**P Media-Pipe-Pose-and-Angle-Estimation**

**Abstract**

This project focuses on using computer vision techniques to estimate body joint angles for applications in pose analysis. Leveraging Google’s MediaPipe framework in combination with OpenCV and Python, we are able to detect human joints and compute key angles such as the hip, knee, and foot angles. These angles are visualized both in real-time overlaid on a video feed and graphically at the end of the video for comprehensive analysis. This can be highly useful in fields such as sports analytics, rehabilitation, and motion tracking. The results show how joint angles evolve over time, with real-time feedback enhancing the interactivity of the analysis process.

**Introduction**

Human pose estimation is a crucial task in many applications such as sports performance monitoring, rehabilitation, motion analysis, and ergonomics. The ability to accurately track body joint movements and angles in real-time opens up numerous opportunities for optimization and assessment in these domains.

This project utilizes Google’s MediaPipe framework to detect body landmarks in real-time and compute the angles between key joints. Specifically, we focus on the hip, knee, and foot angles. These angles are used to assess movement patterns and provide real-time feedback on joint positioning. The processed video feed is accompanied by a graph that visualizes how these angles change over the course of the video.

Our primary objective is to create a system that allows users to analyze joint angles dynamically from video footage and visualize the changes in these angles over time for further analysis.

**Methods Used**

1. MediaPipe Pose Detection

• MediaPipe is a machine learning framework developed by Google that provides an accurate pose estimation system. It utilizes pre-trained models to detect 33 body landmarks, which include major joints such as the hips, knees, and ankles.

• We used MediaPipe’s Pose solution to extract coordinates of these landmarks for each frame of the input video.

2. OpenCV for Video Processing

• OpenCV (Open Source Computer Vision Library) was employed to handle video input/output tasks, such as reading the video frames and displaying them in real-time with pose landmarks.

• OpenCV also allowed us to overlay the calculated angles (hip, knee, and foot) directly on the video feed, giving immediate visual feedback to the user.

3. Angle Calculation

• Using NumPy, the angles between three points (joints) were calculated. Specifically, the hip angle, knee angle, and foot angle were derived from the coordinates of the hip, knee, and ankle landmarks. The formula used for calculating the angle between three points in 2D space is based on trigonometry, utilizing the arctangent function:

\text{{angle}} = \left| \frac{{\arctan2(c\_y - b\_y, c\_x - b\_x) - \arctan2(a\_y - b\_y, a\_x - b\_x)}}{{\pi}} \times 180 \right|

• This allows for real-time calculation of joint angles for each frame in the video.

4. Data Visualization

• Once the video is processed, the calculated angles are plotted over time using Matplotlib.

• Each frame of the video is associated with a set of angles (hip, knee, and foot) and plotted on the graph as a function of time (or frame number). This provides a clear and continuous visualization of how joint angles change over the duration of the video.

5. Annotation

• To improve the interpretability of the graph, the calculated angles were annotated at regular intervals. This helps the user understand how specific values change at various points during the video.

**Results**

Upon running the analysis system, the following outcomes were observed:

1. Real-Time Feedback:

• The system successfully processed the video input in real-time and displayed the pose landmarks for each frame. Additionally, the computed hip, knee, and foot angles were overlaid on the video, offering real-time feedback on joint positioning.

• This functionality could be valuable in contexts such as sports performance tracking or physical therapy, where real-time joint angle information is essential for immediate corrective action.

2. Graphical Visualization:

• At the end of the video, a graph showing the evolution of the hip, knee, and foot angles over time was generated.

• This graphical representation clearly displayed how each joint angle fluctuated throughout the movement. It was noted that during specific movements (e.g., squats or walking patterns), the angles decreased and increased in predictable patterns.

3. Accuracy and Usability:

• The MediaPipe framework provided reliable and accurate joint detection across different movement types. Even in lower-resolution videos, the pose estimation remained robust, and the calculated angles closely followed the expected ranges of human movement.

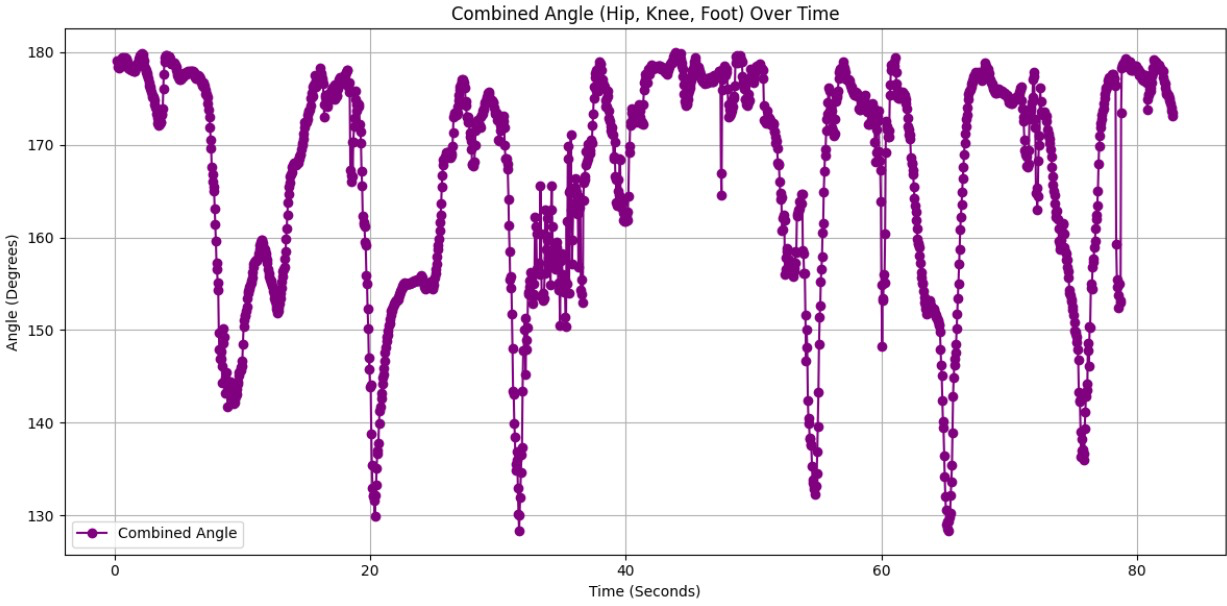
• The annotations on the graph provided a helpful reference for understanding the changes in joint angles at specific frames in the video.

4. Potential Applications:

• This system could be adapted for use in sports analytics to assess an athlete’s form or in physical therapy to monitor the recovery of patients undergoing rehabilitation.

• With further optimization, the system could be extended to track other joints or integrate advanced analysis techniques like machine learning for activity recognition.

