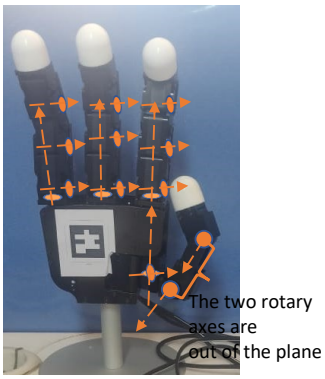

Fig. 1. Allegro RH with 16 actuated joints. The arrows representative of the axes of rotation, orthogonal to the circle.

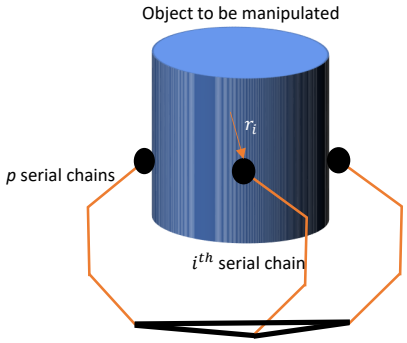

Fig. 2. A tree type robot contacting the object.

The variation of the joint values for a test motion of the DHG manipulating an object is shown in Fig 6. The corresponding magnitudes of the PCA components for different axes of the 11-D data is presented in Fig 7. The motion of the RH and the object can be seen in Fig. 8.

TABLE I
MECHANICAL MOTION RANGE (MMR) FOR THE FOUR JOINTS OF THE THUMB AND THE FOUR FINGERS OF THE ARH (IN DEG).

Joint No	Thumb MMR (deg)	Fingers MMR (deg)
1	64.9	66.84
2	84.11	116.52
3	116.52	119.40
4	119.302	116.863

