Supplementary Materials

Algorithm 1 Implementation of the adaptive model

Recording and pre-processing
- Record resting data and training data
- Calibrate activity detection
- Initialize inducing points using k-Means and train sGPs w.r.t. their hyperparameters σ_n, σ_s, l

Prediction steps
Data: WL EMG-feature of eight electrodes
Result: Velocity vector $\mathbf{v}^*$

while New data points arrive **do**
  if Activity detected **then**
    Computation of $\mathbf{v}^*$
    Add sample $\mathbf{x}^*$ to active batch (X^*)
    if size of $X^* > k^*$ **then**
      Pass X^* to the *update branch*
  else
    $\mathbf{v}^* = \mathbf{0}$
    Add sample to resting batch (X^o)
    if size of $X^o > k^o$ **then**
      Pass X^o to the *update branch*
  if No activity detected for t seconds **then**
    Reset active batch

Update steps
Data: Active batch or resting batch
Result: Modified data structure of the sGPs

if X^* is passed **then**
  Calculate $\tilde{\mathbf{x}}^*$, $\bar{\mathbf{v}}^*$ and $\bar{\sigma}^{*2}$
  Calculate δ and ϵ using $\tilde{\mathbf{x}}^*$
  Pull $\boldsymbol{\mu}^m_{1,j+1}$ towards $\tilde{\mathbf{x}}^*$
  if $\delta > 0.55$ **then**
    Pull $\boldsymbol{\mu}^m_{2,j+1}$ towards $\tilde{\mathbf{x}}^*$
  if Update rule is fulfilled **then**
    Add rand subset of X^* to $\mathcal{D}_d$ and remove rand subset of $\mathcal{D}_d$ with equivalent label
  if Update rule to update X_u is fulfilled **then**
    Add $\tilde{\mathbf{x}}^*$ to X_u of all sGPs
  if Number of updates $> t_{u1}$ **or** update rule 5 or 6 **then**
    Optimize X_u of each sGP
  if Number of updates $> t_{u2}$ **then**
    Recalculate $\boldsymbol{\mu}^0_c$ and Σ^0_c using $\mathcal{D}_{sub}$
else if X^0 is passed **then**
  Add rand subset of X^0 to $\mathcal{D}_d$ and remove rand subset of $\mathcal{D}_d$
if Data structure of sGPs is modified **then**
  Recomputation of model structures within the library which are effected by changes of $\mathcal{D}_d$ or X_u
  Overwrite adapted model structures in *prediction branch*

Update rules

	δ	ϵ	$\bar{\sigma}^{*2}$	$\bar{\mathbf{v}}^*$	*label*
1)	$-$	$+$	$-, (> \lambda_{\sigma 1})$	$v_1 > v_2$	class 1
2)	$-$		$++, (> \lambda_{\sigma 1})$	$v_1 > v_2$	class 1
3)	$+$	o	o, $(> \lambda_{\sigma 2})$	$v_1 \gg v_2$	class 1
4)	$+$	o	o	$v_1 \approx v_2$	diag. label
5)	$(-)$		$(++)$		
6)		$(+)$	$(+)$		

Here, $-$ indicates small values, o medium values, $+$ large values and $++$ is defined as almost one. $\lambda_{\sigma 1} := 0.2$ and $\lambda_{\sigma 2} := 0.3$. An inducing point is added to X_u at $\tilde{\mathbf{x}}^*$ if all conditions in ( ) in one row are fulfilled.

Parameterization

Parameter	Value	Parameter	Value
k^*	50	$\alpha 1$	0.1
k^o	1000	$\alpha 2$	0.025
t	0.1	$\lambda_{\sigma 1}$	0.2
t_{u1}	15	$\lambda_{\sigma 2}$	0.3
t_{u2}	20		

Table 1: Results of the Friedman test

Friedman:	**Chi-Square Value** $(\boldsymbol{\chi^2_R})(\mathbf{2})$	**p-Value** $(\mathbf{p})$	**Effect Size** $(\boldsymbol{\omega})$
Position 1	33.917	< 0.0001	0.485
Position 2*	64.825	< 0.0001	0.671
Position 2**	104.039	< 0.0001	0.850
Main Axes	68.474	< 0.0001	0.563
Diagonal Axes	123.293	< 0.0001	0.756