**Output –**

****

**Combined Angles –**

**Time: 0.21 s, Combined Angle: 179.10°**

**Time: 0.29 s, Combined Angle: 178.38°**

**Time: 0.33 s, Combined Angle: 178.27°**

**Time: 0.37 s, Combined Angle: 178.36°**

**Time: 0.42 s, Combined Angle: 178.44°**

**Time: 0.47 s, Combined Angle: 178.88°**

**Time: 0.51 s, Combined Angle: 178.91°**

**Time: 0.56 s, Combined Angle: 179.12°**

**Time: 0.61 s, Combined Angle: 179.47°**

**Time: 0.65 s, Combined Angle: 179.44°**

**Time: 0.70 s, Combined Angle: 179.05°**

**Time: 0.75 s, Combined Angle: 179.32°**

**Time: 0.80 s, Combined Angle: 179.44°**

**Time: 0.84 s, Combined Angle: 179.30°**

**Time: 0.88 s, Combined Angle: 179.29°**

**Time: 0.93 s, Combined Angle: 179.22°**

**Time: 0.98 s, Combined Angle: 178.98°**

**Time: 1.02 s, Combined Angle: 178.63°**

**Time: 1.07 s, Combined Angle: 178.26°**

**Time: 1.11 s, Combined Angle: 178.24°**

**Time: 1.16 s, Combined Angle: 178.23°**

**Time: 1.21 s, Combined Angle: 178.20°**

**Time: 1.26 s, Combined Angle: 178.13°**

**Time: 1.30 s, Combined Angle: 178.10°**

**Time: 1.35 s, Combined Angle: 178.04°**

**...**

**Time: 82.65 s, Combined Angle: 174.06°**

**Time: 82.70 s, Combined Angle: 173.69°**

**Time: 82.75 s, Combined Angle: 173.50°**

**Time: 82.80 s, Combined Angle: 173.11°**

**Output is truncated. View as a scrollable element or open in a text editor. Adjust cell output settings...**

**Time: 0.21 s, Combined Angle: 179.10°**

**Time: 0.29 s, Combined Angle: 178.38°**

**Time: 0.33 s, Combined Angle: 178.27°**

**Time: 0.37 s, Combined Angle: 178.36°**

**Time: 0.42 s, Combined Angle: 178.44°**

**Time: 0.47 s, Combined Angle: 178.88°**

**Time: 0.51 s, Combined Angle: 178.91°**

**Time: 0.56 s, Combined Angle: 179.12°**

**Time: 0.61 s, Combined Angle: 179.47°**

**Time: 0.65 s, Combined Angle: 179.44°**

**Time: 0.70 s, Combined Angle: 179.05°**

**Time: 0.75 s, Combined Angle: 179.32°**

**Time: 0.80 s, Combined Angle: 179.44°**

**Time: 0.84 s, Combined Angle: 179.30°**

**Time: 0.88 s, Combined Angle: 179.29°**

**Time: 0.93 s, Combined Angle: 179.22°**

**Time: 0.98 s, Combined Angle: 178.98°**

**Time: 1.02 s, Combined Angle: 178.63°**

**Time: 1.07 s, Combined Angle: 178.26°**

**Time: 1.11 s, Combined Angle: 178.24°**

**Time: 1.16 s, Combined Angle: 178.23°**

**Time: 1.21 s, Combined Angle: 178.20°**

**Time: 1.26 s, Combined Angle: 178.13°**

**Time: 1.30 s, Combined Angle: 178.10°**

**Time: 1.35 s, Combined Angle: 178.04°**

**Time: 1.40 s, Combined Angle: 178.04°**

**Time: 1.45 s, Combined Angle: 178.01°**

**Time: 1.49 s, Combined Angle: 177.98°**

**Time: 1.53 s, Combined Angle: 177.92°**

**Time: 1.58 s, Combined Angle: 177.90°**

**Time: 1.64 s, Combined Angle: 178.32°**

**Time: 1.68 s, Combined Angle: 178.58°**

**Time: 1.73 s, Combined Angle: 178.50°**

**Time: 1.77 s, Combined Angle: 178.60°**

**Time: 1.82 s, Combined Angle: 178.82°**

**Time: 1.86 s, Combined Angle: 179.05°**

**Time: 1.91 s, Combined Angle: 179.25°**

**Time: 1.95 s, Combined Angle: 179.45°**

**Time: 2.00 s, Combined Angle: 179.60°**

**Time: 2.05 s, Combined Angle: 179.75°**

**Time: 2.10 s, Combined Angle: 179.85°**

**Time: 2.15 s, Combined Angle: 179.67°**

**Time: 2.19 s, Combined Angle: 179.70°**

**Time: 2.24 s, Combined Angle: 179.44°**

**Time: 2.28 s, Combined Angle: 179.03°**

**Time: 2.33 s, Combined Angle: 178.54°**

**Time: 2.40 s, Combined Angle: 178.24°**

**Time: 2.44 s, Combined Angle: 178.07°**

**Time: 2.49 s, Combined Angle: 177.86°**

**Time: 2.53 s, Combined Angle: 177.75°**

**Time: 2.58 s, Combined Angle: 177.53°**

**Time: 2.63 s, Combined Angle: 177.21°**

**Time: 2.68 s, Combined Angle: 176.76°**

**Time: 2.72 s, Combined Angle: 176.37°**

**Time: 2.77 s, Combined Angle: 176.21°**

**Time: 2.82 s, Combined Angle: 176.07°**

**Time: 2.86 s, Combined Angle: 175.68°**

**Time: 2.91 s, Combined Angle: 175.33°**

**Time: 2.96 s, Combined Angle: 175.19°**

**Time: 3.00 s, Combined Angle: 175.18°**

**Time: 3.05 s, Combined Angle: 175.10°**

**Time: 3.09 s, Combined Angle: 174.75°**

**Time: 3.15 s, Combined Angle: 174.35°**

**Time: 3.19 s, Combined Angle: 174.02°**

**Time: 3.24 s, Combined Angle: 173.85°**

**Time: 3.28 s, Combined Angle: 173.30°**

**Time: 3.33 s, Combined Angle: 172.87°**

**Time: 3.37 s, Combined Angle: 172.37°**

**Time: 3.42 s, Combined Angle: 172.31°**

**Time: 3.47 s, Combined Angle: 172.11°**

**Time: 3.52 s, Combined Angle: 172.17°**

**Time: 3.56 s, Combined Angle: 172.38°**

**Time: 3.61 s, Combined Angle: 172.49°**

**Time: 3.65 s, Combined Angle: 173.24°**

**Time: 3.70 s, Combined Angle: 173.38°**

**Time: 3.77 s, Combined Angle: 173.89°**

**Time: 3.81 s, Combined Angle: 176.02°**

**Time: 3.85 s, Combined Angle: 177.66°**

**Time: 3.90 s, Combined Angle: 178.92°**

**Time: 3.95 s, Combined Angle: 179.42°**

**Time: 4.00 s, Combined Angle: 179.62°**

**Time: 4.04 s, Combined Angle: 179.66°**

**Time: 4.09 s, Combined Angle: 179.59°**

**Time: 4.13 s, Combined Angle: 179.57°**

**Time: 4.18 s, Combined Angle: 179.58°**

**Time: 4.22 s, Combined Angle: 179.56°**

**Time: 4.27 s, Combined Angle: 179.57°**

**Time: 4.32 s, Combined Angle: 179.32°**

**Time: 4.38 s, Combined Angle: 178.93°**

**Time: 4.44 s, Combined Angle: 178.73°**

**Time: 4.49 s, Combined Angle: 178.79°**

**Time: 4.53 s, Combined Angle: 178.89°**

**Time: 4.59 s, Combined Angle: 178.91°**

**Time: 4.66 s, Combined Angle: 178.86°**

**Time: 4.71 s, Combined Angle: 178.62°**

**Time: 4.76 s, Combined Angle: 178.52°**

**Time: 4.81 s, Combined Angle: 178.38°**

**Time: 4.84 s, Combined Angle: 178.02°**

**Time: 4.90 s, Combined Angle: 177.70°**

**Time: 4.94 s, Combined Angle: 177.49°**

**Time: 5.00 s, Combined Angle: 177.31°**

**Time: 5.03 s, Combined Angle: 177.13°**

**Time: 5.08 s, Combined Angle: 177.00°**

**Time: 5.13 s, Combined Angle: 177.06°**

**Time: 5.17 s, Combined Angle: 177.17°**

**Time: 5.22 s, Combined Angle: 177.21°**

**Time: 5.27 s, Combined Angle: 177.32°**

**Time: 5.31 s, Combined Angle: 177.42°**

**Time: 5.36 s, Combined Angle: 177.43°**

**Time: 5.41 s, Combined Angle: 177.70°**

**Time: 5.45 s, Combined Angle: 177.73°**

**Time: 5.50 s, Combined Angle: 177.78°**

**Time: 5.55 s, Combined Angle: 177.65°**

**Time: 5.60 s, Combined Angle: 177.57°**

**Time: 5.64 s, Combined Angle: 177.85°**

**Time: 5.69 s, Combined Angle: 177.89°**

**Time: 5.73 s, Combined Angle: 177.94°**

**Time: 5.78 s, Combined Angle: 177.77°**

**Time: 5.83 s, Combined Angle: 177.79°**

**Time: 5.87 s, Combined Angle: 177.69°**

**Time: 5.92 s, Combined Angle: 177.93°**

**Time: 5.97 s, Combined Angle: 177.97°**

**Time: 6.02 s, Combined Angle: 177.98°**

**Time: 6.06 s, Combined Angle: 177.87°**

**Time: 6.10 s, Combined Angle: 177.90°**

**Time: 6.16 s, Combined Angle: 177.78°**

**Time: 6.22 s, Combined Angle: 177.80°**

**Time: 6.26 s, Combined Angle: 177.60°**

**Time: 6.31 s, Combined Angle: 177.26°**

**Time: 6.36 s, Combined Angle: 177.12°**

**Time: 6.40 s, Combined Angle: 177.21°**

**Time: 6.45 s, Combined Angle: 177.23°**

**Time: 6.50 s, Combined Angle: 177.34°**

**Time: 6.54 s, Combined Angle: 177.53°**

**Time: 6.59 s, Combined Angle: 177.43°**

**Time: 6.64 s, Combined Angle: 177.23°**

**Time: 6.70 s, Combined Angle: 177.19°**

**Time: 6.75 s, Combined Angle: 176.82°**

**Time: 6.80 s, Combined Angle: 176.71°**

**Time: 6.84 s, Combined Angle: 176.64°**

**Time: 6.88 s, Combined Angle: 176.34°**

**Time: 6.93 s, Combined Angle: 176.31°**

**Time: 6.98 s, Combined Angle: 176.66°**

**Time: 7.03 s, Combined Angle: 176.42°**

**Time: 7.07 s, Combined Angle: 175.89°**

**Time: 7.13 s, Combined Angle: 175.44°**

**Time: 7.20 s, Combined Angle: 175.43°**

**Time: 7.25 s, Combined Angle: 175.19°**

**Time: 7.31 s, Combined Angle: 174.44°**

**Time: 7.37 s, Combined Angle: 173.79°**

**Time: 7.42 s, Combined Angle: 172.99°**

**Time: 7.46 s, Combined Angle: 171.91°**

**Time: 7.51 s, Combined Angle: 170.56°**

**Time: 7.56 s, Combined Angle: 169.57°**

**Time: 7.60 s, Combined Angle: 167.65°**

**Time: 7.65 s, Combined Angle: 166.77°**

**Time: 7.69 s, Combined Angle: 166.00°**

**Time: 7.74 s, Combined Angle: 165.43°**

**Time: 7.78 s, Combined Angle: 165.02°**

**Time: 7.83 s, Combined Angle: 163.11°**

**Time: 7.88 s, Combined Angle: 161.36°**

**Time: 7.92 s, Combined Angle: 159.61°**

**Time: 7.97 s, Combined Angle: 157.24°**

**Time: 8.02 s, Combined Angle: 156.55°**

**Time: 8.06 s, Combined Angle: 155.07°**

**Time: 8.11 s, Combined Angle: 154.29°**

**Time: 8.16 s, Combined Angle: 149.66°**

**Time: 8.20 s, Combined Angle: 147.87°**

**Time: 8.25 s, Combined Angle: 146.86°**

**Time: 8.29 s, Combined Angle: 147.73°**

**Time: 8.34 s, Combined Angle: 146.85°**

**Time: 8.39 s, Combined Angle: 146.09°**

**Time: 8.43 s, Combined Angle: 144.26°**

**Time: 8.48 s, Combined Angle: 148.55°**

**Time: 8.53 s, Combined Angle: 150.14°**

**Time: 8.57 s, Combined Angle: 149.31°**

**Time: 8.62 s, Combined Angle: 144.87°**

**Time: 8.66 s, Combined Angle: 143.15°**

**Time: 8.71 s, Combined Angle: 144.30°**

**Time: 8.76 s, Combined Angle: 145.39°**

**Time: 8.81 s, Combined Angle: 143.57°**

**Time: 8.85 s, Combined Angle: 141.78°**

**Time: 8.90 s, Combined Angle: 143.62°**

**Time: 8.94 s, Combined Angle: 143.64°**

**Time: 8.99 s, Combined Angle: 143.58°**

**Time: 9.04 s, Combined Angle: 144.14°**

**Time: 9.10 s, Combined Angle: 144.38°**

**Time: 9.15 s, Combined Angle: 144.00°**

**Time: 9.20 s, Combined Angle: 143.52°**

**Time: 9.24 s, Combined Angle: 142.69°**

**Time: 9.29 s, Combined Angle: 142.13°**

**Time: 9.33 s, Combined Angle: 142.09°**

**Time: 9.38 s, Combined Angle: 142.22°**

**Time: 9.42 s, Combined Angle: 142.51°**

**Time: 9.47 s, Combined Angle: 142.80°**

**Time: 9.52 s, Combined Angle: 143.07°**

**Time: 9.56 s, Combined Angle: 143.67°**

**Time: 9.61 s, Combined Angle: 144.15°**

**Time: 9.66 s, Combined Angle: 144.37°**

**Time: 9.70 s, Combined Angle: 145.09°**

**Time: 9.75 s, Combined Angle: 145.45°**

**Time: 9.80 s, Combined Angle: 145.54°**

**Time: 9.84 s, Combined Angle: 145.66°**

**Time: 9.90 s, Combined Angle: 146.04°**

**Time: 9.95 s, Combined Angle: 146.08°**

**Time: 9.99 s, Combined Angle: 146.71°**

**Time: 10.04 s, Combined Angle: 148.52°**

**Time: 10.09 s, Combined Angle: 150.43°**

**Time: 10.14 s, Combined Angle: 151.08°**

**Time: 10.19 s, Combined Angle: 151.54°**

**Time: 10.23 s, Combined Angle: 151.65°**

**Time: 10.27 s, Combined Angle: 152.10°**

**Time: 10.34 s, Combined Angle: 152.53°**