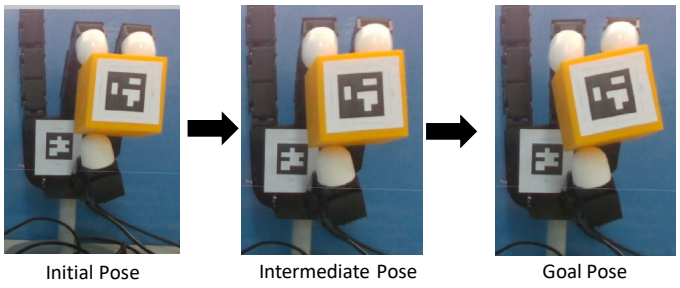

Fig. 3. Snapshots of rotation task

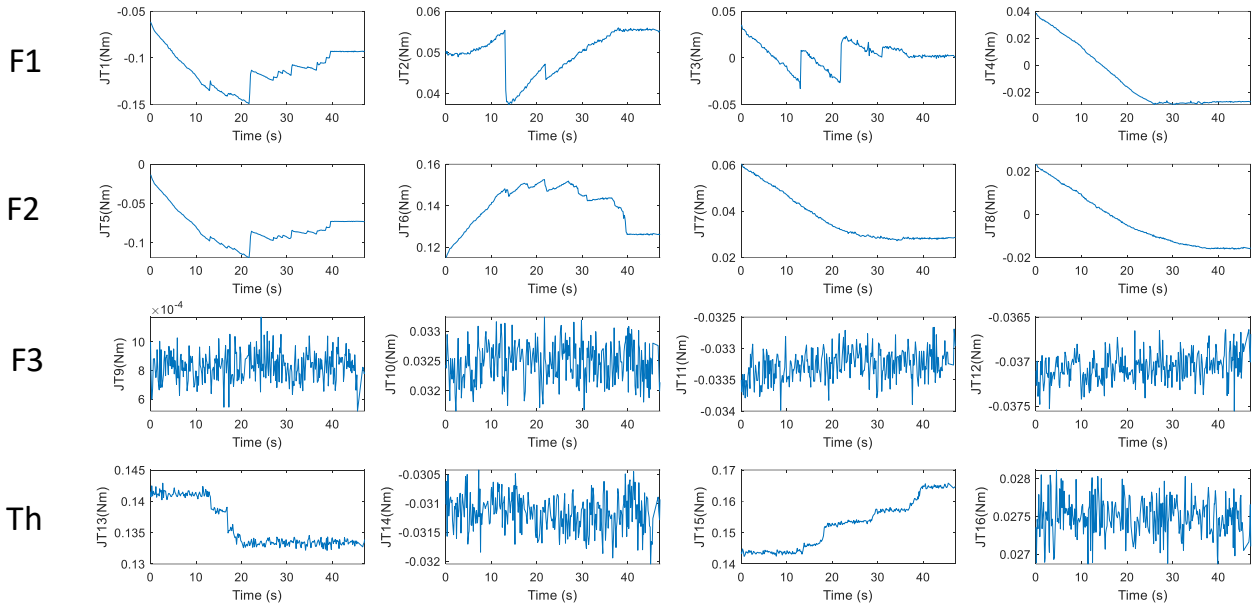

Fig. 4. Variation of the Joint Torque (JT) signal of the 16 actuated joints of the ARH corresponding to the motion in Fig. 3. 'F1' refers to the torque signals of the four joints of the first robotic finger (from right) actuating the object, 'F2' refers to the second finger. 'F3' (third finger) does not hit/ actuate the object, hence the torque signal remains constant. 'Th' refers to the four joints corresponding to the thumb signal.

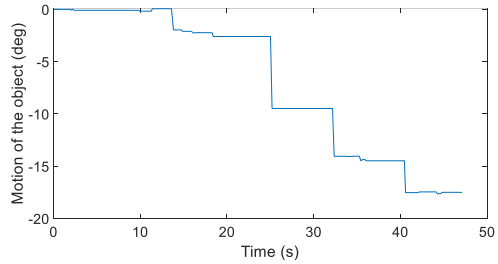

Fig. 5. Motion of the object by the ARH corresponding to Fig. 3.

