# Body Measurement App (Neck, Shoulder, Waist) Using DIP & CV

Group Members:

1. Muhammad Ali FA21-BCS-006
2. Muhammad Yaqoob FA21-BCS-066

## Abstract:

Cross-platform Mobile App, written in React-Native with a python backend model (deployed in a web-server), App takes an Image of a person and finds the measurements and displays them.

Following is the barebones idea of the app:

## Simplified Architecture and Design:

1. **Client-Server Architecture**:
   * **Frontend**: Mobile application (iOS/Android) for user interaction.
   * **Backend**: Server to handle image processing and data management.
2. **Image Processing Pipeline**:
   * **Image Acquisition**: Capture images using the mobile device camera.
   * **Pre-processing**: Normalize images (resize, adjust lighting).
   * **Feature Extraction**: Use CV techniques to identify key points (neck, shoulder, waist).
   * **Measurement Calculation**: Calculate dimensions based on pixel distances and scale.
3. **User Interface (UI)**:
   * Simple and intuitive UI for users to upload images and view results.
   * Option to save measurements and generate reports.

## Programming Languages and Technologies

1. **Frontend Development**:
   * **Frameworks** **/ language:**
     + **React Native** for cross-platform development.
2. **Backend Development**:

* **Cloud Computing.**
  + **Languages**:
    - **Python** (with Flask or Django) for handling image processing and server-side logic.
  + **Database**:
    - **SQLite** for local storage or **PostgreSQL/MySQL** for server-side storage.

1. **Image Processing and Computer Vision**:
   * **Possible Libraries**:
     + **OpenCV** for image processing tasks.
     + **TensorFlow** or **PyTorch** for implementing any machine learning models if needed for enhanced accuracy.

## Inspiration / Related Work:

1. <https://github.com/farazBhatti/Human-Body-Measurements-using-Computer-Vision>
2. Forest Health Monitoring App Developed at LUMS (image segmentation, height estimation using AI, image capture using mobile):

<https://wit.lums.edu.pk/node/9489>

1. Designing a Contactless, AI System to Measure the Human Body using a Single Camera for the Clothing and Fashion Industry – University of London:  
   <https://www.researchgate.net/publication/373343443_Designing_a_Contactless_AI_System_to_Measure_the_Human_Body_using_a_Single_Camera_for_the_Clothing_and_Fashion_Industry>
2. FITME: BODY MEASUREMENT ESTIMATIONS USING MACHINE LEARNING METHOD ~ Paper available on Sciencedirect.com

## Applications:

Following are application domains where the app/tech developed can be employed/used (after expansion of scope/extra work):

1. **E-commerce Fashion Retail**

* **Personalized Size Recommendations**: The app can provide users with accurate size recommendations based on their body measurements, reducing the uncertainty associated with online clothing purchases. This can lead to higher customer satisfaction and lower return rates due to sizing issues.
* **Virtual Try-On Solutions**: By integrating with augmented reality, the app can allow users to visualize how clothing will fit on their bodies, enhancing the online shopping experience and increasing conversion rates.

2. **Custom Tailoring and Made-to-Measure Services**

* **Automated Measurement Collection**: Tailoring businesses can use the app to collect body measurements remotely (from home like during COVID), allowing customers to order custom-fitted clothing without needing to visit a tailor. This can save time and improve convenience for both customers and businesses.
* **Enhanced Customer Engagement**: By providing a seamless way to obtain accurate measurements, the app can help tailor services to individual customer needs, fostering loyalty and repeat business.

3. **Health and Fitness Applications**

* **Body Composition Tracking**: The app can be used to track body measurements over time, helping users monitor changes in their body shape and size as part of fitness or weight loss programs. This can motivate users by providing tangible progress indicators.
* **Personalized Fitness Plans**: By understanding body measurements, fitness professionals can create tailored workout and nutrition plans that align with individual body types and goals.

*(Hence it can be integrated into Fitness Apps.)*

4. **Uniform and Apparel Sizing for Organizations**

* **Efficient Measurement for Uniforms**: Organizations can use the app to quickly gather measurements for uniforms, ensuring that employees receive properly fitting clothing without the need for physical fittings, which can be time-consuming and intrusive.
* **Data Collection for Inventory Management**: Businesses can analyze aggregated measurement data to optimize inventory management and production planning, ensuring that they produce sizes that align with their customer base.

5. **Consumer Insights and Product Development**

* **Market Research**: The app can collect data on body shapes and sizes, providing valuable insights for brands to develop products that better meet the needs of their target audience, reducing waste and improving fit.
* **Trend Analysis**: By analyzing measurement data, companies can identify emerging trends in body sizes and shapes, allowing them to adjust their offerings accordingly

## Future Scope:

* Scope of the App can be expanded to include arm length, Torse and height measurements.
* This is will make it desirable to be integrated into a Virtual Clothing Try-on App/website.