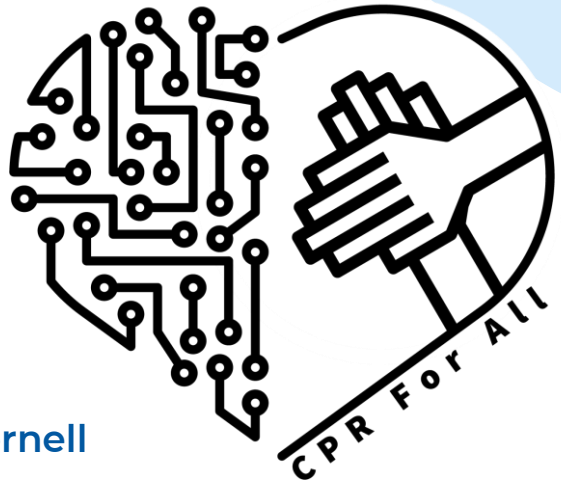
Cardiopulmonary Resuscitation

CPR For All



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The Challenge

CRP For All

How Might We create a **low-cost** version of a CPR model that appropriately simulates the **compression force** and **depth** required for high-quality CPR?

PAKISTAN LIFE SAVERS PROGRAMME

Join hands, save lives

User Groups & Needs

School Children

6-12th Grade.
Bystander CPR

College Students

Pre-Med Students.
Bystander CPR

Medical Students

Early year students.
Bystander & Clinical CPR

Organizations

Govt. workers, corporate employees.
Bystander CPR

PLS & Trainers

Running and administering bystander CPR trainings.

General Public

Any layperson trainee in PLS Bystander CPR programs

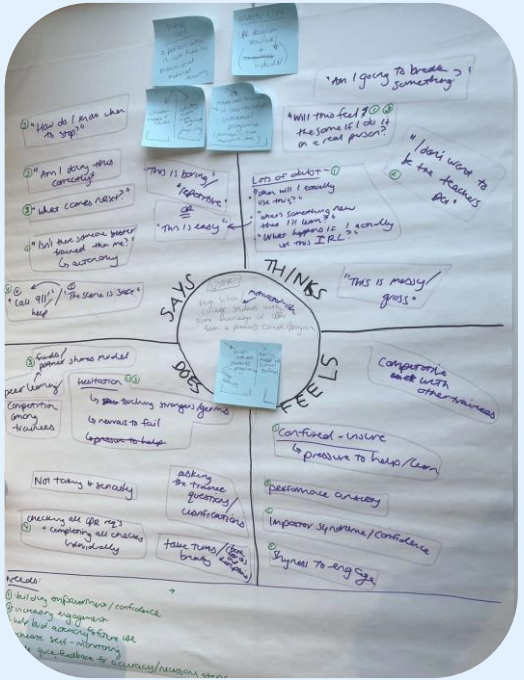
Design Challenge Framework

Components from empathy mapping:

Says: - How do I know when to stop? **- Am I doing this correctly?** - What comes next?	Thinks: - This is messy/gross! **- Will this feel the same if I do it on a real person?**
Does: - **Hesitation** to touch models or germs (Fear of failure). - Ask trainer more questions.	Feels: - Confused/unsure. **- Imposter Syndrome.** - Performance Anxiety.

Needs:

- ❑ Building empowerment/confidence
- ❑ Increase engagement
- ❑ Help build accuracy
- ❑ Enhance self-monitoring
- ❑ Quick feedback