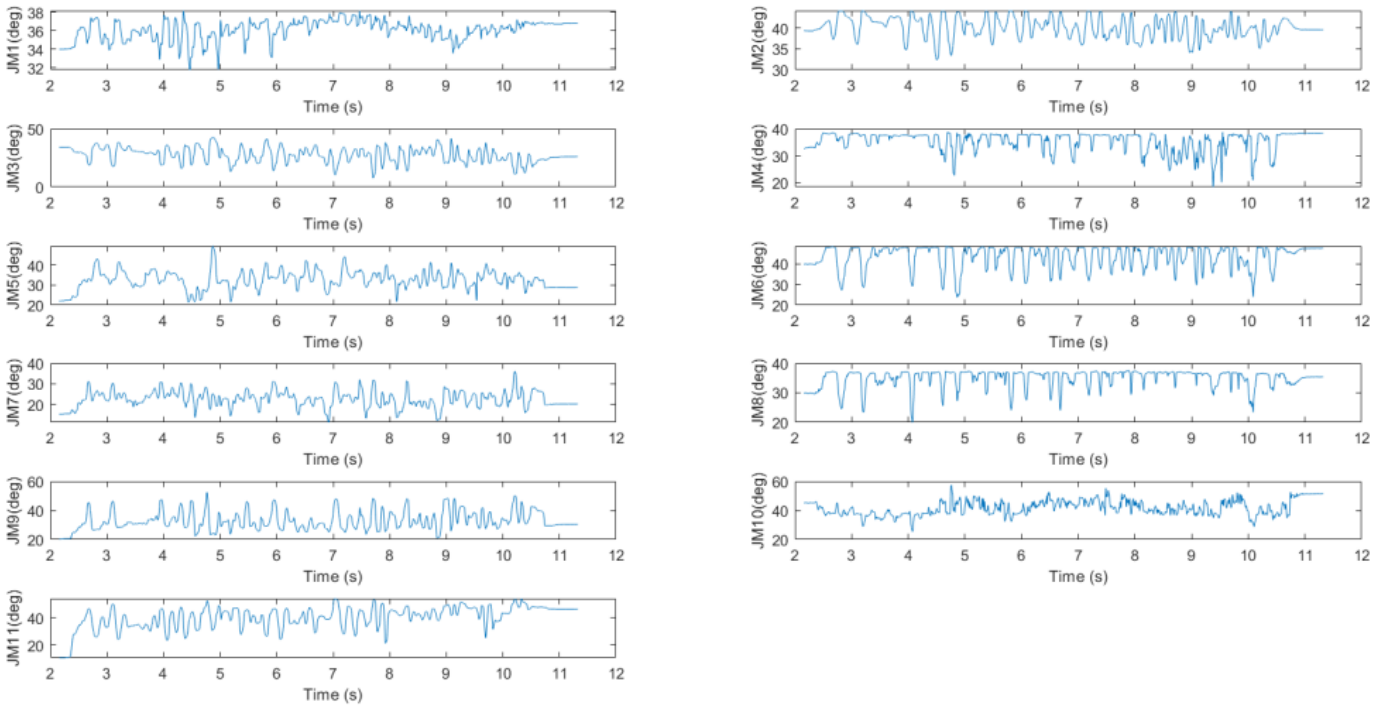

Fig. 6. Variation of the Joint Motion (JM) signal of the 11 joints of the DHG for arbitrary motion with a spherical ball; the joint motion signal for the i^{th} encoder is represented as 'JMi'.

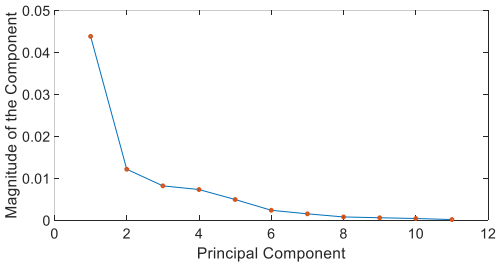

Fig. 7. PCA analysis of the data corresponding to Fig. 6.

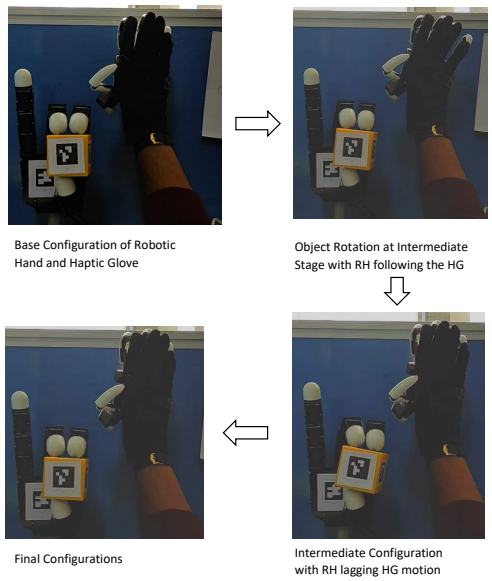

Fig. 8. Intermediate motion of the HG and RH mapping.

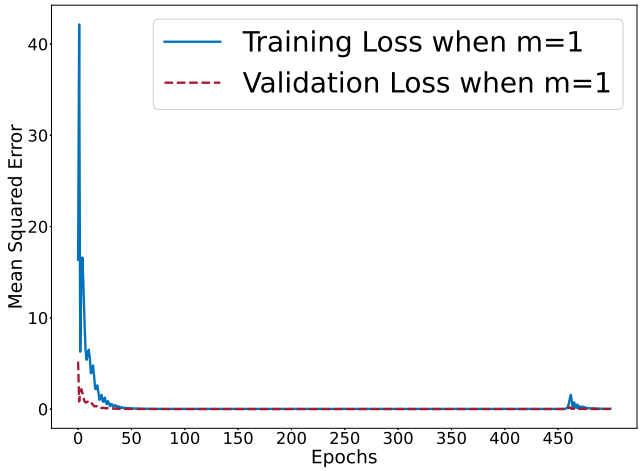

Fig. 9. Mean Squared Error corresponding to the train and the validation data set (rad) on $m = 1$.

