



Fig. 4.3 Human-humanoid imitation activities. Face-to-face human-humanoid imitation (HHI) activities for (A) HHI of horizontal arm movement, (B) Humanoid horizontal arm movement, (C) HHI of vertical arm movement, and (D) Humanoid vertical arm movement.

4.5.2 Human-Humanoid Imitation Activities

For the human-humanoid imitation (HHI) experiment four wearable IMUs sensors were used in which two sensors were attached to the right hand of the participant and two sensors were attached to the left hand of the humanoid robot (Figure 4.3 A,C). Then, in the face-to-face imitation activity, each participant was asked to imitate repetitions of simple horizontal and vertical arm movements performed by the humanoid robot in the following conditions:

- ten repetitions of horizontal arm movement at normal (HN) and faster (HF) velocity (Fi. 4.3 A), and
- ten repetitions of vertical arm movement at normal (VN) and faster (VF) velocity (Fig. 4.3 C).

The normal and faster velocity of arm movements is defined by the duration in number of samples of one repetition of NAO's arm movements. We select NAO's arm movements duration to distinguish between normal and faster arm movements as the movements from the humanoid robot have less variation between repetition to repetition. The duration for one repetition of the horizontal arm movement at normal velocity, HN,