Appendix B

Robot Motion Corpus Acquisition Details

B.1 Video Corpus Creation

B.1.1 Camera Equipment

The following equipment was used to film the final corpus videos:

- Camera body: Canon EOS 5D IV ;
- Lens : Canon EF 16-35mm f/4 L IS ;
- a Tripod to mount the camera.

B.1.2 Camera Settings

Below, we present the settings we decided to use to capture the video corpus. The footage was recorded in 4K (3840 x 2160 pixels), which required the use of cropping (1.64x). Due to this, the 16-35mm Lens acts as a 26-57mm lens.

- Video recording format: 4K 25.00Fps MJPG MOV;
- Exposure: Manual;
- White balance: Automatic;
- Aperture: f/4;
- Shutter speed: 1/60;

- ISO speed: between 400 and 800, depending on the lighting (time of day, weather). This was adjusted such that the final video result when viewed on a screen would have similar colors and visual aspect to the rest of the video corpus.

B.1.3 Video Post-processing

375 videos were filmed in total. The first pre-processing step was to split the videos corresponding to motion sequence E into two parts, essentially two motion sequences (we used the ffmpeg library for this). After the split, we refer to the acceleration to constant speed motion sequence as sequence E, and the constant speed to deceleration as sequence F. This brings the total number of videos to 450. All of these videos have audio tracks, and we do not include the muted copies in the corpus since for experimental purposes, the speakers or video player can be muted.

The original files were very large due to the 4K resolution and high-quality MJPEG format. Video playback also proved to require a moderately powerful processor. Our goal was to re-use the videos in an online experiment where participants would be using their own computers to view the videos, hence the size had to be reduced and the videos had to be re-encoded to a lightweight format, all while maintaining as much quality as possible. We consulted the videographer who recommended to re-encode the videos using the H.264 codec (we used the Handbrake software to do this). This reduced the size of the corpus from around 220GB to 33GB. If further optimization was required, we could downscale the videos to a resolution of 1080x1920 (also using Handbrake), given that most people likely do not use displays with a higher resolution.

When recording the videos, the photographer was operating the camera, and an experimenter was in charge of positioning the robot, selecting the parameters (eye shape, variant), selecting and launching the velocity profile execution, and manually controlling the head rotation if needed. The experimenter and photographer agreed on when to start recording, and the experimenter waited three or four seconds before starting the robot movement. The experimenter said "stop" once the robot had stopped moving for three or four seconds. In order to remove the sound of the experimenter saying stop, and to obtain a waiting time of two seconds before and after the motion, we cut on or two seconds off the beginning and the end of each video in a semi-automated fashion (a script using ffmpeg was applied with different parameters depending on the batch of videos being processed).

B.2 Discussion

The camera settings and equipment were the result of some compromises. Initially, a 24-70mm lens with 1/125 shutter speed (f/2.8 L) was selected. Due to the optical cropping factor and the wide field of view to be covered (the longest robot movement was 6 meters long), we had to place the camera quite near the robot. This forced us to use the 16-35mm lens with a 1/60 shutter speed(effectively losing 1 EV), despite the fact that it would have allowed us to work with better light. The 1/125 shutter speed could have reduced the motion blur when using the saccade motion variant, although it may have made the room's neon

lighting oscillations visible.

Despite the varying natural light, we decided not to use the automatic ISO in order to make sure we always had an adequate amount of under-exposure. Slight under-exposure was necessary in order to make the RobAIR's LED eyes clearly visible.

In hindsight, it may have proved beneficial to film the corpus in a lower resolution for several reasons:

- 4K files were very large, which meant regularly transferring files off the camera;
- with our camera, filming at a full HD (1920x1080) resolution would have allowed us to avoid using the crop factor, and to use the 24-70mm lens. This would also have allowed to film at 50 or 100 fps in case we wanted to use slow-motion.

Alternatively, with a Canon EOS R6 or R5 instead of our 5D IV, we could have used a very small crop factor (1.07x) even while filming 4K. The problem of large filesize would still have to be considered.

One aspect to be cautious of when filming such a corpus is to make sure not to lose any data. We suffered from some problems while using a card reader connected to a PC, which corrupted the card. Fortunately, we were able to recover the data by using the protocol defined by the camera's manufacturer, consisting in directly plugging the camera into the pc via a cable, and using their software. This method avoids file corruption and guarantees a proper file transfer.