

The background is a light blue gradient with various geometric shapes and fitness-related icons. In the top left, there is a blue and pink dumbbell. In the top right, a red barbell is partially visible. On the left side, a large blue circle is partially shown. In the bottom left, a blue barbell is partially visible. In the bottom right, there is a pink and blue jump rope. The text "AI COACH APP" is centered in a bold, blue, sans-serif font.

# AI COACH APP

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The background is a light blue-grey color. It features several abstract geometric elements: a red line forming a loop in the top-left; a pink and blue cylindrical object in the top-left; a blue square with the white text '01' in the center; a blue cylindrical object in the top-right; a pink ring in the middle-right; a blue ring in the middle-left; a pink and blue cylindrical object in the bottom-right; and a blue cylindrical object in the bottom-right. The text '01' is in a bold, white, sans-serif font.

01

# TEAM INFO

## **TEAM ID: 19**

**1**

**Mohamed AbdElhamed Taha**  
**ID: 162020527**

**2**

**Mohamed Adel Ali**  
**ID: 162020522**

**3**

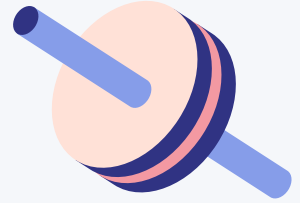
**Mohamed Atef Amin**  
**ID: 162020526**



02

# **TASK DESCRIPTION**

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- **The task involves developing an application that counts bicep curls using computer vision techniques.**
- **Utilizing pose estimation, the application tracks key points of the human body to determine bicep curl movements.**
- **The application provides real-time feedback on correct and incorrect curls.**

The background is a light gray with several abstract geometric elements. In the top left, a red line loops around a pink and blue cylindrical object. In the top right, a blue diagonal band contains a dark blue cylinder. On the left edge, a blue ring is partially visible. On the right edge, a pink ring is partially visible. In the bottom right, there is a complex object with a blue rod passing through a series of orange, pink, and blue rings. The number '03' is centered in a dark blue square.

03

# DEMO OF APP

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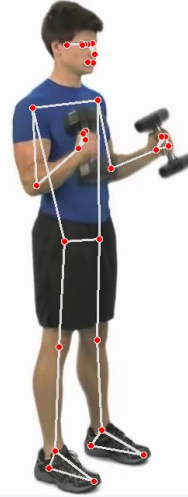


Bicep Curl Counter

L	3
R	3
IL	0
IR	0



L	1
R	1
IL	0
IR	0



**GITHUB LINK: <https://github.com/MohamedBinSalman/AI-Coach-App>**

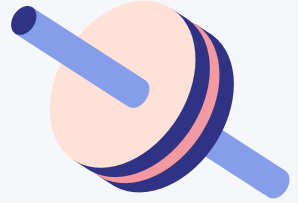


The background is a light blue-grey color. It features several abstract geometric elements: a red line forming a loop in the top left; a pink and blue striped cylinder in the top left; a blue square with the number '04' in the center; a blue cylinder in the top right; a pink ring in the middle right; a blue ring in the middle left; a pink triangle in the bottom left; and a blue and orange striped cylinder in the bottom right.

04

# CONTRIBUTION

# CONTRIBUTION



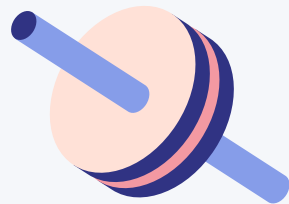
- **Developed algorithm to calculate angles between body keypoints to identify bicep curls.**
- **Integrated real-time feedback for correct and incorrect curl counts.**
- **The accuracy of the bicep curl detection is calculated by comparing the total counts of correct and incorrect curls detected by the app with the counts provided by the user.**
- **Error analysis: the details of incorrect bicep curls, including the count number, flag indicating whether it's an up or down motion, and the angle at which the error occurred.**

The background is a light gray with several abstract geometric elements. In the top left, a red line loops around a pink and blue cylindrical object. In the top right, a blue diagonal band contains a dark blue cylinder. On the left, a blue ring is partially visible. On the right, a pink ring is partially visible. In the bottom right, a blue cylinder passes through a stack of orange and blue disks. The central text is positioned between the top and bottom elements.