Interview Takeaways

4 Emergency Medicine Physicians @ Weill Cornell

Pakistan Life Savers Program

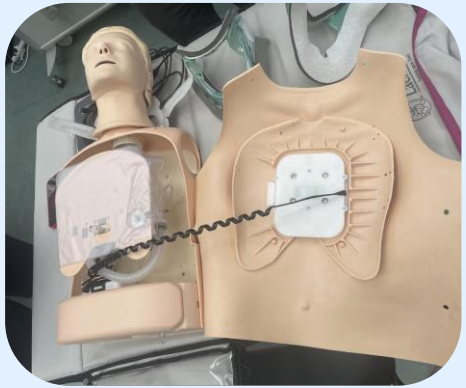
- Recent implementation of CPR into national education curriculum, ~10 million students 6th-12th grade
- Every trainee has one pillow and shares an expensive training mannequin
- Low resourced, high work output
- Need an affordable, portable, scalable, reproducible CPR model to deploy in their programs

CPR Training

- Compressions (depth, rate, hand placement, length) is necessary to teach in bystander CPR over ventilation
- 2-2.5 inches deep at 100-120 cpm for 2 minutes
- Deliver high quality, intuitive feedback without increasing cost

Project Goals & Constraints

Expensive



No Feedback

Highly Accurate Feedback

Cheap

CPR For All

Project Goals & Constraints

Goals

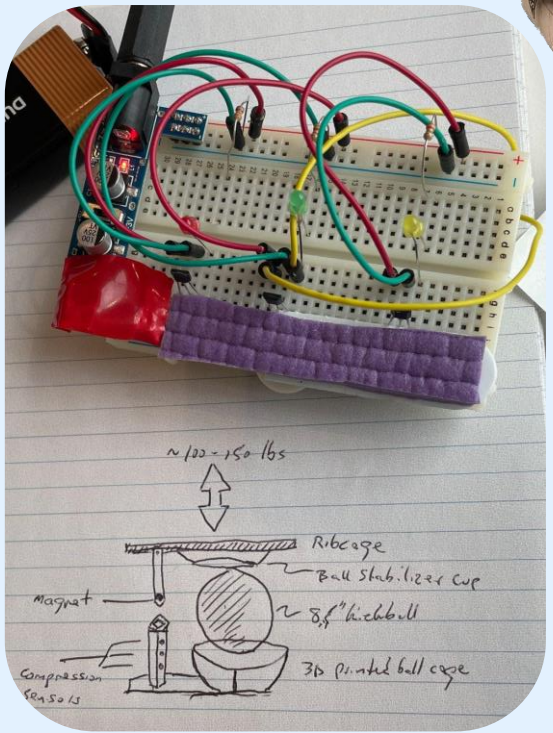
- ❑ Compression only
- ❑ Accurate depth and rate feedback
- ❑ Scalable and portable for schools

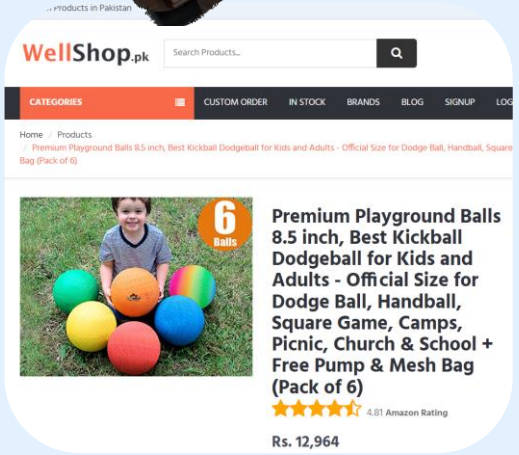
Constraints

- ❑ Low cost, affordable objects
- ❑ Reproducible
- ❑ Easy to assemble
- ❑ Repairable