**Time: 10.38 s, Combined Angle: 153.38°**

**Time: 10.43 s, Combined Angle: 154.00°**

**Time: 10.48 s, Combined Angle: 154.21°**

**Time: 10.53 s, Combined Angle: 154.38°**

**Time: 10.57 s, Combined Angle: 154.63°**

**Time: 10.62 s, Combined Angle: 154.87°**

**Time: 10.66 s, Combined Angle: 155.07°**

**Time: 10.71 s, Combined Angle: 155.31°**

**Time: 10.76 s, Combined Angle: 155.73°**

**Time: 10.80 s, Combined Angle: 156.26°**

**Time: 10.85 s, Combined Angle: 156.82°**

**Time: 10.90 s, Combined Angle: 157.12°**

**Time: 10.95 s, Combined Angle: 157.41°**

**Time: 11.00 s, Combined Angle: 157.49°**

**Time: 11.04 s, Combined Angle: 157.51°**

**Time: 11.08 s, Combined Angle: 157.47°**

**Time: 11.13 s, Combined Angle: 157.54°**

**Time: 11.20 s, Combined Angle: 157.73°**

**Time: 11.24 s, Combined Angle: 157.89°**

**Time: 11.29 s, Combined Angle: 158.32°**

**Time: 11.33 s, Combined Angle: 158.74°**

**Time: 11.38 s, Combined Angle: 159.12°**

**Time: 11.43 s, Combined Angle: 159.52°**

**Time: 11.48 s, Combined Angle: 159.73°**

**Time: 11.52 s, Combined Angle: 159.73°**

**Time: 11.57 s, Combined Angle: 159.44°**

**Time: 11.61 s, Combined Angle: 159.03°**

**Time: 11.68 s, Combined Angle: 158.80°**

**Time: 11.73 s, Combined Angle: 158.72°**

**Time: 11.77 s, Combined Angle: 158.53°**

**Time: 11.82 s, Combined Angle: 158.23°**

**Time: 11.87 s, Combined Angle: 157.90°**

**Time: 11.91 s, Combined Angle: 157.61°**

**Time: 11.96 s, Combined Angle: 157.21°**

**Time: 12.00 s, Combined Angle: 156.62°**

**Time: 12.05 s, Combined Angle: 156.13°**

**Time: 12.11 s, Combined Angle: 155.73°**

**Time: 12.15 s, Combined Angle: 155.43°**

**Time: 12.21 s, Combined Angle: 155.29°**

**Time: 12.25 s, Combined Angle: 155.17°**

**Time: 12.32 s, Combined Angle: 154.81°**

**Time: 12.38 s, Combined Angle: 154.56°**

**Time: 12.43 s, Combined Angle: 154.25°**

**Time: 12.48 s, Combined Angle: 153.92°**

**Time: 12.53 s, Combined Angle: 153.48°**

**Time: 12.58 s, Combined Angle: 153.09°**

**Time: 12.62 s, Combined Angle: 152.59°**

**Time: 12.67 s, Combined Angle: 152.31°**

**Time: 12.71 s, Combined Angle: 152.04°**

**Time: 12.76 s, Combined Angle: 151.85°**

**Time: 12.81 s, Combined Angle: 152.05°**

**Time: 12.85 s, Combined Angle: 152.43°**

**Time: 12.89 s, Combined Angle: 152.89°**

**Time: 12.94 s, Combined Angle: 153.38°**

**Time: 12.99 s, Combined Angle: 153.94°**

**Time: 13.04 s, Combined Angle: 154.58°**

**Time: 13.08 s, Combined Angle: 155.21°**

**Time: 13.13 s, Combined Angle: 155.77°**

**Time: 13.17 s, Combined Angle: 156.36°**

**Time: 13.22 s, Combined Angle: 156.61°**

**Time: 13.27 s, Combined Angle: 156.82°**

**Time: 13.33 s, Combined Angle: 157.73°**

**Time: 13.38 s, Combined Angle: 158.51°**

**Time: 13.42 s, Combined Angle: 159.82°**

**Time: 13.46 s, Combined Angle: 160.96°**

**Time: 13.51 s, Combined Angle: 162.37°**

**Time: 13.56 s, Combined Angle: 163.77°**

**Time: 13.60 s, Combined Angle: 164.67°**

**Time: 13.65 s, Combined Angle: 165.45°**

**Time: 13.70 s, Combined Angle: 165.91°**

**Time: 13.75 s, Combined Angle: 166.54°**

**Time: 13.79 s, Combined Angle: 166.87°**

**Time: 13.84 s, Combined Angle: 167.08°**

**Time: 13.90 s, Combined Angle: 167.59°**

**Time: 13.95 s, Combined Angle: 167.82°**

**Time: 14.01 s, Combined Angle: 167.93°**

**Time: 14.05 s, Combined Angle: 168.02°**

**Time: 14.11 s, Combined Angle: 168.00°**

**Time: 14.15 s, Combined Angle: 167.85°**

**Time: 14.19 s, Combined Angle: 167.80°**

**Time: 14.24 s, Combined Angle: 167.95°**

**Time: 14.29 s, Combined Angle: 168.02°**

**Time: 14.33 s, Combined Angle: 168.07°**

**Time: 14.37 s, Combined Angle: 168.37°**

**Time: 14.43 s, Combined Angle: 168.52°**

**Time: 14.47 s, Combined Angle: 168.78°**

**Time: 14.52 s, Combined Angle: 168.92°**

**Time: 14.56 s, Combined Angle: 169.00°**

**Time: 14.61 s, Combined Angle: 169.53°**

**Time: 14.66 s, Combined Angle: 169.92°**

**Time: 14.70 s, Combined Angle: 170.15°**

**Time: 14.75 s, Combined Angle: 170.59°**

**Time: 14.80 s, Combined Angle: 171.18°**

**Time: 14.84 s, Combined Angle: 171.90°**

**Time: 14.88 s, Combined Angle: 172.46°**

**Time: 14.93 s, Combined Angle: 172.37°**

**Time: 14.98 s, Combined Angle: 172.44°**

**Time: 15.07 s, Combined Angle: 172.72°**

**Time: 15.12 s, Combined Angle: 173.26°**

**Time: 15.16 s, Combined Angle: 173.57°**

**Time: 15.21 s, Combined Angle: 173.73°**

**Time: 15.26 s, Combined Angle: 173.83°**

**Time: 15.31 s, Combined Angle: 174.25°**

**Time: 15.35 s, Combined Angle: 175.04°**

**Time: 15.39 s, Combined Angle: 175.62°**

**Time: 15.45 s, Combined Angle: 175.17°**

**Time: 15.49 s, Combined Angle: 175.23°**

**Time: 15.53 s, Combined Angle: 176.23°**

**Time: 15.58 s, Combined Angle: 176.53°**

**Time: 15.63 s, Combined Angle: 176.64°**

**Time: 15.68 s, Combined Angle: 177.50°**

**Time: 15.74 s, Combined Angle: 176.91°**

**Time: 15.79 s, Combined Angle: 176.23°**

**Time: 15.83 s, Combined Angle: 176.97°**

**Time: 15.90 s, Combined Angle: 177.16°**

**Time: 15.94 s, Combined Angle: 177.29°**

**Time: 15.99 s, Combined Angle: 177.32°**

**Time: 16.03 s, Combined Angle: 177.35°**

**Time: 16.09 s, Combined Angle: 178.25°**

**Time: 16.13 s, Combined Angle: 177.77°**

**Time: 16.18 s, Combined Angle: 177.50°**

**Time: 16.22 s, Combined Angle: 177.16°**

**Time: 16.27 s, Combined Angle: 176.88°**

**Time: 16.31 s, Combined Angle: 176.61°**

**Time: 16.36 s, Combined Angle: 174.39°**

**Time: 16.41 s, Combined Angle: 173.01°**

**Time: 16.45 s, Combined Angle: 175.12°**

**Time: 16.50 s, Combined Angle: 175.36°**

**Time: 16.54 s, Combined Angle: 174.96°**

**Time: 16.59 s, Combined Angle: 174.34°**

**Time: 16.63 s, Combined Angle: 174.38°**

**Time: 16.69 s, Combined Angle: 174.14°**

**Time: 16.73 s, Combined Angle: 175.07°**

**Time: 16.78 s, Combined Angle: 175.59°**

**Time: 16.83 s, Combined Angle: 175.23°**

**Time: 16.87 s, Combined Angle: 175.07°**

**Time: 16.92 s, Combined Angle: 175.64°**

**Time: 16.97 s, Combined Angle: 175.92°**

**Time: 17.03 s, Combined Angle: 176.10°**

**Time: 17.07 s, Combined Angle: 176.16°**

**Time: 17.11 s, Combined Angle: 176.18°**

**Time: 17.16 s, Combined Angle: 176.28°**

**Time: 17.21 s, Combined Angle: 176.45°**

**Time: 17.25 s, Combined Angle: 174.88°**

**Time: 17.31 s, Combined Angle: 175.10°**

**Time: 17.35 s, Combined Angle: 175.20°**

**Time: 17.40 s, Combined Angle: 175.32°**

**Time: 17.44 s, Combined Angle: 175.99°**

**Time: 17.48 s, Combined Angle: 176.26°**

**Time: 17.53 s, Combined Angle: 176.65°**

**Time: 17.58 s, Combined Angle: 177.02°**

**Time: 17.63 s, Combined Angle: 177.28°**

**Time: 17.67 s, Combined Angle: 176.94°**

**Time: 17.73 s, Combined Angle: 177.22°**

**Time: 17.79 s, Combined Angle: 176.62°**

**Time: 17.83 s, Combined Angle: 176.95°**

**Time: 17.87 s, Combined Angle: 177.06°**

**Time: 17.92 s, Combined Angle: 177.19°**

**Time: 17.96 s, Combined Angle: 177.37°**

**Time: 18.01 s, Combined Angle: 177.48°**

**Time: 18.07 s, Combined Angle: 177.61°**

**Time: 18.12 s, Combined Angle: 177.85°**

**Time: 18.16 s, Combined Angle: 178.07°**

**Time: 18.21 s, Combined Angle: 178.06°**

**Time: 18.26 s, Combined Angle: 176.52°**

**Time: 18.30 s, Combined Angle: 176.32°**

**Time: 18.35 s, Combined Angle: 176.75°**

**Time: 18.40 s, Combined Angle: 175.71°**

**Time: 18.45 s, Combined Angle: 167.26°**

**Time: 18.49 s, Combined Angle: 165.97°**

**Time: 18.54 s, Combined Angle: 166.65°**

**Time: 18.58 s, Combined Angle: 170.33°**

**Time: 18.62 s, Combined Angle: 166.58°**

**Time: 18.67 s, Combined Angle: 170.25°**

**Time: 18.73 s, Combined Angle: 171.96°**

**Time: 18.76 s, Combined Angle: 172.84°**

**Time: 18.82 s, Combined Angle: 175.84°**

**Time: 18.85 s, Combined Angle: 174.88°**

**Time: 18.90 s, Combined Angle: 174.36°**

**Time: 18.95 s, Combined Angle: 173.64°**

**Time: 18.99 s, Combined Angle: 174.34°**

**Time: 19.05 s, Combined Angle: 174.43°**

**Time: 19.09 s, Combined Angle: 174.36°**

**Time: 19.13 s, Combined Angle: 174.08°**

**Time: 19.18 s, Combined Angle: 172.24°**

**Time: 19.23 s, Combined Angle: 171.40°**

**Time: 19.27 s, Combined Angle: 170.20°**

**Time: 19.32 s, Combined Angle: 167.09°**

**Time: 19.37 s, Combined Angle: 165.58°**

**Time: 19.41 s, Combined Angle: 162.28°**

**Time: 19.46 s, Combined Angle: 161.44°**

**Time: 19.50 s, Combined Angle: 161.61°**

**Time: 19.55 s, Combined Angle: 161.16°**

**Time: 19.60 s, Combined Angle: 159.49°**

**Time: 19.64 s, Combined Angle: 159.18°**

**Time: 19.70 s, Combined Angle: 155.92°**

**Time: 19.75 s, Combined Angle: 155.03°**

**Time: 19.79 s, Combined Angle: 152.26°**

**Time: 19.85 s, Combined Angle: 150.17°**

**Time: 19.89 s, Combined Angle: 147.01°**

**Time: 19.93 s, Combined Angle: 145.76°**

**Time: 19.99 s, Combined Angle: 143.84°**

**Time: 20.04 s, Combined Angle: 144.03°**

**Time: 20.09 s, Combined Angle: 138.79°**

**Time: 20.13 s, Combined Angle: 135.48°**

**Time: 20.18 s, Combined Angle: 132.90°**

**Time: 20.23 s, Combined Angle: 132.06°**

**Time: 20.27 s, Combined Angle: 132.16°**

**Time: 20.32 s, Combined Angle: 131.55°**

**Time: 20.36 s, Combined Angle: 129.86°**

**Time: 20.41 s, Combined Angle: 132.21°**

**Time: 20.46 s, Combined Angle: 133.24°**

**Time: 20.50 s, Combined Angle: 135.10°**

**Time: 20.55 s, Combined Angle: 136.71°**

**Time: 20.59 s, Combined Angle: 136.98°**

**Time: 20.64 s, Combined Angle: 137.80°**

**Time: 20.69 s, Combined Angle: 139.88°**

**Time: 20.73 s, Combined Angle: 141.22°**

**Time: 20.80 s, Combined Angle: 141.77°**

**Time: 20.85 s, Combined Angle: 142.61°**

**Time: 20.89 s, Combined Angle: 143.24°**

**Time: 20.94 s, Combined Angle: 144.25°**

**Time: 20.99 s, Combined Angle: 144.86°**

**Time: 21.03 s, Combined Angle: 145.23°**

**Time: 21.08 s, Combined Angle: 145.86°**

**Time: 21.12 s, Combined Angle: 146.66°**

**Time: 21.17 s, Combined Angle: 147.54°**

**Time: 21.21 s, Combined Angle: 148.18°**

**Time: 21.26 s, Combined Angle: 148.86°**

**Time: 21.31 s, Combined Angle: 149.22°**

**Time: 21.36 s, Combined Angle: 149.45°**

**Time: 21.41 s, Combined Angle: 149.94°**

**Time: 21.47 s, Combined Angle: 150.53°**

**Time: 21.51 s, Combined Angle: 150.77°**

**Time: 21.55 s, Combined Angle: 151.22°**

**Time: 21.60 s, Combined Angle: 151.63°**

**Time: 21.65 s, Combined Angle: 152.03°**

**Time: 21.70 s, Combined Angle: 152.09°**

**Time: 21.74 s, Combined Angle: 152.32°**

**Time: 21.78 s, Combined Angle: 152.58°**

**Time: 21.83 