User Manual for The Digital Goniometer

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1. Introduction

Welcome to Digital Goniometer a tool in your hands that will effectively replace a manual Goniometer. This product combines an Android application with an Arduino sensor that uses an IMU internal sensor to provide the needed precise measurements.

2. Product Components

- **3D Printed Box:** Contains the Arduino and preinstalled battery. The box has a place where the user can add changeable bands to easily perform measurements.
- **Arduino sensor:** Measures angles and provide data to the Digital Goniometer application.
- **Battery:** Powers the Arduino, The Battery is a package with three Triple-A changeable batteries.
- **Android Application:** Provide a User-friendly user interface, a database that allow users to download excel file with patient records, save measurements and display patient's data including FirstName, LastName, and detailed measurements.

3. Getting Started

1- Unpacking: Carefully remove the product from its packaging.

2- Optional: install bands on the 3D printed box (bands should not exceed 2*27mm).

3- Download: Download the Digital Goniometer application from Google Play Store.

4. Initialize Bluetooth Connectivity

1. Ensure Bluetooth is enabled on you phone
2. When the application is downloaded, open the application and allow the permissions needed (Location, Bluetooth).
3. press on setup sensor connection button. When the user clicks a window will show and ask the user to enter the device physical address. This address is a combination of numbers and letters following this pattern "xx:xx:xx:xx:xx:xx". This combination is found on a sticker inside the package.
4. The setup sensor connection button will change to Connect To Device by then.
5. Press on that button to connect to the sensor
6. The button should disappear when the connection is established.

5. Managing The Patient List

1- Accessing Patient List:

- From the Main screen press on “Access My Patients” button.

2- Buttons functionality:

- + **Plus Button:** This button will allow the user to add new patient by entering both first and last name then click on add button.
- **Download Button:** This button will save the patient records into an excel sheet.

3- Patient Options:

Press on button to show the patient options.

- **New Measurement:** Take the user to the measurements page.
- **View Patient Records:** Take the user to the measurement records where the user can review all the measurement history of the patient.
- **Delete Patient:** Allow the user to delete the patient with all the patient’s records (Careful This Step Cannot Be Undone).

6- Taking Measurements

1- Positioning:

- Place the Arduino sensor at the initial location

2- Orientation:

a) Head Rotation Measurement

- Always position the device so the side labeled “This face Up/Away” is facing upward.

b) Pronation and Supination (Elbow Rotation)

- Always position the device so the side labeled “This Face Up/Away” is facing the palm of your hand.

c) Shoulder Abduction:

- Always position the device so the side labeled “This Face Up/Away” is oriented away from your body.

d) Hip Abduction:

- Always position the device so the side labeled “This Face Up/Away” is oriented away from your body.

3- Stability:

- For best results, please take measurements carefully and slowly rotate/abduct to get precise measurements. To add more stability the user can use bands with the specified diameters(2*27mm).

4- Initiating Measurements:

- Access the desired measurement type.
- Click “Start” button, a message should pop-up and ask the user to confirm starting new measurement.
- Before clicking yes, make sure the device is stable, and the positioning/orientation of the device are correct since it will be the zero point for the desired measurement.
- When ready, click yes and the application will show real-time measurements and show a new locked button called “Stop Measuring To Save”.

5- Saving Data:

- To enable save button, the user should stop the measurement. This will help the user to get a precise measurement and will reduce the chance of getting random values from a sudden move.
- When measuring is stopped, a “Save Measurement” button will show.
- Click on “Save Measurement” button.
- A message “Measurement Saved Successfully” will notify the user of a successful save and the “Save Measurement” button will disappear again.

7. Troubleshooting

- **Application is not connecting to device:**
  1. Ensure Bluetooth is enabled on your phone.
  2. Ensure the Arduino battery switch is On and that the batteries are not empty.
  3. Ensure that you entered the correct device physical address following this pattern "xx:xx:xx:xx:xx:xx".

- **Inaccurate measurements:**
  1. Ensure the sensor is placed flat and stable during connection.
  2. Try reconnecting to the device
  3. Let the patient redo the measurement and slowly rotate/ abduct to ensure precise measurement is taken.

8. Technical Support

For further assistance, contact our support team at team8@concordia.ca and our support team will happily come back to you As soon as possible.

9. Safety Information

- Do not expose the device to water or extreme temperatures.
- Ensure the device is stored in a dry environment when not in use.
- **Keep out of reach of children:**

  This device contains small parts and/or potential hazardous components that can pose a choking hazard or other risks to young children.
- **Routine Cleaning:**

  Regularly clean the device only by applying a small amount of spray (e.g. Isopropyl Alcohol) into a soft microfiber cloth and gently wipe the box.
- **Disposal and Recycling:**

  Proper Disposal: Dispose of the device and any associated components in accordance with local regulations. Do not throw electronic waste in regular trash. Check for recycling programs or facilities in your area.