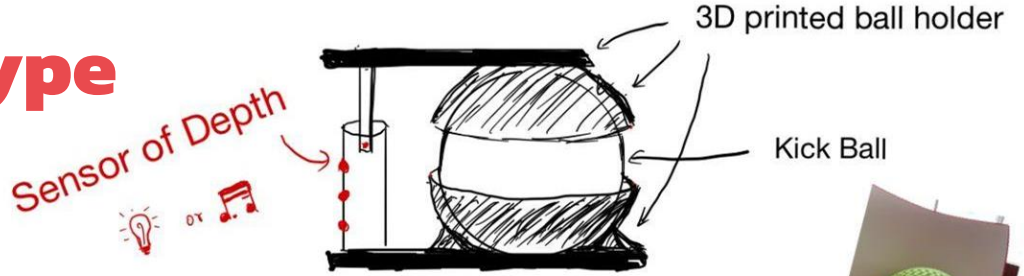
Proof of Concept

- Compression training device
- Using a kickball to simulate pressure
- Showing 3 levels of feedback for compression depth
- Hand placement direction
- Body/rib cage: 3D print, casting, any object chamber
- Potentially adapting our design for new kinds of balls and for other local materials

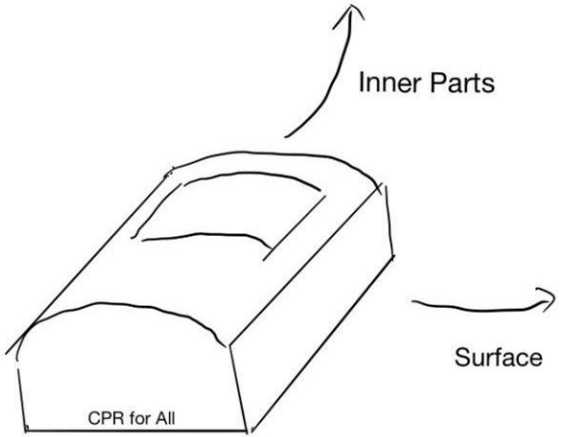


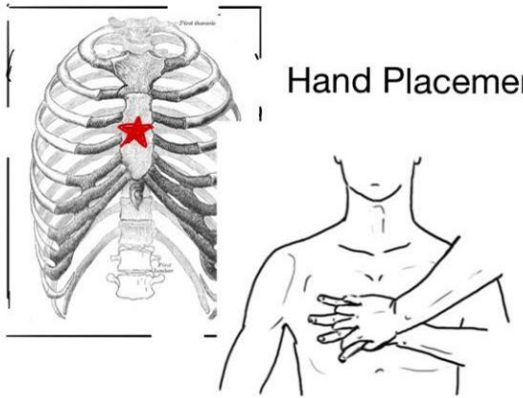


Prototype

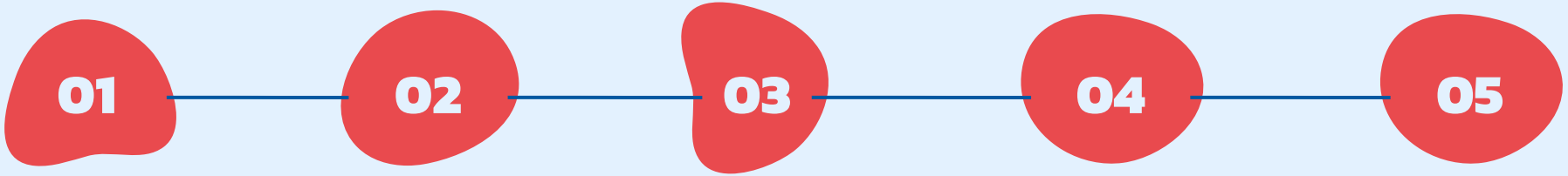

Sensor of Depth
or
3D printed ball holder
Kick Ball


SPORT DESIGN


Inner Parts
Surface
CPR for All


Hand Placement

Our Roadmap



Simulate Chest Compressions

- Kickball + feedback 3D printed holder
- Feedback electronics + rod/piston cylinder

Tune System Accuracy

- Test and finalize feedback sensor placement and response to correct compression depth

Build Chest Cage

- Design and build the chamber for our system to hold kickball, stand and feedback electronics

Add Hand Placement

- Design the top of the chamber to instruct correct hand placement

Assess & Tune Usability

- Test with users and identify design components to improve

Thanks!

Does anyone have any questions?