s, Combined Angle: 152.79°**

**Time: 21.88 s, Combined Angle: 152.91°**

**Time: 21.92 s, Combined Angle: 153.02°**

**Time: 21.97 s, Combined Angle: 153.14°**

**Time: 22.02 s, Combined Angle: 153.19°**

**Time: 22.06 s, Combined Angle: 153.21°**

**Time: 22.11 s, Combined Angle: 153.22°**

**Time: 22.15 s, Combined Angle: 153.34°**

**Time: 22.20 s, Combined Angle: 153.52°**

**Time: 22.25 s, Combined Angle: 153.76°**

**Time: 22.29 s, Combined Angle: 153.88°**

**Time: 22.35 s, Combined Angle: 154.07°**

**Time: 22.38 s, Combined Angle: 154.18°**

**Time: 22.44 s, Combined Angle: 154.39°**

**Time: 22.48 s, Combined Angle: 154.54°**

**Time: 22.52 s, Combined Angle: 154.72°**

**Time: 22.57 s, Combined Angle: 154.82°**

**Time: 22.61 s, Combined Angle: 154.98°**

**Time: 22.67 s, Combined Angle: 155.06°**

**Time: 22.71 s, Combined Angle: 155.06°**

**Time: 22.76 s, Combined Angle: 155.01°**

**Time: 22.80 s, Combined Angle: 155.03°**

**Time: 22.84 s, Combined Angle: 155.06°**

**Time: 22.90 s, Combined Angle: 155.02°**

**Time: 22.94 s, Combined Angle: 155.03°**

**Time: 22.99 s, Combined Angle: 155.04°**

**Time: 23.04 s, Combined Angle: 154.97°**

**Time: 23.08 s, Combined Angle: 155.00°**

**Time: 23.13 s, Combined Angle: 155.07°**

**Time: 23.18 s, Combined Angle: 155.10°**

**Time: 23.22 s, Combined Angle: 155.08°**

**Time: 23.27 s, Combined Angle: 155.11°**

**Time: 23.31 s, Combined Angle: 155.19°**

**Time: 23.36 s, Combined Angle: 155.25°**

**Time: 23.40 s, Combined Angle: 155.27°**

**Time: 23.45 s, Combined Angle: 155.29°**

**Time: 23.50 s, Combined Angle: 155.39°**

**Time: 23.54 s, Combined Angle: 155.38°**

**Time: 23.59 s, Combined Angle: 155.34°**

**Time: 23.63 s, Combined Angle: 155.39°**

**Time: 23.68 s, Combined Angle: 155.42°**

**Time: 23.73 s, Combined Angle: 155.30°**

**Time: 23.77 s, Combined Angle: 155.34°**

**Time: 23.82 s, Combined Angle: 155.43°**

**Time: 23.86 s, Combined Angle: 155.58°**

**Time: 23.92 s, Combined Angle: 155.54°**

**Time: 23.96 s, Combined Angle: 155.54°**

**Time: 24.01 s, Combined Angle: 155.85°**

**Time: 24.05 s, Combined Angle: 155.66°**

**Time: 24.10 s, Combined Angle: 155.36°**

**Time: 24.14 s, Combined Angle: 155.09°**

**Time: 24.20 s, Combined Angle: 154.83°**

**Time: 24.23 s, Combined Angle: 154.62°**

**Time: 24.28 s, Combined Angle: 154.47°**

**Time: 24.33 s, Combined Angle: 154.69°**

**Time: 24.37 s, Combined Angle: 154.53°**

**Time: 24.42 s, Combined Angle: 154.56°**

**Time: 24.48 s, Combined Angle: 154.69°**

**Time: 24.51 s, Combined Angle: 154.91°**

**Time: 24.56 s, Combined Angle: 154.88°**

**Time: 24.62 s, Combined Angle: 154.78°**

**Time: 24.67 s, Combined Angle: 155.14°**

**Time: 24.71 s, Combined Angle: 155.18°**

**Time: 24.77 s, Combined Angle: 154.97°**

**Time: 24.81 s, Combined Angle: 154.72°**

**Time: 24.85 s, Combined Angle: 154.39°**

**Time: 24.90 s, Combined Angle: 154.55°**

**Time: 24.94 s, Combined Angle: 154.89°**

**Time: 24.99 s, Combined Angle: 155.42°**

**Time: 25.04 s, Combined Angle: 155.62°**

**Time: 25.09 s, Combined Angle: 156.16°**

**Time: 25.13 s, Combined Angle: 156.62°**

**Time: 25.18 s, Combined Angle: 157.16°**

**Time: 25.22 s, Combined Angle: 157.96°**

**Time: 25.28 s, Combined Angle: 158.66°**

**Time: 25.32 s, Combined Angle: 159.21°**

**Time: 25.37 s, Combined Angle: 159.79°**

**Time: 25.41 s, Combined Angle: 160.71°**

**Time: 25.46 s, Combined Angle: 161.66°**

**Time: 25.51 s, Combined Angle: 162.47°**

**Time: 25.55 s, Combined Angle: 163.64°**

**Time: 25.59 s, Combined Angle: 165.43°**

**Time: 25.64 s, Combined Angle: 166.65°**

**Time: 25.69 s, Combined Angle: 167.86°**

**Time: 25.73 s, Combined Angle: 168.34°**

**Time: 25.79 s, Combined Angle: 168.40°**

**Time: 25.83 s, Combined Angle: 168.66°**

**Time: 25.87 s, Combined Angle: 168.68°**

**Time: 25.92 s, Combined Angle: 168.84°**

**Time: 25.97 s, Combined Angle: 169.18°**

**Time: 26.01 s, Combined Angle: 169.17°**

**Time: 26.06 s, Combined Angle: 169.22°**

**Time: 26.10 s, Combined Angle: 169.16°**

**Time: 26.15 s, Combined Angle: 169.05°**

**Time: 26.19 s, Combined Angle: 168.77°**

**Time: 26.25 s, Combined Angle: 168.86°**

**Time: 26.29 s, Combined Angle: 168.63°**

**Time: 26.34 s, Combined Angle: 168.82°**

**Time: 26.38 s, Combined Angle: 169.08°**

**Time: 26.44 s, Combined Angle: 169.87°**

**Time: 26.48 s, Combined Angle: 171.30°**

**Time: 26.52 s, Combined Angle: 173.05°**

**Time: 26.57 s, Combined Angle: 173.45°**

**Time: 26.61 s, Combined Angle: 173.34°**

**Time: 26.66 s, Combined Angle: 173.30°**

**Time: 26.71 s, Combined Angle: 173.35°**

**Time: 26.76 s, Combined Angle: 173.19°**

**Time: 26.80 s, Combined Angle: 173.46°**

**Time: 26.85 s, Combined Angle: 174.10°**

**Time: 26.90 s, Combined Angle: 174.79°**

**Time: 26.94 s, Combined Angle: 175.41°**

**Time: 26.98 s, Combined Angle: 175.96°**

**Time: 27.04 s, Combined Angle: 176.27°**

**Time: 27.08 s, Combined Angle: 176.44°**

**Time: 27.13 s, Combined Angle: 176.77°**

**Time: 27.17 s, Combined Angle: 177.08°**

**Time: 27.23 s, Combined Angle: 177.00°**

**Time: 27.27 s, Combined Angle: 176.94°**

**Time: 27.32 s, Combined Angle: 176.67°**

**Time: 27.37 s, Combined Angle: 176.34°**

**Time: 27.41 s, Combined Angle: 176.17°**

**Time: 27.46 s, Combined Angle: 174.71°**

**Time: 27.50 s, Combined Angle: 174.22°**

**Time: 27.55 s, Combined Angle: 173.02°**

**Time: 27.60 s, Combined Angle: 172.96°**

**Time: 27.64 s, Combined Angle: 172.96°**

**Time: 27.69 s, Combined Angle: 172.47°**

**Time: 27.73 s, Combined Angle: 172.39°**

**Time: 27.78 s, Combined Angle: 171.36°**

**Time: 27.83 s, Combined Angle: 170.82°**

**Time: 27.87 s, Combined Angle: 169.50°**

**Time: 27.92 s, Combined Angle: 170.38°**

**Time: 27.96 s, Combined Angle: 167.86°**

**Time: 28.01 s, Combined Angle: 167.89°**

**Time: 28.06 s, Combined Angle: 168.07°**

**Time: 28.10 s, Combined Angle: 167.66°**

**Time: 28.15 s, Combined Angle: 168.15°**

**Time: 28.20 s, Combined Angle: 169.92°**

**Time: 28.24 s, Combined Angle: 171.52°**

**Time: 28.29 s, Combined Angle: 171.98°**

**Time: 28.33 s, Combined Angle: 171.98°**

**Time: 28.38 s, Combined Angle: 172.33°**

**Time: 28.43 s, Combined Angle: 172.67°**

**Time: 28.48 s, Combined Angle: 172.05°**

**Time: 28.52 s, Combined Angle: 172.13°**

**Time: 28.57 s, Combined Angle: 172.11°**

**Time: 28.62 s, Combined Angle: 171.90°**

**Time: 28.66 s, Combined Angle: 172.97°**

**Time: 28.71 s, Combined Angle: 173.26°**

**Time: 28.76 s, Combined Angle: 173.39°**

**Time: 28.80 s, Combined Angle: 173.66°**

**Time: 28.86 s, Combined Angle: 173.77°**

**Time: 28.90 s, Combined Angle: 173.87°**

**Time: 28.94 s, Combined Angle: 174.37°**

**Time: 28.99 s, Combined Angle: 174.59°**

**Time: 29.03 s, Combined Angle: 174.64°**

**Time: 29.09 s, Combined Angle: 175.00°**

**Time: 29.13 s, Combined Angle: 175.14°**

**Time: 29.18 s, Combined Angle: 175.38°**

**Time: 29.23 s, Combined Angle: 175.60°**

**Time: 29.27 s, Combined Angle: 175.65°**

**Time: 29.31 s, Combined Angle: 175.45°**

**Time: 29.36 s, Combined Angle: 174.90°**

**Time: 29.41 s, Combined Angle: 174.63°**

**Time: 29.45 s, Combined Angle: 174.75°**

**Time: 29.50 s, Combined Angle: 174.80°**

**Time: 29.55 s, Combined Angle: 174.65°**

**Time: 29.59 s, Combined Angle: 174.54°**

**Time: 29.65 s, Combined Angle: 174.56°**

**Time: 29.69 s, Combined Angle: 173.96°**

**Time: 29.74 s, Combined Angle: 173.38°**

**Time: 29.79 s, Combined Angle: 173.59°**

**Time: 29.83 s, Combined Angle: 173.39°**

**Time: 29.88 s, Combined Angle: 173.49°**

**Time: 29.93 s, Combined Angle: 173.29°**

**Time: 29.97 s, Combined Angle: 172.66°**

**Time: 30.01 s, Combined Angle: 172.82°**

**Time: 30.06 s, Combined Angle: 170.54°**

**Time: 30.11 s, Combined Angle: 170.42°**

**Time: 30.16 s, Combined Angle: 171.51°**

**Time: 30.20 s, Combined Angle: 172.07°**

**Time: 30.25 s, Combined Angle: 172.72°**

**Time: 30.29 s, Combined Angle: 172.88°**

**Time: 30.34 s, Combined Angle: 171.75°**

**Time: 30.39 s, Combined Angle: 172.52°**

**Time: 30.43 s, Combined Angle: 173.15°**

**Time: 30.48 s, Combined Angle: 171.85°**

**Time: 30.53 s, Combined Angle: 169.98°**

**Time: 30.58 s, Combined Angle: 168.52°**

**Time: 30.62 s, Combined Angle: 168.55°**

**Time: 30.67 s, Combined Angle: 168.49°**

**Time: 30.72 s, Combined Angle: 167.94°**

**Time: 30.76 s, Combined Angle: 167.34°**

**Time: 30.82 s, Combined Angle: 164.12°**

**Time: 30.85 s, Combined Angle: 161.34°**

**Time: 30.91 s, Combined Angle: 158.49°**

**Time: 30.95 s, Combined Angle: 155.40°**

**Time: 30.99 s, Combined Angle: 154.59°**

**Time: 31.04 s, Combined Angle: 155.75°**

**Time: 31.09 s, Combined Angle: 151.71°**

**Time: 31.13 s, Combined Angle: 148.01°**

**Time: 31.18 s, Combined Angle: 143.44°**

**Time: 31.23 s, Combined Angle: 143.02°**

**Time: 31.27 s, Combined Angle: 139.90°**

**Time: 31.32 s, Combined Angle: 138.45°**

**Time: 31.36 s, Combined Angle: 134.89°**

**Time: 31.42 s, Combined Angle: 135.60°**

**Time: 31.46 s, Combined Angle: 136.85°**

**Time: 31.51 s, Combined Angle: 136.04°**

**Time: 31.55 s, Combined Angle: 132.96°**

**Time: 31.60 s, Combined Angle: 130.14°**

**Time: 31.65 s, Combined Angle: 128.37°**

**Time: 31.69 s, Combined Angle: 130.03°**

**Time: 31.74 s, Combined Angle: 131.89°**

**Time: 31.78 s, Combined Angle: 134.65°**

**Time: 31.83 s, Combined Angle: 136.53°**

**Time: 31.88 s, Combined Angle: 137.35°**

**Time: 31.92 s, Combined Angle: 143.38°**

**Time: 31.97 s, Combined Angle: 147.82°**

**Time: 32.02 s, Combined Angle: 147.79°**

**Time: 32.06 s, Combined Angle: 150.06°**

**Time: 32.11 s, Combined Angle: 151.28°**

**Time: 32.15 s, Combined Angle: 145.18°**

**Time: 32.20 s, Combined Angle: 148.93°**

**Time: 32.26 s, Combined Angle: 147.93°**

**Time: 32.30 s, Combined Angle: 150.25°**

**Time: 32.35 s, Combined Angle: 153.90°**

**Time: 32.39 s, Combined Angle: 154.14°**

**Time: 32.44 s, Combined Angle: 154.67°**

**Time: 32.48 s, Combined Angle: 155.29°**

**Time: 32.53 s, Combined Angle: 154.83°**

**Time: 32.58 s, Combined Angle: 156.21°**

**Time: 32.62 s, Combined Angle: 155.65°**

**Time: 32.68 s, Combined Angle: 153.55°**

**Time: 32.71 s, Combined Angle: 152.85°**

**Time: 32.76 s, Combined Angle: 153.90°**

**Time: 32.81 s, Combined Angle: 155.01°**

**Time: 32.85 s, Combined Angle: 156.15°**

**Time: 32.90 s, Combined Angle: 162.23°**

**Time: 32.94 s, Combined Angle: 161.14°**

**Time: 33.00 s, Combined Angle: 