05

**DATA**

# DATA



## Training Data:

- **The model is trained and evaluated on a custom dataset comprising 60,000 images featuring one or few people in common poses, along with 25,000 images of individuals performing fitness exercises.**

## Testing Data:

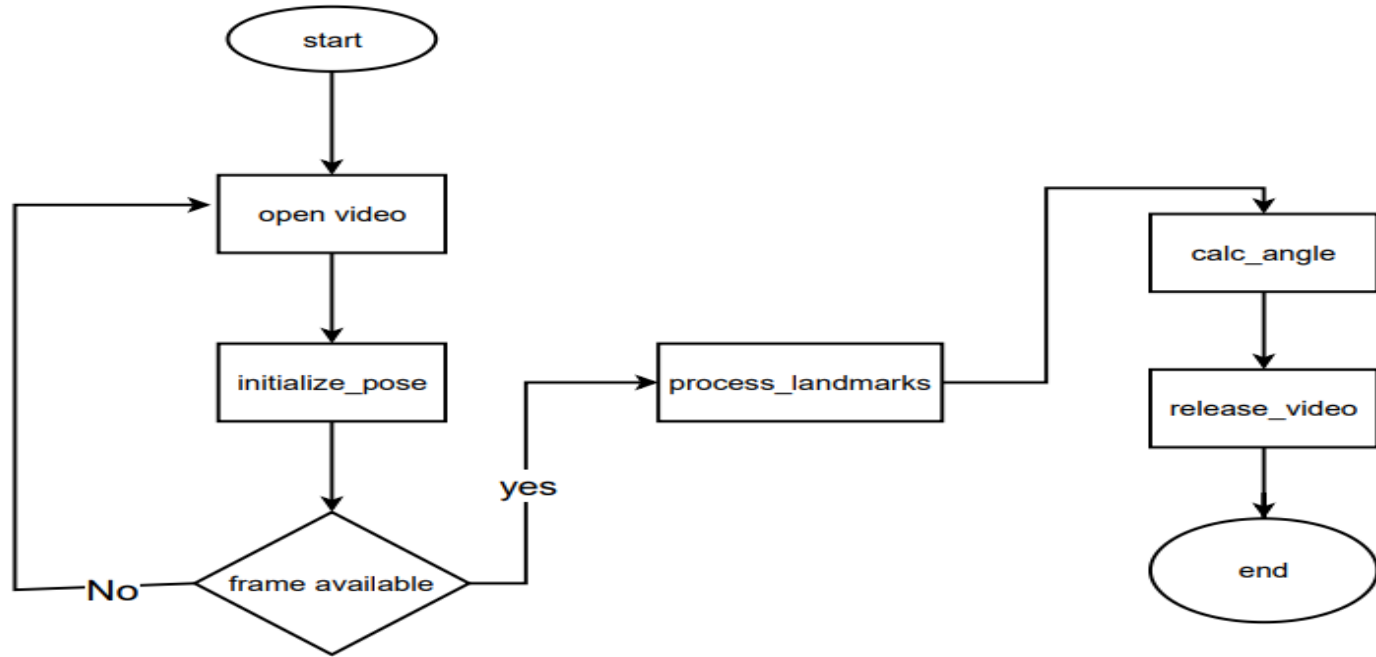
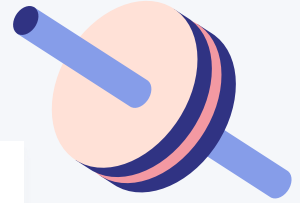
- **The AR dataset served as the primary testing data for evaluating the performance of our pose estimation model.**

The background is a light gray with several abstract geometric elements. In the top left, a red line loops around a pink and blue cylindrical object. In the top right, a blue diagonal band contains a dark blue cylinder. On the right side, there is a pink ring. In the bottom right, a blue cylinder passes through a stack of orange, pink, and blue rings. The text '06' is centered in a dark blue square, and 'PROJECT ARCHITECTURE' is centered below it in a bold, dark blue font.

