

Virtual Reality Headset Design

Anthropometric recommendations for improved accommodation

Design for Human Variability – Fall 2023

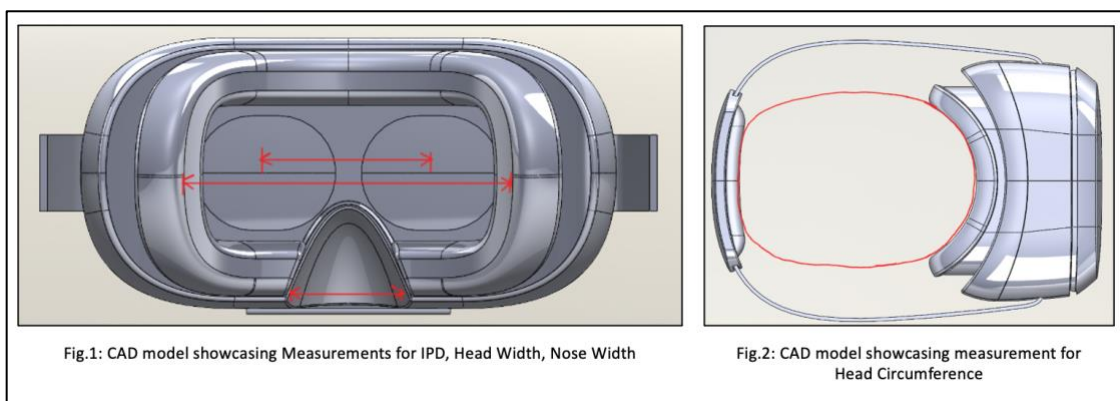
Team Members: Karanveer Chawla, Shivam Acharya, Zulfiqar Islahqamat, Shreyas Nagaraj.

Global technology companies around the world have turned their attention on Virtual, Augmented, and Mixed Reality as part of their future product lineups. However, most headsets on the market today face challenges relating to a user's fit, comfort, accommodation, fatigue due to weight, etc. Further, the prolonged use of VR headsets that are devoid of adequate accommodation measures may result in extensive strain on a user's neck. In terms of the adjustability of current headsets, the major criteria remain the range of adjustment of the headband and Interpupillary distance (IPD), but little consideration is given to the overall fit of the headset across a user's face and the nose bridge.

For our analysis and design recommendations, the primary population is the US civilian population while the secondary population is the Indian civilian population. During our analysis, we used the ANSUR I Headboard Data and the NHANES 2013-2016 data sets for our primary population. For the secondary population, have used the summary statistics of Indian civilian populations from other research studies and performing quantile-based synthesis to come up with the required data. We synthesized the data by performing regression with residual variance and aimed to accommodate 95% of the primary and secondary populations on measures in the following table:

Measure	Min Value (mm)	Max Value (mm)	Adjustability (mm)	US Male Accom (%)	US Female Accom (%)	Overall US Accom (%)
Nose Breadth	25	48	23	97.96	97.09	95.06
Head Width	133	166	33	96.75	99.15	95.91
Head Circumference*	508	615	107	97.35	99.56	96.92
Inter Pupillary Distance (IPD)	47	66	19	96.30	98.75	95.05

*Based on fit trials for VR headsets conducted by our team, we received feedback that a greater head circumference adjustment was preferred by most of the volunteers. Hence, we decided to add 10mm of additional adjustability, not related to anthropometry in order to get the head circumference accommodation.



Next Steps: As part of our next steps, we will be conducting a disproportionate disaccommodation analysis across the primary populations to quantify discommendation across the different ethnicities. Further, the accommodation for males, females, and the overall accommodation for the secondary population will be calculated and comparisons will be made to the primary population.