160.36°**

**Time: 33.03 s, Combined Angle: 156.63°**

**Time: 33.08 s, Combined Angle: 156.80°**

**Time: 33.13 s, Combined Angle: 156.79°**

**Time: 33.18 s, Combined Angle: 157.29°**

**Time: 33.23 s, Combined Angle: 156.14°**

**Time: 33.27 s, Combined Angle: 156.02°**

**Time: 33.31 s, Combined Angle: 165.54°**

**Time: 33.36 s, Combined Angle: 160.38°**

**Time: 33.41 s, Combined Angle: 153.49°**

**Time: 33.46 s, Combined Angle: 153.59°**

**Time: 33.50 s, Combined Angle: 153.22°**

**Time: 33.55 s, Combined Angle: 154.01°**

**Time: 33.59 s, Combined Angle: 153.43°**

**Time: 33.65 s, Combined Angle: 156.11°**

**Time: 33.69 s, Combined Angle: 163.03°**

**Time: 33.74 s, Combined Angle: 160.20°**

**Time: 33.79 s, Combined Angle: 158.71°**

**Time: 33.83 s, Combined Angle: 162.06°**

**Time: 33.88 s, Combined Angle: 159.75°**

**Time: 33.92 s, Combined Angle: 157.83°**

**Time: 33.97 s, Combined Angle: 157.47°**

**Time: 34.01 s, Combined Angle: 156.88°**

**Time: 34.06 s, Combined Angle: 156.80°**

**Time: 34.11 s, Combined Angle: 154.85°**

**Time: 34.15 s, Combined Angle: 162.99°**

**Time: 34.20 s, Combined Angle: 165.61°**

**Time: 34.24 s, Combined Angle: 161.20°**

**Time: 34.30 s, Combined Angle: 158.20°**

**Time: 34.34 s, Combined Angle: 158.10°**

**Time: 34.39 s, Combined Angle: 158.09°**

**Time: 34.44 s, Combined Angle: 156.81°**

**Time: 34.48 s, Combined Angle: 156.55°**

**Time: 34.53 s, Combined Angle: 156.95°**

**Time: 34.57 s, Combined Angle: 159.46°**

**Time: 34.62 s, Combined Angle: 158.90°**

**Time: 34.67 s, Combined Angle: 158.39°**

**Time: 34.71 s, Combined Angle: 154.28°**

**Time: 34.76 s, Combined Angle: 155.17°**

**Time: 34.81 s, Combined Angle: 154.49°**

**Time: 34.85 s, Combined Angle: 150.52°**

**Time: 34.90 s, Combined Angle: 157.51°**

**Time: 34.94 s, Combined Angle: 158.01°**

**Time: 35.00 s, Combined Angle: 158.28°**

**Time: 35.03 s, Combined Angle: 156.06°**

**Time: 35.09 s, Combined Angle: 154.59°**

**Time: 35.14 s, Combined Angle: 154.49°**

**Time: 35.18 s, Combined Angle: 154.13°**

**Time: 35.23 s, Combined Angle: 155.42°**

**Time: 35.27 s, Combined Angle: 151.43°**

**Time: 35.32 s, Combined Angle: 150.38°**

**Time: 35.37 s, Combined Angle: 161.72°**

**Time: 35.41 s, Combined Angle: 154.96°**

**Time: 35.46 s, Combined Angle: 168.49°**

**Time: 35.50 s, Combined Angle: 169.85°**

**Time: 35.56 s, Combined Angle: 153.96°**

**Time: 35.60 s, Combined Angle: 164.92°**

**Time: 35.65 s, Combined Angle: 165.17°**

**Time: 35.70 s, Combined Angle: 171.09°**

**Time: 35.74 s, Combined Angle: 163.00°**

**Time: 35.78 s, Combined Angle: 157.12°**

**Time: 35.83 s, Combined Angle: 159.71°**

**Time: 35.88 s, Combined Angle: 162.79°**

**Time: 35.93 s, Combined Angle: 163.63°**

**Time: 35.97 s, Combined Angle: 165.32°**

**Time: 36.02 s, Combined Angle: 166.33°**

**Time: 36.07 s, Combined Angle: 165.40°**

**Time: 36.11 s, Combined Angle: 164.60°**

**Time: 36.16 s, Combined Angle: 164.93°**

**Time: 36.20 s, Combined Angle: 163.95°**

**Time: 36.25 s, Combined Angle: 162.58°**

**Time: 36.29 s, Combined Angle: 156.80°**

**Time: 36.34 s, Combined Angle: 163.23°**

**Time: 36.39 s, Combined Angle: 164.33°**

**Time: 36.44 s, Combined Angle: 163.95°**

**Time: 36.48 s, Combined Angle: 154.38°**

**Time: 36.53 s, Combined Angle: 153.86°**

**Time: 36.57 s, Combined Angle: 155.47°**

**Time: 36.63 s, Combined Angle: 152.93°**

**Time: 36.67 s, Combined Angle: 163.99°**

**Time: 36.72 s, Combined Angle: 165.93°**

**Time: 36.76 s, Combined Angle: 166.24°**

**Time: 36.80 s, Combined Angle: 166.63°**

**Time: 36.85 s, Combined Angle: 169.27°**

**Time: 36.90 s, Combined Angle: 167.88°**

**Time: 36.94 s, Combined Angle: 168.22°**

**Time: 36.99 s, Combined Angle: 168.48°**

**Time: 37.03 s, Combined Angle: 170.10°**

**Time: 37.08 s, Combined Angle: 169.55°**

**Time: 37.13 s, Combined Angle: 169.99°**

**Time: 37.17 s, Combined Angle: 169.11°**

**Time: 37.23 s, Combined Angle: 169.38°**

**Time: 37.30 s, Combined Angle: 170.55°**

**Time: 37.34 s, Combined Angle: 170.24°**

**Time: 37.40 s, Combined Angle: 172.15°**

**Time: 37.44 s, Combined Angle: 173.32°**

**Time: 37.48 s, Combined Angle: 175.02°**

**Time: 37.53 s, Combined Angle: 176.21°**

**Time: 37.58 s, Combined Angle: 177.26°**

**Time: 37.63 s, Combined Angle: 177.74°**

**Time: 37.67 s, Combined Angle: 178.01°**

**Time: 37.72 s, Combined Angle: 175.77°**

**Time: 37.77 s, Combined Angle: 175.78°**

**Time: 37.81 s, Combined Angle: 175.79°**

**Time: 37.87 s, Combined Angle: 176.61°**

**Time: 37.91 s, Combined Angle: 178.93°**

**Time: 37.95 s, Combined Angle: 178.57°**

**Time: 38.00 s, Combined Angle: 178.76°**

**Time: 38.04 s, Combined Angle: 178.72°**

**Time: 38.09 s, Combined Angle: 178.02°**

**Time: 38.13 s, Combined Angle: 177.06°**

**Time: 38.18 s, Combined Angle: 176.67°**

**Time: 38.23 s, Combined Angle: 176.29°**

**Time: 38.28 s, Combined Angle: 176.44°**

**Time: 38.32 s, Combined Angle: 176.23°**

**Time: 38.38 s, Combined Angle: 174.80°**

**Time: 38.41 s, Combined Angle: 174.11°**

**Time: 38.47 s, Combined Angle: 174.09°**

**Time: 38.51 s, Combined Angle: 175.01°**

**Time: 38.56 s, Combined Angle: 175.85°**

**Time: 38.60 s, Combined Angle: 175.30°**

**Time: 38.64 s, Combined Angle: 173.63°**

**Time: 38.70 s, Combined Angle: 172.89°**

**Time: 38.74 s, Combined Angle: 172.53°**

**Time: 38.79 s, Combined Angle: 172.03°**

**Time: 38.83 s, Combined Angle: 171.49°**

**Time: 38.88 s, Combined Angle: 171.19°**

**Time: 38.93 s, Combined Angle: 171.88°**

**Time: 38.98 s, Combined Angle: 171.05°**

**Time: 39.04 s, Combined Angle: 168.52°**

**Time: 39.09 s, Combined Angle: 168.72°**

**Time: 39.13 s, Combined Angle: 170.32°**

**Time: 39.18 s, Combined Angle: 166.63°**

**Time: 39.22 s, Combined Angle: 166.30°**

**Time: 39.27 s, Combined Angle: 163.76°**

**Time: 39.31 s, Combined Angle: 163.46°**

**Time: 39.36 s, Combined Angle: 164.96°**

**Time: 39.41 s, Combined Angle: 166.28°**

**Time: 39.45 s, Combined Angle: 164.55°**

**Time: 39.51 s, Combined Angle: 168.51°**

**Time: 39.55 s, Combined Angle: 168.41°**

**Time: 39.59 s, Combined Angle: 164.32°**

**Time: 39.64 s, Combined Angle: 163.26°**

**Time: 39.69 s, Combined Angle: 163.72°**

**Time: 39.74 s, Combined Angle: 163.92°**

**Time: 39.78 s, Combined Angle: 161.89°**

**Time: 39.83 s, Combined Angle: 162.65°**

**Time: 39.87 s, Combined Angle: 161.91°**

**Time: 39.92 s, Combined Angle: 161.77°**

**Time: 39.97 s, Combined Angle: 161.80°**

**Time: 40.02 s, Combined Angle: 162.28°**

**Time: 40.06 s, Combined Angle: 161.97°**

**Time: 40.10 s, Combined Angle: 161.88°**

**Time: 40.15 s, Combined Angle: 162.71°**

**Time: 40.20 s, Combined Angle: 164.49°**

**Time: 40.25 s, Combined Angle: 169.20°**

**Time: 40.29 s, Combined Angle: 169.90°**

**Time: 40.34 s, Combined Angle: 172.47°**

**Time: 40.39 s, Combined Angle: 172.06°**

**Time: 40.44 s, Combined Angle: 173.41°**

**Time: 40.48 s, Combined Angle: 173.84°**

**Time: 40.53 s, Combined Angle: 173.01°**

**Time: 40.57 s, Combined Angle: 172.62°**

**Time: 40.62 s, Combined Angle: 172.90°**

**Time: 40.67 s, Combined Angle: 172.95°**

**Time: 40.71 s, Combined Angle: 172.79°**

**Time: 40.76 s, Combined Angle: 172.59°**

**Time: 40.80 s, Combined Angle: 172.42°**

**Time: 40.85 s, Combined Angle: 172.64°**

**Time: 40.90 s, Combined Angle: 172.52°**

**Time: 40.95 s, Combined Angle: 173.20°**

**Time: 40.99 s, Combined Angle: 174.36°**

**Time: 41.04 s, Combined Angle: 173.84°**

**Time: 41.09 s, Combined Angle: 173.68°**

**Time: 41.13 s, Combined Angle: 173.04°**

**Time: 41.17 s, Combined Angle: 172.60°**

**Time: 41.22 s, Combined Angle: 172.35°**

**Time: 41.27 s, Combined Angle: 172.40°**

**Time: 41.31 s, Combined Angle: 172.22°**

**Time: 41.36 s, Combined Angle: 174.39°**

**Time: 41.41 s, Combined Angle: 175.87°**

**Time: 41.45 s, Combined Angle: 176.72°**

**Time: 41.50 s, Combined Angle: 177.04°**

**Time: 41.54 s, Combined Angle: 177.57°**

**Time: 41.59 s, Combined Angle: 177.59°**

**Time: 41.64 s, Combined Angle: 176.75°**

**Time: 41.68 s, Combined Angle: 177.76°**

**Time: 41.73 s, Combined Angle: 177.95°**

**Time: 41.77 s, Combined Angle: 178.12°**

**Time: 41.82 s, Combined Angle: 177.57°**

**Time: 41.87 s, Combined Angle: 177.91°**

**Time: 41.92 s, Combined Angle: 178.44°**

**Time: 41.97 s, Combined Angle: 178.59°**

**Time: 42.01 s, Combined Angle: 178.41°**

**Time: 42.06 s, Combined Angle: 178.24°**

**Time: 42.11 s, Combined Angle: 178.21°**

**Time: 42.15 s, Combined Angle: 178.23°**

**Time: 42.20 s, Combined Angle: 178.24°**

**Time: 42.25 s, Combined Angle: 178.24°**

**Time: 42.29 s, Combined Angle: 178.29°**

**Time: 42.33 s, Combined Angle: 178.38°**

**Time: 42.40 s, Combined Angle: 178.45°**

**Time: 42.45 s, Combined Angle: 178.44°**

**Time: 42.49 s, Combined Angle: 178.45°**

**Time: 42.53 s, Combined Angle: 178.49°**

**Time: 42.58 s, Combined Angle: 178.48°**

**Time: 42.63 s, Combined Angle: 178.48°**

**Time: 42.68 s, Combined Angle: 178.49°**

**Time: 42.73 s, Combined Angle: 178.39°**

**Time: 42.78 s, Combined Angle: 178.23°**

**Time: 42.82 s, Combined Angle: 178.23°**

**Time: 42.87 s, Combined Angle: 178.24°**

**Time: 42.92 s, Combined Angle: 178.28°**

**Time: 42.97 s, Combined Angle: 178.32°**

**Time: 43.00 s, Combined Angle: 178.24°**

**Time: 43.06 s, Combined Angle: 178.22°**

**Time: 43.10 s, Combined Angle: 177.83°**

**Time: 43.15 s, Combined Angle: 177.78°**

**Time: 43.20 s, Combined Angle: 177.61°**

**Time: 43.24 s, Combined Angle: 177.88°**

**Time: 43.29 s, Combined Angle: 178.07°**

**Time: 43.34 s, Combined Angle: 178.26°**

**Time: 43.38 s, Combined Angle: 178.38°**

**Time: 43.43 s, Combined Angle: 178.53°**

**Time: 43.48 s, Combined Angle: 178.69°**

**Time: 43.52 s, Combined Angle: 178.81°**

**Time: 43.57 s, Combined Angle: 178.80°**

**Time: 43.62 s, Combined Angle: 178.86°**

**Time: 43.66 s, Combined Angle: 179.10°**

**Time: 43.71 s, Combined Angle: 179.19°**

**Time: 43.75 s, Combined Angle: 179.52°**

**Time: 43.81 s, Combined Angle: 179.70°**

**Time: 43.85 s, Combined Angle: 179.88°**

**Time: 43.91 s, Combined Angle: 179.95°**

**Time: 43.96 s, Combined Angle: 179.81°**

**Time: 44.01 s, Combined Angle: 179.45°**

**Time: 44.05 s, Combined Angle: 179.38°**

**Time: 44.10 s, Combined Angle: 179.17°**

**Time: 44.15 s, Combined Angle: 179.06°**

**Time: 44.20 s, Combined Angle: 179.37°**

**Time: 44.25 s, Combined Angle: 179.81°**

**Time: 