06

# PROJECT ARCHITECTURE

# PROJECT ARCHITECTURE



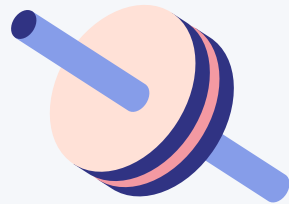
**Figure: Workflow of the project**

The background is a light blue-grey color. It features several abstract geometric elements: a red line forming a loop in the top-left; a pink and blue cylindrical object in the top-left; a blue square with the number '07' in the center; a blue cylindrical object in the top-right; a pink donut shape on the right; a blue donut shape on the left; a pink triangular shape in the bottom-left; and a blue and orange cylindrical object in the bottom-right.

07

# METHODS

# METHODS



## 1. Pose Estimation

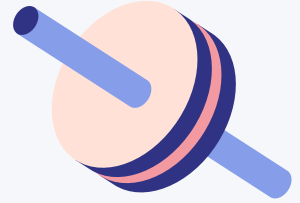
- **Purpose:** Provides accurate spatial information for analyzing arm movements during bicep curls.
- **Functionality:** Detects and tracks key body landmarks such as shoulders, elbows, and wrists.

## 2. Angle Calculation

- **Purpose:** Computes the angle formed at the elbow joint using three points: shoulder, elbow, and wrist.
- **Functionality:** Utilizes vector algebra to determine the angle between lines joining shoulder-elbow and elbow-wrist.



# METHODS



## 3. Bicep Curl Counting

- **Approach:** Processes video frames, extracts landmark coordinates, and calculates angles for left and right arms.
- **Count Logic:** Tracks transitions of the hand position to increment counters for correct and incorrect bicep curls.

## 4. Visualization and Analysis

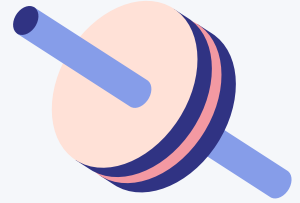
- **OpenCV Integration:** Displays annotated video frames with detected landmarks and connection lines.
- **Accuracy Evaluation:** Calculates accuracy metrics for correct and incorrect bicep curl counts.

The background is a light gray with several abstract geometric elements. In the top left, a red line forms a loop, ending in a pink and blue cylindrical object. In the top right, a blue diagonal band contains a dark blue cylinder. On the right side, there is a large pink ring. In the bottom right, a blue cylinder passes through a stack of orange and blue rings. The bottom left corner features a pink diagonal band. The number '08' is centered in a dark blue square.

08

# RESULTS

# RESULTS



1

## Metric: accuracy

We build a dataset consists of 7 video, with total correct count 90 and 22 incorrect bicep curls , the accuracy is : 95.55 % for correct and 54.54 % for incorrect as it gives 86 correct count and 12 incorrect count .

2

## Model Performance

### AR Dataset :

- Metric: PCK@0.2
- BlazePose Full: 84.1%
- BlazePose Lite: 79.6%

**Ref:** Valentin Bazarevsky ,Ivan Grishchenko, Karthik Raveendran, Tyler Zhu, Fan Zhang, Matthias Grundmann,BlazePose: On-device Real-time Body Pose tracking,2020

The background is a light gray-blue gradient. It features several abstract geometric elements: a red jump rope with a pink handle in the top left; a blue cylinder in the top right; a large pink circle on the right edge; a blue circle on the left edge; a pink triangle in the bottom left corner; and two dumbbells, one pink and one blue, in the bottom left and right respectively. The text is centered in the middle of the image.

# THANKS!

**DO YOU HAVE ANY QUESTIONS?**