compare patient’s vector with reference vector
How do we know when a pose is “correct”?

- Hard code matching based on body angles

Compare patient’s vector with reference vector
Easily **scalable** to different exercises
Architecture Backbone

DOCTOR

SERVER

PATIENT

DATABASE

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Architecture Backbone

DOCTOR

SERVER

PATIENT

DATABASE

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Client handles video call & pose tracking

PoseNet Model

TensorFlow

Doctor  Translations  Patient

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Architecture Backbone

- DOCTOR
- PATIENT
- SERVER
- DATABASE
Server side split into microservices
Live data reduces miscommunication
Translation makes apollo accessible to all
Making medicine accessible

Appointments easily accessible from home
Making medicine intelligent

Real-time guidance improves communication and enables physical therapy
Making medicine inclusive

Quality care is made universal through translation
Rethinking physical therapy
Questions?
Appendix - Research

- **Study** from Aarhus University Hospital in Denmark that suggests *correlation* between *pain* and *heart rate*
- Most common musculoskeletal injuries are from *trauma*, *back pain*, and *arthritis*
- Our tensorflow model uses a *residual neural network* architecture with *52 layers* ([more on residual neural networks](#))
- Why Tensorflow.js? Tensorflow.js makes it easy to build and deploy ML models from the browser