44.29 s, Combined Angle: 179.26°**

**Time: 44.34 s, Combined Angle: 178.83°**

**Time: 44.38 s, Combined Angle: 178.56°**

**Time: 44.43 s, Combined Angle: 178.16°**

**Time: 44.47 s, Combined Angle: 177.41°**

**Time: 44.53 s, Combined Angle: 176.52°**

**Time: 44.56 s, Combined Angle: 175.52°**

**Time: 44.62 s, Combined Angle: 174.68°**

**Time: 44.66 s, Combined Angle: 174.25°**

**Time: 44.71 s, Combined Angle: 174.30°**

**Time: 44.75 s, Combined Angle: 174.35°**

**Time: 44.80 s, Combined Angle: 174.41°**

**Time: 44.85 s, Combined Angle: 174.95°**

**Time: 44.89 s, Combined Angle: 175.51°**

**Time: 44.94 s, Combined Angle: 175.83°**

**Time: 44.98 s, Combined Angle: 176.11°**

**Time: 45.03 s, Combined Angle: 176.52°**

**Time: 45.07 s, Combined Angle: 176.88°**

**Time: 45.13 s, Combined Angle: 177.37°**

**Time: 45.17 s, Combined Angle: 177.83°**

**Time: 45.21 s, Combined Angle: 178.04°**

**Time: 45.26 s, Combined Angle: 178.17°**

**Time: 45.31 s, Combined Angle: 178.67°**

**Time: 45.36 s, Combined Angle: 178.93°**

**Time: 45.40 s, Combined Angle: 179.41°**

**Time: 45.45 s, Combined Angle: 179.06°**

**Time: 45.49 s, Combined Angle: 178.54°**

**Time: 45.54 s, Combined Angle: 178.38°**

**Time: 45.59 s, Combined Angle: 178.38°**

**Time: 45.63 s, Combined Angle: 178.44°**

**Time: 45.68 s, Combined Angle: 178.25°**

**Time: 45.73 s, Combined Angle: 177.93°**

**Time: 45.77 s, Combined Angle: 177.97°**

**Time: 45.82 s, Combined Angle: 177.66°**

**Time: 45.87 s, Combined Angle: 177.29°**

**Time: 45.91 s, Combined Angle: 177.03°**

**Time: 45.96 s, Combined Angle: 177.12°**

**Time: 46.00 s, Combined Angle: 176.87°**

**Time: 46.05 s, Combined Angle: 176.81°**

**Time: 46.10 s, Combined Angle: 176.78°**

**Time: 46.14 s, Combined Angle: 176.60°**

**Time: 46.19 s, Combined Angle: 176.97°**

**Time: 46.23 s, Combined Angle: 177.09°**

**Time: 46.28 s, Combined Angle: 177.21°**

**Time: 46.34 s, Combined Angle: 176.75°**

**Time: 46.37 s, Combined Angle: 176.70°**

**Time: 46.42 s, Combined Angle: 176.69°**

**Time: 46.47 s, Combined Angle: 176.81°**

**Time: 46.51 s, Combined Angle: 177.00°**

**Time: 46.56 s, Combined Angle: 177.07°**

**Time: 46.61 s, Combined Angle: 177.32°**

**Time: 46.66 s, Combined Angle: 177.23°**

**Time: 46.70 s, Combined Angle: 176.96°**

**Time: 46.75 s, Combined Angle: 176.88°**

**Time: 46.80 s, Combined Angle: 176.86°**

**Time: 46.84 s, Combined Angle: 176.84°**

**Time: 46.89 s, Combined Angle: 177.20°**

**Time: 46.93 s, Combined Angle: 177.46°**

**Time: 46.98 s, Combined Angle: 177.50°**

**Time: 47.02 s, Combined Angle: 177.29°**

**Time: 47.07 s, Combined Angle: 177.35°**

**Time: 47.12 s, Combined Angle: 177.37°**

**Time: 47.17 s, Combined Angle: 177.45°**

**Time: 47.22 s, Combined Angle: 177.44°**

**Time: 47.27 s, Combined Angle: 177.94°**

**Time: 47.30 s, Combined Angle: 177.92°**

**Time: 47.35 s, Combined Angle: 177.97°**

**Time: 47.40 s, Combined Angle: 177.91°**

**Time: 47.45 s, Combined Angle: 166.93°**

**Time: 47.49 s, Combined Angle: 164.55°**

**Time: 47.54 s, Combined Angle: 175.89°**

**Time: 47.58 s, Combined Angle: 177.05°**

**Time: 47.63 s, Combined Angle: 178.19°**

**Time: 47.68 s, Combined Angle: 178.51°**

**Time: 47.73 s, Combined Angle: 178.07°**

**Time: 47.77 s, Combined Angle: 177.86°**

**Time: 47.82 s, Combined Angle: 177.55°**

**Time: 47.87 s, Combined Angle: 177.85°**

**Time: 47.91 s, Combined Angle: 178.22°**

**Time: 47.96 s, Combined Angle: 175.99°**

**Time: 48.00 s, Combined Angle: 174.35°**

**Time: 48.05 s, Combined Angle: 173.00°**

**Time: 48.10 s, Combined Angle: 173.10°**

**Time: 48.15 s, Combined Angle: 173.83°**

**Time: 48.20 s, Combined Angle: 173.92°**

**Time: 48.24 s, Combined Angle: 173.38°**

**Time: 48.29 s, Combined Angle: 173.63°**

**Time: 48.34 s, Combined Angle: 174.08°**

**Time: 48.39 s, Combined Angle: 174.96°**

**Time: 48.43 s, Combined Angle: 175.07°**

**Time: 48.47 s, Combined Angle: 175.19°**

**Time: 48.53 s, Combined Angle: 176.34°**

**Time: 48.57 s, Combined Angle: 178.85°**

**Time: 48.62 s, Combined Angle: 179.55°**

**Time: 48.66 s, Combined Angle: 179.60°**

**Time: 48.71 s, Combined Angle: 179.28°**

**Time: 48.75 s, Combined Angle: 178.88°**

**Time: 48.81 s, Combined Angle: 178.92°**

**Time: 48.85 s, Combined Angle: 179.05°**

**Time: 48.89 s, Combined Angle: 179.65°**

**Time: 48.94 s, Combined Angle: 179.36°**

**Time: 48.99 s, Combined Angle: 179.20°**

**Time: 49.04 s, Combined Angle: 178.94°**

**Time: 49.08 s, Combined Angle: 178.95°**

**Time: 49.13 s, Combined Angle: 177.41°**

**Time: 49.17 s, Combined Angle: 176.82°**

**Time: 49.23 s, Combined Angle: 176.20°**

**Time: 49.26 s, Combined Angle: 176.08°**

**Time: 49.31 s, Combined Angle: 174.94°**

**Time: 49.36 s, Combined Angle: 174.93°**

**Time: 49.41 s, Combined Angle: 174.90°**

**Time: 49.46 s, Combined Angle: 174.31°**

**Time: 49.50 s, Combined Angle: 174.28°**

**Time: 49.55 s, Combined Angle: 174.62°**

**Time: 49.60 s, Combined Angle: 175.42°**

**Time: 49.64 s, Combined Angle: 174.75°**

**Time: 49.69 s, Combined Angle: 177.17°**

**Time: 49.74 s, Combined Angle: 177.06°**

**Time: 49.78 s, Combined Angle: 178.22°**

**Time: 49.83 s, Combined Angle: 177.49°**

**Time: 49.87 s, Combined Angle: 177.13°**

**Time: 49.92 s, Combined Angle: 177.35°**

**Time: 49.96 s, Combined Angle: 177.21°**

**Time: 50.02 s, Combined Angle: 176.72°**

**Time: 50.06 s, Combined Angle: 177.72°**

**Time: 50.10 s, Combined Angle: 178.21°**

**Time: 50.15 s, Combined Angle: 178.39°**

**Time: 50.20 s, Combined Angle: 178.47°**

**Time: 50.24 s, Combined Angle: 178.28°**

**Time: 50.29 s, Combined Angle: 178.38°**

**Time: 50.33 s, Combined Angle: 178.39°**

**Time: 50.38 s, Combined Angle: 178.22°**

**Time: 50.43 s, Combined Angle: 178.46°**

**Time: 50.47 s, Combined Angle: 178.71°**

**Time: 50.52 s, Combined Angle: 178.49°**

**Time: 50.57 s, Combined Angle: 178.31°**

**Time: 50.61 s, Combined Angle: 178.21°**

**Time: 50.66 s, Combined Angle: 178.21°**

**Time: 50.71 s, Combined Angle: 178.10°**

**Time: 50.75 s, Combined Angle: 177.17°**

**Time: 50.80 s, Combined Angle: 174.28°**

**Time: 50.85 s, Combined Angle: 172.71°**

**Time: 50.90 s, Combined Angle: 172.54°**

**Time: 50.94 s, Combined Angle: 172.30°**

**Time: 51.00 s, Combined Angle: 172.69°**

**Time: 51.03 s, Combined Angle: 172.56°**

**Time: 51.09 s, Combined Angle: 173.67°**

**Time: 51.15 s, Combined Angle: 173.02°**

**Time: 51.19 s, Combined Angle: 172.88°**

**Time: 51.23 s, Combined Angle: 172.58°**

**Time: 51.28 s, Combined Angle: 172.65°**

**Time: 51.33 s, Combined Angle: 172.25°**

**Time: 51.38 s, Combined Angle: 172.23°**

**Time: 51.42 s, Combined Angle: 172.12°**

**Time: 51.47 s, Combined Angle: 172.13°**

**Time: 51.51 s, Combined Angle: 172.38°**

**Time: 51.56 s, Combined Angle: 172.27°**

**Time: 51.61 s, Combined Angle: 171.47°**

**Time: 51.65 s, Combined Angle: 171.45°**

**Time: 51.70 s, Combined Angle: 170.89°**

**Time: 51.74 s, Combined Angle: 170.16°**

**Time: 51.79 s, Combined Angle: 170.41°**

**Time: 51.84 s, Combined Angle: 169.61°**

**Time: 51.89 s, Combined Angle: 168.00°**

**Time: 51.93 s, Combined Angle: 167.95°**

**Time: 51.98 s, Combined Angle: 167.78°**

**Time: 52.03 s, Combined Angle: 166.08°**

**Time: 52.07 s, Combined Angle: 164.81°**

**Time: 52.12 s, Combined Angle: 164.07°**

**Time: 52.17 s, Combined Angle: 164.34°**

**Time: 52.22 s, Combined Angle: 160.75°**

**Time: 52.26 s, Combined Angle: 160.87°**

**Time: 52.31 s, Combined Angle: 162.06°**

**Time: 52.35 s, Combined Angle: 162.40°**

**Time: 52.40 s, Combined Angle: 161.82°**

**Time: 52.44 s, Combined Angle: 156.01°**

**Time: 52.49 s, Combined Angle: 156.63°**

**Time: 52.54 s, Combined Angle: 157.81°**

**Time: 52.59 s, Combined Angle: 158.50°**

**Time: 52.63 s, Combined Angle: 158.77°**

**Time: 52.68 s, Combined Angle: 158.56°**

**Time: 52.73 s, Combined Angle: 157.56°**

**Time: 52.77 s, Combined Angle: 157.41°**

**Time: 52.82 s, Combined Angle: 157.14°**

**Time: 52.88 s, Combined Angle: 156.65°**

**Time: 52.91 s, Combined Angle: 156.38°**

**Time: 52.96 s, Combined Angle: 156.17°**

**Time: 53.01 s, Combined Angle: 156.42°**

**Time: 53.06 s, Combined Angle: 155.81°**

**Time: 53.10 s, Combined Angle: 156.29°**

**Time: 53.14 s, Combined Angle: 156.35°**

**Time: 53.20 s, Combined Angle: 156.70°**

**Time: 53.24 s, Combined Angle: 157.23°**

**Time: 53.28 s, Combined Angle: 158.44°**

**Time: 53.34 s, Combined Angle: 158.33°**

**Time: 53.38 s, Combined Angle: 162.33°**

**Time: 53.43 s, Combined Angle: 162.53°**

**Time: 53.47 s, Combined Angle: 162.94°**

**Time: 53.52 s, Combined Angle: 162.74°**

**Time: 53.57 s, Combined Angle: 163.92°**

**Time: 53.61 s, Combined Angle: 163.08°**

**Time: 53.66 s, Combined Angle: 163.72°**

**Time: 53.71 s, Combined Angle: 163.65°**

**Time: 53.75 s, Combined Angle: 164.63°**

**Time: 53.80 s, Combined Angle: 164.64°**

**Time: 53.85 s, Combined Angle: 158.63°**

**Time: 53.90 s, Combined Angle: 158.30°**

**Time: 53.94 s, Combined Angle: 156.10°**

**Time: 54.00 s, Combined Angle: 156.14°**

**Time: 54.05 s, Combined Angle: 151.58°**

**Time: 54.10 s, Combined Angle: 146.67°**

**Time: 54.14 s, Combined Angle: 150.01°**

**Time: 54.19 s, Combined Angle: 148.15°**

**Time: 54.24 s, Combined Angle: 142.45°**

**Time: 54.28 s, Combined Angle: 140.49°**

**Time: 54.33 s, Combined Angle: 139.96°**

**Time: 54.38 s, Combined Angle: 138.36°**

**Time: 54.42 s, Combined Angle: 138.22°**

**Time: 54.47 s, Combined Angle: 137.65°**

**Time: 54.51 s, Combined Angle: 137.53°**

**Time: 54.56 s, Combined Angle: 135.31°**

**Time: 54.61 s, Combined Angle: 133.87°**

**Time: 54.65 s, Combined Angle: 133.56°**

**Time: 54.70 s, Combined Angle: 133.23°**

**Time: 54.75 s, Combined Angle: 132.89°**

**Time: 54.79 s, Combined Angle: 133.22°**

**Time: 54.83 s, Combined Angle: 132.27°**

**Time: 54.89 s, Combined Angle: 133.13°**

**Time: 54.93 s, Combined Angle: 134.55°**

**Time: 54.98 s, Combined Angle: 136.84°**

**Time: 55.02 s, Combined Angle: 139.61°**

**Time: 55.07 s, Combined Angle: 143.29°**

**Time: 55.12 s, Combined Angle: 148.48°**

**Time: 55.17 s, Combined Angle: 151.46°**

**Time: 55.21 s, Combined Angle: 152.63°**

**Time: 55.25 s, Combined Angle: 155.20°**

**Time: 55.30 s, Combined Angle: 156.53°**

**Time: 55.35 s, Combined Angle: 157.90°**

**Time: 55.39 s, Combined Angle: 160.51°**

**Time: 55.44 s, Combined Angle: 161.57°**

**Time: 55.48 s, Combined Angle: 