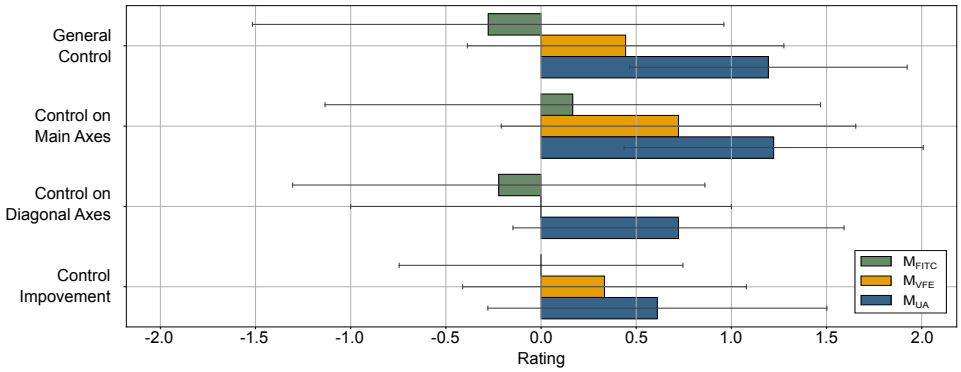

Figure 1: Results of the questionnaire on the satisfaction of the control with the range from -2.5 to +2.5. Subjects answered the questionnaire at the end of each test session.

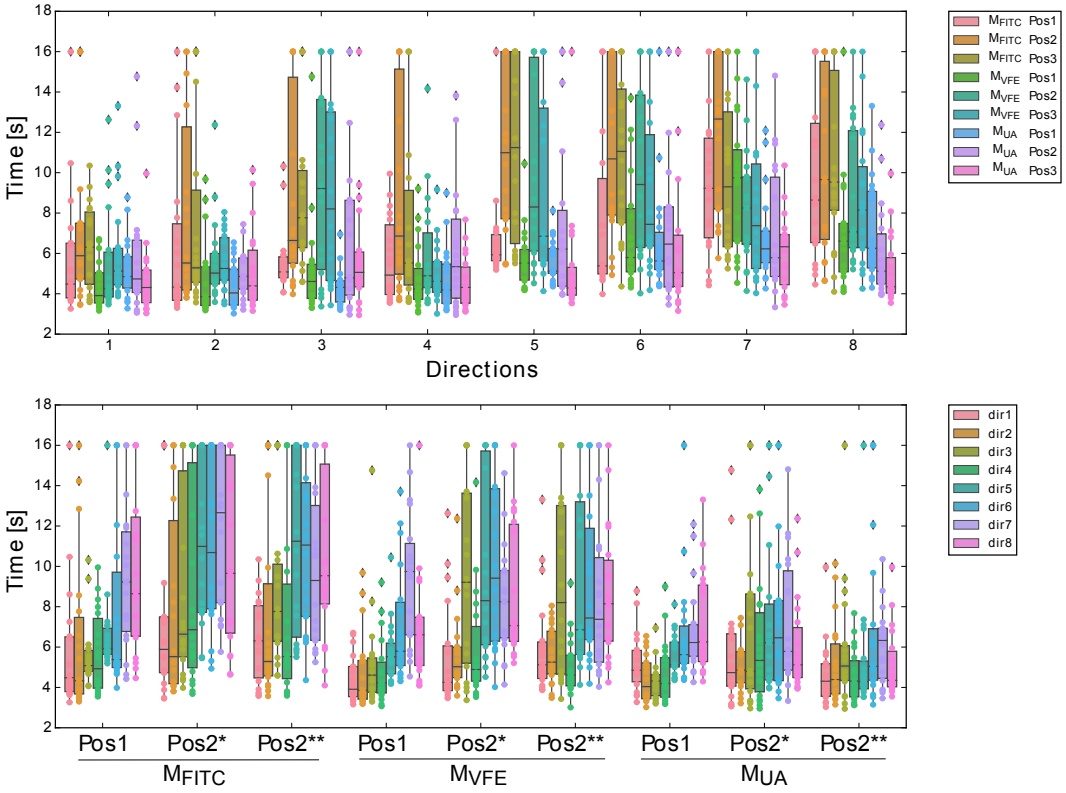

Figure 2: Results of the Fitts analysis; upper part: results for the different directions, direction 1-4 refer to the main axes and direction 5-8 to the diagonal axes; lower part: results for the different positions.