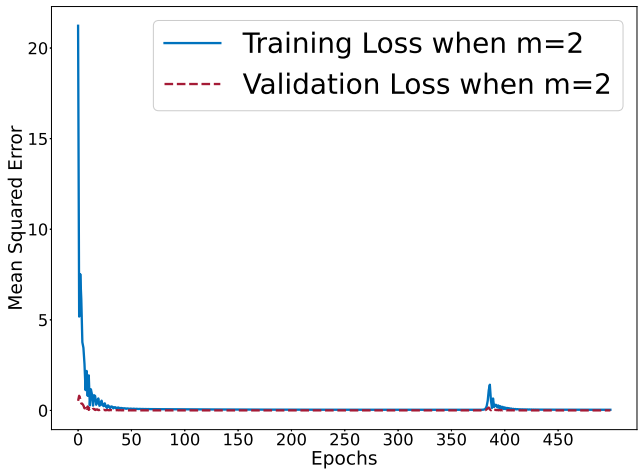

Fig. 10. Mean Squared Error corresponding to the train and the validation data set (rad) on $m = 2$.

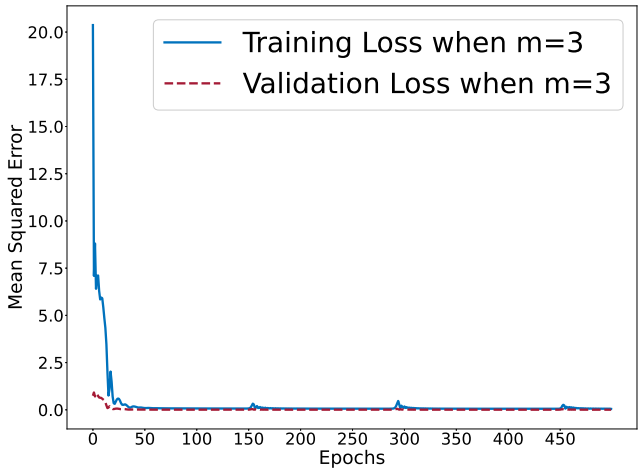

Fig. 11. Mean Squared Error corresponding to the train and the validation data set (rad) on $m = 3$.

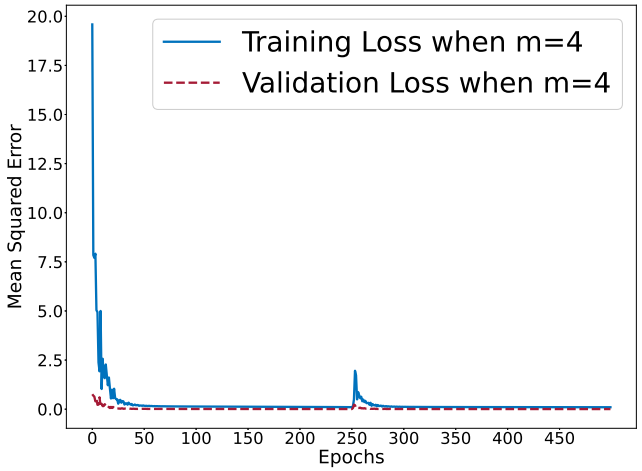

Fig. 12. Mean Squared Error corresponding to the train and the validation data set (rad) on $m = 4$.

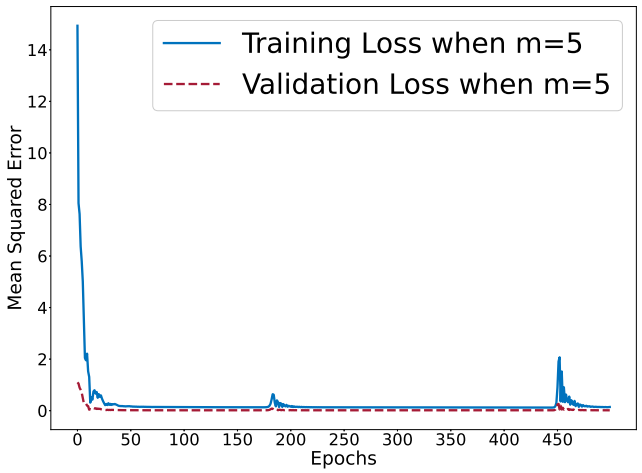

Fig. 13. Mean Squared Error corresponding to the train and the validation data set (rad) on $m = 5$.