164.88°**

**Time: 55.54 s, Combined Angle: 167.12°**

**Time: 55.58 s, Combined Angle: 168.81°**

**Time: 55.63 s, Combined Angle: 169.54°**

**Time: 55.68 s, Combined Angle: 171.55°**

**Time: 55.72 s, Combined Angle: 172.79°**

**Time: 55.76 s, Combined Angle: 173.30°**

**Time: 55.82 s, Combined Angle: 174.61°**

**Time: 55.85 s, Combined Angle: 176.20°**

**Time: 55.91 s, Combined Angle: 175.81°**

**Time: 55.95 s, Combined Angle: 173.64°**

**Time: 55.99 s, Combined Angle: 173.40°**

**Time: 56.04 s, Combined Angle: 173.99°**

**Time: 56.08 s, Combined Angle: 173.65°**

**Time: 56.13 s, Combined Angle: 171.86°**

**Time: 56.18 s, Combined Angle: 171.56°**

**Time: 56.23 s, Combined Angle: 171.17°**

**Time: 56.27 s, Combined Angle: 170.98°**

**Time: 56.32 s, Combined Angle: 171.26°**

**Time: 56.37 s, Combined Angle: 172.77°**

**Time: 56.41 s, Combined Angle: 174.64°**

**Time: 56.46 s, Combined Angle: 175.26°**

**Time: 56.50 s, Combined Angle: 175.42°**

**Time: 56.55 s, Combined Angle: 175.19°**

**Time: 56.60 s, Combined Angle: 175.85°**

**Time: 56.64 s, Combined Angle: 177.14°**

**Time: 56.69 s, Combined Angle: 177.82°**

**Time: 56.74 s, Combined Angle: 178.13°**

**Time: 56.78 s, Combined Angle: 178.15°**

**Time: 56.83 s, Combined Angle: 178.06°**

**Time: 56.88 s, Combined Angle: 178.15°**

**Time: 56.92 s, Combined Angle: 178.43°**

**Time: 56.97 s, Combined Angle: 179.00°**

**Time: 57.02 s, Combined Angle: 178.66°**

**Time: 57.07 s, Combined Angle: 178.34°**

**Time: 57.11 s, Combined Angle: 178.18°**

**Time: 57.16 s, Combined Angle: 177.88°**

**Time: 57.20 s, Combined Angle: 177.20°**

**Time: 57.25 s, Combined Angle: 177.08°**

**Time: 57.29 s, Combined Angle: 177.03°**

**Time: 57.34 s, Combined Angle: 177.03°**

**Time: 57.39 s, Combined Angle: 177.00°**

**Time: 57.43 s, Combined Angle: 177.00°**

**Time: 57.48 s, Combined Angle: 176.96°**

**Time: 57.53 s, Combined Angle: 176.74°**

**Time: 57.57 s, Combined Angle: 176.38°**

**Time: 57.62 s, Combined Angle: 176.21°**

**Time: 57.66 s, Combined Angle: 176.02°**

**Time: 57.71 s, Combined Angle: 175.82°**

**Time: 57.77 s, Combined Angle: 175.84°**

**Time: 57.82 s, Combined Angle: 175.52°**

**Time: 57.86 s, Combined Angle: 175.39°**

**Time: 57.91 s, Combined Angle: 175.38°**

**Time: 57.96 s, Combined Angle: 175.55°**

**Time: 58.01 s, Combined Angle: 175.66°**

**Time: 58.05 s, Combined Angle: 175.60°**

**Time: 58.09 s, Combined Angle: 175.33°**

**Time: 58.14 s, Combined Angle: 175.21°**

**Time: 58.19 s, Combined Angle: 175.10°**

**Time: 58.24 s, Combined Angle: 173.93°**

**Time: 58.28 s, Combined Angle: 173.76°**

**Time: 58.33 s, Combined Angle: 173.74°**

**Time: 58.37 s, Combined Angle: 174.29°**

**Time: 58.42 s, Combined Angle: 174.59°**

**Time: 58.47 s, Combined Angle: 174.29°**

**Time: 58.51 s, Combined Angle: 174.35°**

**Time: 58.56 s, Combined Angle: 174.69°**

**Time: 58.61 s, Combined Angle: 174.97°**

**Time: 58.65 s, Combined Angle: 175.18°**

**Time: 58.70 s, Combined Angle: 175.39°**

**Time: 58.74 s, Combined Angle: 174.53°**

**Time: 58.79 s, Combined Angle: 174.36°**

**Time: 58.84 s, Combined Angle: 173.74°**

**Time: 58.88 s, Combined Angle: 173.61°**

**Time: 58.93 s, Combined Angle: 173.63°**

**Time: 58.97 s, Combined Angle: 172.23°**

**Time: 59.02 s, Combined Angle: 172.32°**

**Time: 59.07 s, Combined Angle: 172.18°**

**Time: 59.11 s, Combined Angle: 172.29°**

**Time: 59.16 s, Combined Angle: 172.38°**

**Time: 59.20 s, Combined Angle: 172.45°**

**Time: 59.26 s, Combined Angle: 173.09°**

**Time: 59.30 s, Combined Angle: 174.46°**

**Time: 59.35 s, Combined Angle: 174.01°**

**Time: 59.40 s, Combined Angle: 173.69°**

**Time: 59.44 s, Combined Angle: 173.68°**

**Time: 59.48 s, Combined Angle: 170.32°**

**Time: 59.53 s, Combined Angle: 168.11°**

**Time: 59.58 s, Combined Angle: 169.19°**

**Time: 59.63 s, Combined Angle: 171.61°**

**Time: 59.67 s, Combined Angle: 172.55°**

**Time: 59.72 s, Combined Angle: 173.14°**

**Time: 59.77 s, Combined Angle: 173.64°**

**Time: 59.82 s, Combined Angle: 169.32°**

**Time: 59.86 s, Combined Angle: 168.25°**

**Time: 59.90 s, Combined Angle: 167.27°**

**Time: 59.95 s, Combined Angle: 163.89°**

**Time: 60.00 s, Combined Angle: 154.88°**

**Time: 60.05 s, Combined Angle: 148.23°**

**Time: 60.09 s, Combined Angle: 153.21°**

**Time: 60.13 s, Combined Angle: 153.46°**

**Time: 60.19 s, Combined Angle: 155.98°**

**Time: 60.23 s, Combined Angle: 155.09°**

**Time: 60.28 s, Combined Angle: 160.35°**

**Time: 60.32 s, Combined Angle: 169.15°**

**Time: 60.37 s, Combined Angle: 172.61°**

**Time: 60.42 s, Combined Angle: 171.98°**

**Time: 60.46 s, Combined Angle: 171.61°**

**Time: 60.51 s, Combined Angle: 170.92°**

**Time: 60.56 s, Combined Angle: 170.87°**

**Time: 60.61 s, Combined Angle: 171.51°**

**Time: 60.66 s, Combined Angle: 175.39°**

**Time: 60.69 s, Combined Angle: 176.52°**

**Time: 60.74 s, Combined Angle: 178.08°**

**Time: 60.79 s, Combined Angle: 178.60°**

**Time: 60.83 s, Combined Angle: 178.58°**

**Time: 60.88 s, Combined Angle: 178.55°**

**Time: 60.93 s, Combined Angle: 178.75°**

**Time: 60.98 s, Combined Angle: 178.56°**

**Time: 61.02 s, Combined Angle: 178.95°**

**Time: 61.07 s, Combined Angle: 179.36°**

**Time: 61.12 s, Combined Angle: 177.85°**

**Time: 61.16 s, Combined Angle: 176.58°**

**Time: 61.22 s, Combined Angle: 175.98°**

**Time: 61.27 s, Combined Angle: 175.09°**

**Time: 61.33 s, Combined Angle: 175.03°**

**Time: 61.37 s, Combined Angle: 175.04°**

**Time: 61.41 s, Combined Angle: 175.24°**

**Time: 61.46 s, Combined Angle: 175.43°**

**Time: 61.51 s, Combined Angle: 175.48°**

**Time: 61.55 s, Combined Angle: 175.53°**

**Time: 61.60 s, Combined Angle: 175.63°**

**Time: 61.64 s, Combined Angle: 175.66°**

**Time: 61.70 s, Combined Angle: 175.53°**

**Time: 61.74 s, Combined Angle: 175.49°**

**Time: 61.79 s, Combined Angle: 175.34°**

**Time: 61.83 s, Combined Angle: 175.14°**

**Time: 61.88 s, Combined Angle: 174.93°**

**Time: 61.92 s, Combined Angle: 174.51°**

**Time: 61.97 s, Combined Angle: 173.93°**

**Time: 62.02 s, Combined Angle: 172.91°**

**Time: 62.06 s, Combined Angle: 172.02°**

**Time: 62.11 s, Combined Angle: 171.64°**

**Time: 62.16 s, Combined Angle: 171.11°**

**Time: 62.21 s, Combined Angle: 171.12°**

**Time: 62.25 s, Combined Angle: 170.62°**

**Time: 62.30 s, Combined Angle: 168.61°**

**Time: 62.35 s, Combined Angle: 168.05°**

**Time: 62.39 s, Combined Angle: 167.91°**

**Time: 62.44 s, Combined Angle: 167.25°**

**Time: 62.48 s, Combined Angle: 166.80°**

**Time: 62.53 s, Combined Angle: 165.47°**

**Time: 62.58 s, Combined Angle: 164.28°**

**Time: 62.63 s, Combined Angle: 163.43°**

**Time: 62.67 s, Combined Angle: 162.74°**

**Time: 62.72 s, Combined Angle: 161.82°**

**Time: 62.77 s, Combined Angle: 161.01°**

**Time: 62.81 s, Combined Angle: 159.85°**

**Time: 62.86 s, Combined Angle: 159.41°**

**Time: 62.91 s, Combined Angle: 159.32°**

**Time: 62.95 s, Combined Angle: 158.91°**

**Time: 62.99 s, Combined Angle: 158.03°**

**Time: 63.05 s, Combined Angle: 157.22°**

**Time: 63.09 s, Combined Angle: 156.26°**

**Time: 63.14 s, Combined Angle: 155.64°**

**Time: 63.18 s, Combined Angle: 155.03°**

**Time: 63.23 s, Combined Angle: 155.10°**

**Time: 63.28 s, Combined Angle: 154.21°**

**Time: 63.32 s, Combined Angle: 153.50°**

**Time: 63.38 s, Combined Angle: 152.99°**

**Time: 63.42 s, Combined Angle: 152.66°**

**Time: 63.46 s, Combined Angle: 152.28°**

**Time: 63.51 s, Combined Angle: 152.16°**

**Time: 63.56 s, Combined Angle: 151.79°**

**Time: 63.60 s, Combined Angle: 151.88°**

**Time: 63.65 s, Combined Angle: 152.23°**

**Time: 63.70 s, Combined Angle: 152.29°**

**Time: 63.74 s, Combined Angle: 153.19°**

**Time: 63.79 s, Combined Angle: 153.05°**

**Time: 63.84 s, Combined Angle: 152.66°**

**Time: 63.88 s, Combined Angle: 152.58°**

**Time: 63.93 s, Combined Angle: 152.40°**

**Time: 63.97 s, Combined Angle: 152.37°**

**Time: 64.02 s, Combined Angle: 152.35°**

**Time: 64.07 s, Combined Angle: 152.28°**

**Time: 64.11 s, Combined Angle: 152.21°**

**Time: 64.16 s, Combined Angle: 151.88°**

**Time: 64.20 s, Combined Angle: 151.73°**

**Time: 64.25 s, Combined Angle: 151.65°**

**Time: 64.30 s, Combined Angle: 151.35°**

**Time: 64.35 s, Combined Angle: 151.28°**

**Time: 64.39 s, Combined Angle: 151.00°**

**Time: 64.44 s, Combined Angle: 151.06°**

**Time: 64.48 s, Combined Angle: 150.58°**

**Time: 64.53 s, Combined Angle: 150.53°**

**Time: 64.58 s, Combined Angle: 149.87°**

**Time: 64.63 s, Combined Angle: 147.92°**

**Time: 64.67 s, Combined Angle: 146.20°**

**Time: 64.71 s, Combined Angle: 145.11°**

**Time: 64.77 s, Combined Angle: 142.45°**

**Time: 64.81 s, Combined Angle: 140.14°**

**Time: 64.85 s, Combined Angle: 139.51°**

**Time: 64.91 s, Combined Angle: 136.46°**

**Time: 64.95 s, Combined Angle: 134.14°**

**Time: 65.00 s, Combined Angle: 132.09°**

**Time: 65.04 s, Combined Angle: 130.58°**

**Time: 65.09 s, Combined Angle: 129.03°**

**Time: 65.14 s, Combined Angle: 129.35°**

**Time: 65.18 s, Combined Angle: 128.58°**

**Time: 65.23 s, Combined Angle: 128.36°**

**Time: 65.28 s, Combined Angle: 129.39°**

**Time: 65.33 s, Combined Angle: 129.84°**

**Time: 65.37 s, Combined Angle: 130.20°**

**Time: 65.42 s, Combined Angle: 132.12°**

**Time: 65.46 s, Combined Angle: 133.65°**

**Time: 65.51 s, Combined Angle: 135.40°**

**Time: 65.55 s, Combined Angle: 138.89°**

**Time: 65.60 s, Combined Angle: 142.89°**

**Time: 65.65 s, Combined Angle: 144.92°**

**Time: 65.70 s, Combined Angle: 146.20°**

**Time: 65.74 s, Combined Angle: 146.88°**

**Time: 65.79 s, Combined Angle: 147.54°**

**Time: 65.84 s, Combined Angle: 148.52°**

**Time: 65.88 s, Combined Angle: 150.11°**

**Time: 65.93 s, Combined Angle: 151.73°**

**Time: 65.97 s, Combined Angle: 153.44°**

**Time: 66.02 s, Combined Angle: 155.04°**

**Time: 66.08 s, Combined Angle: 157.14°**

**Time: 66.11 s, Combined Angle: 158.73°**

**Time: 66.16 s, Combined Angle: 160.85°**

**Time: 66.21 s, Combined Angle: 162.21°**

**Time: 66.26 s, Combined Angle: 163.57°**

**Time: 66.31 s, Combined Angle: 164.95°**

**Time: 66.36 s, Combined Angle: 166.32°**

**Time: 66.41 s, Combined Angle: 167.63°**

**Time: 66.47 s, Combined Angle: 168.99°**

**Time: 66.50 s, Combined Angle: 170.13°**

**Time: 66.56 s, Combined Angle: 171.23°**

**Time: 66.60 s, Combined Angle: 172.01°**

**Time: 66.64 s, Combined Angle: 172.81°**

**Time: 66.69 s, Combined Angle: 173.22°**

**Time: 66.74 s, Combined Angle: 173.96°**

**Time: 66.78 s, Combined Angle: 174.89°**

**Time: 66.83 s, Combined Angle: 175.45°**

**Time: 66.89 s, Combined Angle: 175.78°**

**Time: 66.95 s, Combined Angle: 175.88°**

**Time: 67.01 s, Combined Angle: 176.30°**

**Time: 67.04 s, Combined Angle: 176.55°**

**Time: 67.10 s, Combined Angle: 176.72°**

**Time: 67.14 s, Combined Angle: 176.94°**

**Time: 67.19 s, Combined Angle: 177.13°**

**Time: 67.23 s, Combined Angle: 177.39°**

**Time: 67.28 s, Combined Angle: 177.45°**

**Time: 67.32 s, Combined Angle: 177.67°**

**Time: 67.38 s, Combined Angle: 177.81°**

**Time: 67.43 s, Combined Angle: 177.45°**

**Time: 67.47 s, Combined Angle: 177.32°**

**Time: 67.53 s, Combined Angle: 177.45°**

**Time: 67.57 s, Combined Angle: 177.58°**

**Time: 67.62 s, Combined Angle: 177.79°**

**Time: 67.66 s, Combined Angle: 177.75°**

**Time: 67.72 s, Combined Angle: 177.65°**

**Time: 67.76 s, Combined Angle: 177.47°**

**Time: 67.80 s, Combined Angle: 177.42°**

**Time: 67.85 s, Combined Angle: 176.99°**

**Time: 67.89 s, Combined Angle: 177.00°**

**Time: 67.96 s, Combined Angle: 177.81°**

**Time: 68.02 s, Combined Angle: 177.90°**

**Time: 68.07 s, Combined Angle: 178.35°**

**Time: 68.11 s, Combined Angle: 178.82°**

**Time: 68.16 s, Combined Angle: 178.49°**

**Time: 68.21 s, Combined Angle: 178.38°**

**Time: 68.27 s, Combined Angle: 178.21°**

**Time: 68.33 s, Combined Angle: 178.20°**

**Time: 68.39 s, Combined Angle: 177.73°**

**Time: 68.45 s, Combined Angle: 177.21°**

**Time: 68.51 s, Combined Angle: 177.07°**

**Time: 68.57 s, Combined Angle: 176.70°**

**Time: 68.63 s, Combined Angle: 176.49°**

**Time: 68.67 s, Combined Angle: 176.58°**

**Time: 68.71 s, Combined Angle: 176.20°**

**Time: 68.76 s, Combined Angle: 175.98°**

**Time: 68.82 s, Combined Angle: 175.89°**

**Time: 68.86 s, Combined Angle: 175.85°**

**Time: 68.90 s, Combined Angle: 175.61°**

**Time: 68.96 s, Combined Angle: 175.61°**

**Time: 69.00 s, Combined Angle: 175.67°**

**Time: 69.05 s, Combined Angle: 175.74°**

**Time: 69.09 s, Combined Angle: 175.79°**

**Time: 69.14 s, Combined Angle: 176.09°**

**Time: 69.18 s, Combined Angle: 175.87°**

**Time: 69.24 s, Combined Angle: 175.82°**

**Time: 69.27 s, Combined Angle: 175.74°**

**Time: 69.33 s, Combined Angle: 175.78°**

**Time: 69.37 s, Combined Angle: 175.82°**

**Time: 69.42 s, Combined Angle: 175.85°**

**Time: 69.47 s, Combined Angle: 175.63°**

**Time: 69.51 s, Combined Angle: 175.65°**

**Time: 69.56 s, Combined Angle: 175.46°**

**Time: 69.61 s, Combined Angle: 175.63°**

**Time: 69.65 s, Combined Angle: 175.44°**

**Time: 69.70 s, Combined Angle: 175.41°**

**Time: 69.77 s, Combined Angle: 175.33°**

**Time: 69.82 s, Combined Angle: 175.33°**

**Time: 69.87 s, Combined Angle: 175.26°**

**Time: 69.92 s, Combined Angle: 175.00°**

**Time: 69.99 s, Combined Angle: 174.58°**

**Time: 70.04 s, Combined Angle: 174.75°**

**Time: 70.08 s, Combined Angle: 174.58°**

**Time: 70.13 s, Combined Angle: 174.43°**

**Time: 70.18 s, Combined Angle: 174.43°**

**Time: 70.23 s, Combined Angle: 174.62°**

**Time: 70.26 s, Combined Angle: 174.75°**

**Time: 70.31 s, Combined Angle: 174.74°**

**Time: 70.36 s, Combined Angle: 174.83°**

**Time: 70.42 s, Combined Angle: 174.94°**

**Time: 70.48 s, Combined Angle: 175.03°**

**Time: 70.51 s, Combined Angle: 175.04°**

**Time: 70.57 s, Combined Angle: 175.19°**

**Time: 70.62 s, Combined Angle: 175.08°**

**Time: 70.66 s, Combined Angle: 175.20°**

**Time: 70.70 s, Combined Angle: 175.25°**

**Time: 70.75 s, Combined Angle: 175.50°**

**Time: 70.80 s, Combined Angle: 175.72°**

**Time: 70.85 s, Combined Angle: 175.95°**

**Time: 70.89 s, Combined Angle: 176.16°**

**Time: 70.94 s, Combined Angle: 176.31°**

**Time: 70.98 s, Combined Angle: 174.78°**

**Time: 71.03 s, Combined Angle: 173.89°**

**Time: 71.08 s, Combined Angle: 172.97°**

**Time: 71.12 s, Combined Angle: 172.52°**

**Time: 71.18 s, Combined Angle: 170.49°**

**Time: 71.21 s, Combined Angle: 169.39°**

**Time: 71.27 s, Combined Angle: 168.93°**

**Time: 71.34 s, Combined Angle: 168.75°**

**Time: 71.39 s, Combined Angle: 167.71°**

**Time: 71.44 s, Combined Angle: 167.58°**

**Time: 71.48 s, Combined Angle: 167.95°**

**Time: 71.53 s, Combined Angle: 169.38°**

**Time: 71.57 s, Combined Angle: 172.76°**

**Time: 71.63 s, Combined Angle: 173.65°**

**Time: 71.67 s, Combined Angle: 173.76°**

**Time: 71.71 s, Combined Angle: 174.03°**

**Time: 71.76 s, Combined Angle: 174.61°**

**Time: 71.81 s, Combined Angle: 175.17°**

**Time: 71.85 s, Combined Angle: 177.04°**

**Time: 71.90 s, Combined Angle: 177.41°**

**Time: 71.94 s, Combined Angle: 177.86°**

**Time: 71.99 s, Combined Angle: 172.81°**

**Time: 72.04 s, Combined Angle: 171.91°**

**Time: 72.08 s, Combined Angle: 164.84°**

**Time: 72.13 s, Combined Angle: 165.32°**

**Time: 72.18 s, Combined Angle: 163.03°**

**Time: 72.23 s, Combined Angle: 164.40°**

**Time: 72.27 s, Combined Angle: 168.29°**

**Time: 72.32 s, Combined Angle: 169.93°**

**Time: 72.37 s, Combined Angle: 170.97°**

**Time: 72.41 s, Combined Angle: 176.15°**

**Time: 72.46 s, Combined Angle: 174.65°**

**Time: 72.51 s, Combined Angle: 173.55°**

**Time: 72.55 s, Combined Angle: 173.36°**

**Time: 72.59 s, Combined Angle: 173.44°**

**Time: 72.64 s, Combined Angle: 173.46°**

**Time: 72.69 s, Combined Angle: 173.21°**

**Time: 72.74 s, Combined Angle: 173.52°**

**Time: 72.79 s, Combined Angle: 173.11°**

**Time: 72.84 s, Combined Angle: 173.15°**

**Time: 72.88 s, Combined Angle: 173.08°**

**Time: 72.92 s, Combined Angle: 172.51°**

**Time: 72.97 s, Combined Angle: 171.65°**

**Time: 73.03 s, Combined Angle: 171.23°**

**Time: 73.08 s, Combined Angle: 170.94°**

**Time: 73.12 s, Combined Angle: 170.61°**

**Time: 73.18 s, Combined Angle: 170.15°**

**Time: 73.24 s, Combined Angle: 169.48°**

**Time: 73.28 s, Combined Angle: 168.72°**

**Time: 73.33 s, Combined Angle: 167.62°**

**Time: 73.39 s, Combined Angle: 166.62°**

**Time: 73.43 s, Combined Angle: 165.74°**

**Time: 73.49 s, Combined Angle: 165.03°**

**Time: 73.53 s, Combined Angle: 164.52°**

**Time: 73.58 s, Combined Angle: 163.63°**

**Time: 73.62 s, Combined Angle: 162.74°**

**Time: 73.67 s, Combined Angle: 162.21°**

**Time: 73.73 s, Combined Angle: 162.85°**

**Time: 73.78 s, Combined Angle: 161.96°**

**Time: 73.85 s, Combined Angle: 160.92°**

**Time: 73.89 s, Combined Angle: 159.62°**

**Time: 73.93 s, Combined Angle: 159.30°**

**Time: 73.98 s, Combined Angle: 158.72°**

**Time: 74.03 s, Combined Angle: 158.99°**

**Time: 74.07 s, Combined Angle: 159.76°**

**Time: 74.12 s, Combined Angle: 160.64°**

**Time: 74.18 s, Combined Angle: 161.45°**

**Time: 74.23 s, Combined Angle: 161.58°**

**Time: 74.28 s, Combined Angle: 160.35°**

**Time: 74.32 s, Combined Angle: 158.98°**

**Time: 74.37 s, Combined Angle: 158.53°**

**Time: 74.41 s, Combined Angle: 157.62°**

**Time: 74.46 s, Combined Angle: 158.29°**

**Time: 74.52 s, Combined Angle: 157.55°**

**Time: 74.56 s, Combined Angle: 156.85°**

**Time: 74.60 s, Combined Angle: 156.31°**

**Time: 74.65 s, Combined Angle: 155.63°**

**Time: 74.69 s, Combined Angle: 154.34°**

**Time: 74.74 s, Combined Angle: 153.97°**

**Time: 74.78 s, Combined Angle: 153.78°**

**Time: 74.83 s, Combined Angle: 153.36°**

**Time: 74.87 s, Combined Angle: 153.05°**

**Time: 74.92 s, Combined Angle: 152.52°**

**Time: 74.98 s, Combined Angle: 152.19°**

**Time: 75.01 s, Combined Angle: 151.58°**

**Time: 75.07 s, Combined Angle: 150.83°**

**Time: 75.11 s, Combined Angle: 149.94°**

**Time: 75.15 s, Combined Angle: 149.85°**

**Time: 75.21 s, Combined Angle: 149.64°**

**Time: 75.25 s, Combined Angle: 149.27°**

**Time: 75.30 s, Combined Angle: 148.74°**

**Time: 75.35 s, Combined Angle: 147.86°**

**Time: 75.39 s, Combined Angle: 146.83°**

**Time: 75.44 s, Combined Angle: 143.30°**

**Time: 75.48 s, Combined Angle: 142.36°**

**Time: 75.53 s, Combined Angle: 142.27°**

**Time: 75.57 s, Combined Angle: 139.05°**

**Time: 75.62 s, Combined Angle: 136.33°**

**Time: 75.67 s, Combined Angle: 136.96°**

**Time: 75.71 s, Combined Angle: 138.26°**

**Time: 75.76 s, Combined Angle: 137.09°**

**Time: 75.81 s, Combined Angle: 136.02°**

**Time: 75.86 s, Combined Angle: 136.65°**

**Time: 75.90 s, Combined Angle: 139.40°**

**Time: 75.95 s, Combined Angle: 141.15°**

**Time: 76.00 s, Combined Angle: 142.82°**

**Time: 76.05 s, Combined Angle: 144.20°**

**Time: 76.10 s, Combined Angle: 143.50°**

**Time: 76.14 s, Combined Angle: 147.83°**

**Time: 76.19 s, Combined Angle: 148.62°**

**Time: 76.24 s, Combined Angle: 146.11°**

**Time: 76.28 s, Combined Angle: 150.44°**

**Time: 76.33 s, Combined Angle: 150.30°**

**Time: 76.38 s, Combined Angle: 154.60°**

**Time: 76.42 s, Combined Angle: 154.95°**

**Time: 76.47 s, Combined Angle: 154.44°**

**Time: 76.51 s, Combined Angle: 156.75°**

**Time: 76.56 s, Combined Angle: 157.32°**

**Time: 76.60 s, Combined Angle: 157.67°**

**Time: 76.65 s, Combined Angle: 158.96°**

**Time: 76.70 s, Combined Angle: 159.58°**

**Time: 76.75 s, Combined Angle: 160.95°**

**Time: 76.80 s, Combined Angle: 162.01°**

**Time: 76.84 s, Combined Angle: 162.44°**

**Time: 76.88 s, Combined Angle: 163.40°**

**Time: 76.93 s, Combined Angle: 165.05°**

**Time: 76.98 s, Combined Angle: 167.98°**

**Time: 77.03 s, Combined Angle: 169.86°**

**Time: 77.08 s, Combined Angle: 170.97°**

**Time: 77.12 s, Combined Angle: 171.84°**

**Time: 77.17 s, Combined Angle: 172.32°**

**Time: 77.21 s, Combined Angle: 172.72°**

**Time: 77.26 s, Combined Angle: 173.20°**

**Time: 77.31 s, Combined Angle: 173.66°**

**Time: 77.35 s, Combined Angle: 173.94°**

**Time: 77.41 s, Combined Angle: 174.44°**

**Time: 77.45 s, Combined Angle: 175.03°**

**Time: 77.50 s, Combined Angle: 175.47°**

**Time: 77.54 s, Combined Angle: 175.88°**

**Time: 77.59 s, Combined Angle: 176.10°**

**Time: 77.64 s, Combined Angle: 176.22°**

**Time: 77.68 s, Combined Angle: 176.43°**

**Conclusion**

The pose estimation and joint angle analysis system developed in this project successfully combined real-time visual feedback and detailed post-analysis of movement through graphical representations. This project demonstrates the power of using MediaPipe and OpenCV to create a tool that can be employed in a variety of fields requiring motion analysis, such as sports, rehabilitation, and ergonomics. Future improvements could involve adding more joints for analysis or applying the system in real-world scenarios with larger datasets.