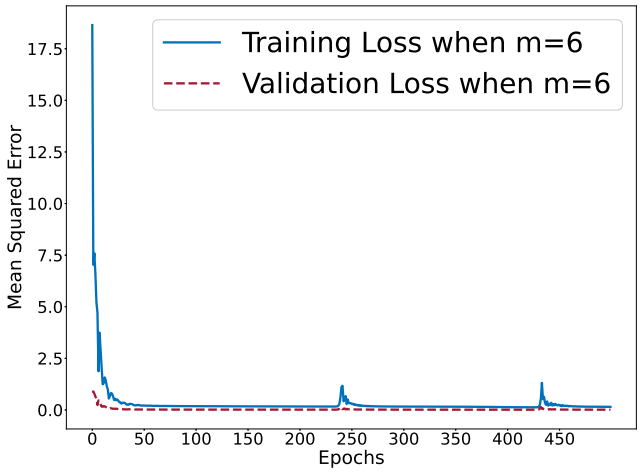

Fig. 14. Mean Squared Error corresponding to the train and the validation data set (rad) on $m = 6$.

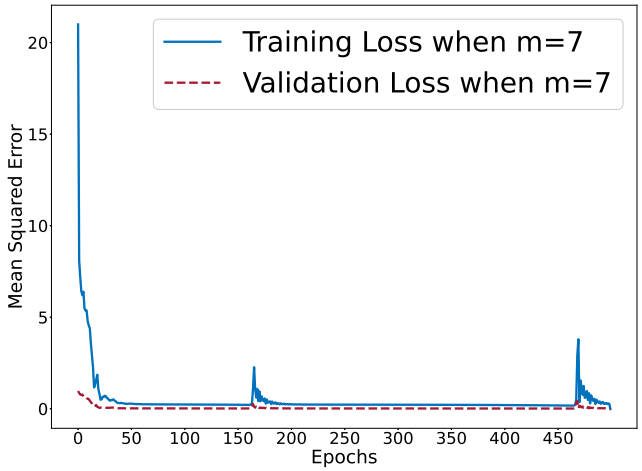

Fig. 15. Mean Squared Error corresponding to the train and the validation data set (rad) on $m = 7$.

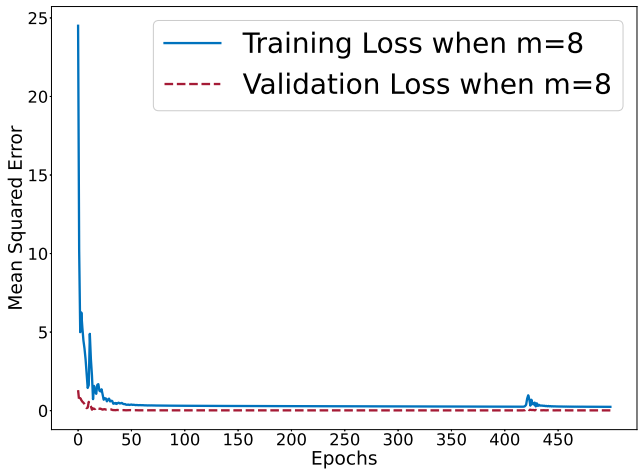

Fig. 16. Mean Squared Error corresponding to the train and the validation data set (rad) on $m = 8$.

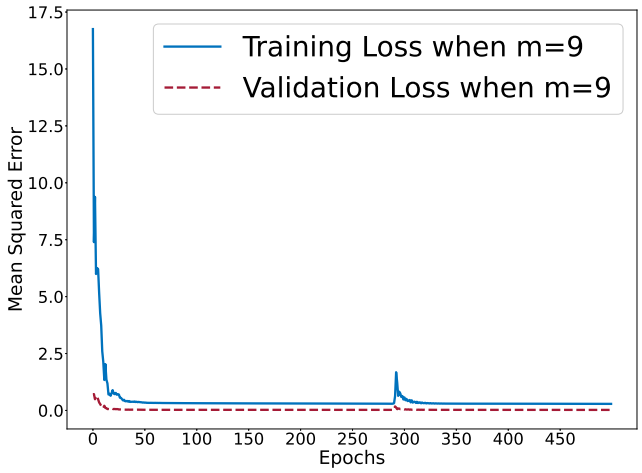

Fig. 17. Mean Squared Error corresponding to the train and the validation data set (rad) on $m = 9$.

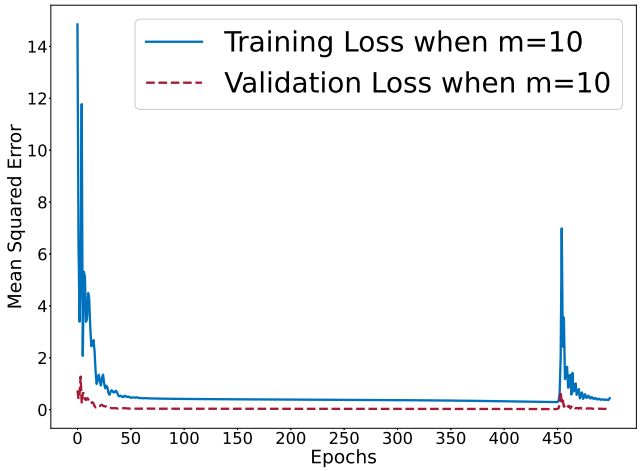

Fig. 18. Mean Squared Error corresponding to the train and the validation data set (rad) on $m = 10$.

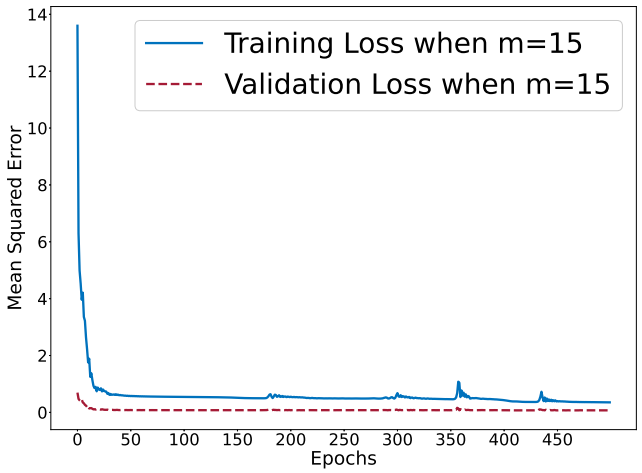

Fig. 19. Mean Squared Error corresponding to the train and the validation data set (rad) on $m = 15$.

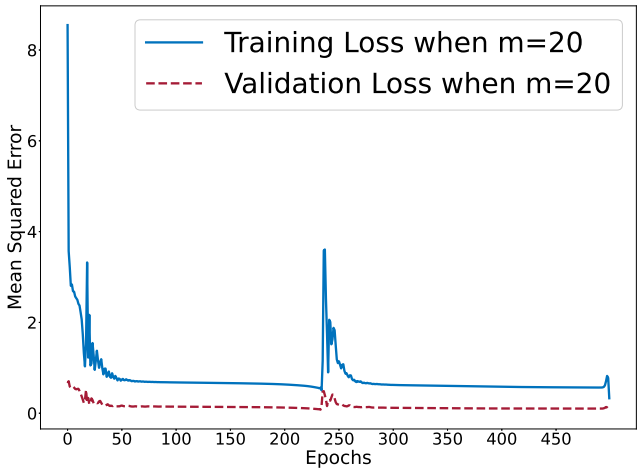

Fig. 20. Mean Squared Error corresponding to the train and the validation data set (rad) on $m = 20$.