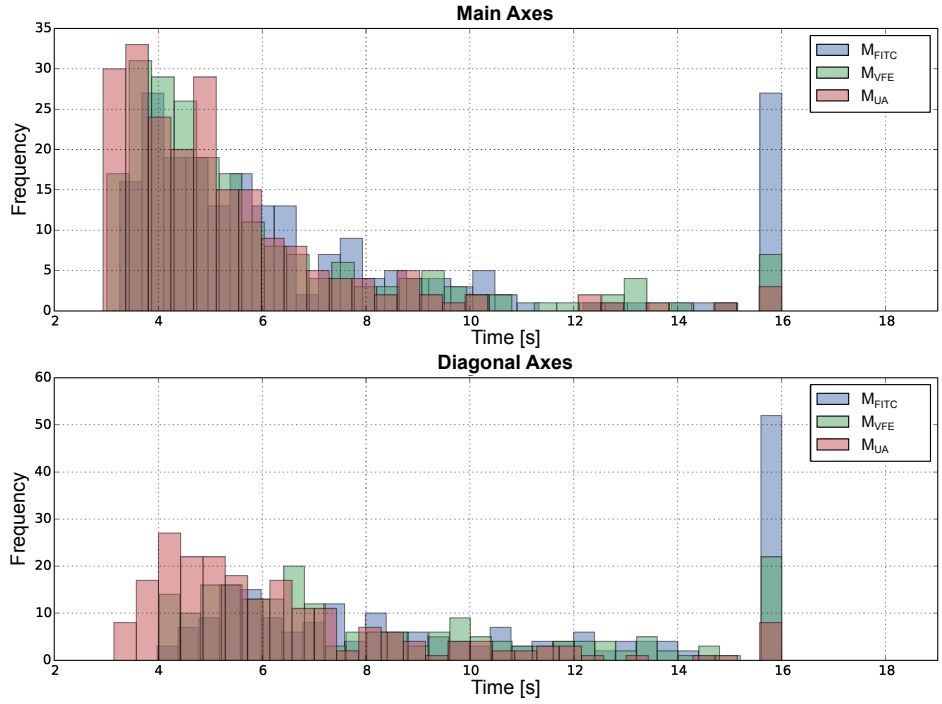

Figure 3: Distribution of time with respect to navigation along the main axes (top subplot) or diagonal axes (bottom subplot). Note that a time of 16s corresponds to failed trials.

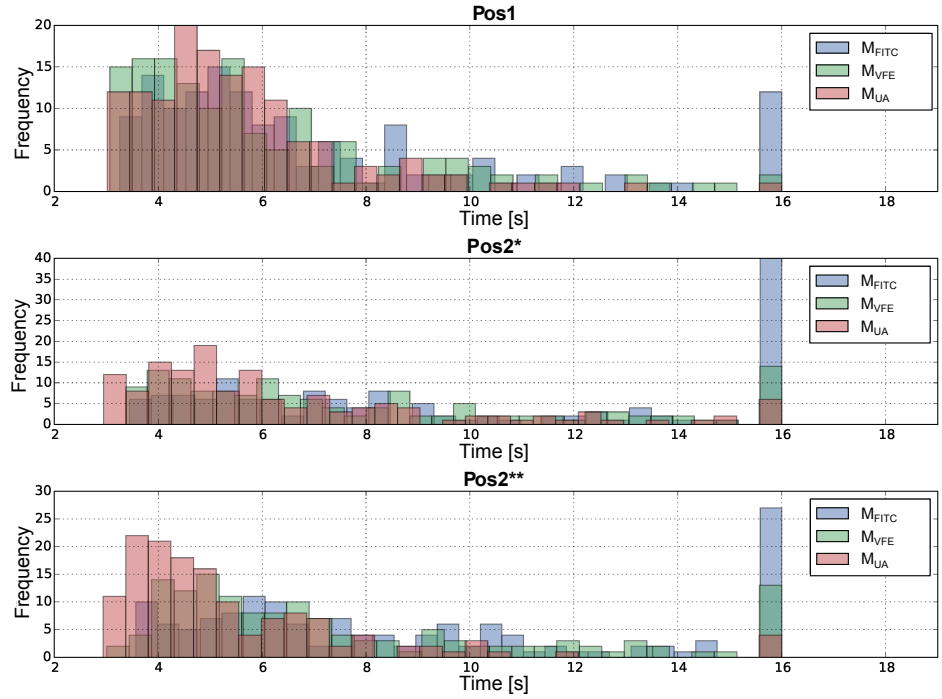

Figure 4: Distribution of time with respect to the different positions. Note that a time of 16s corresponds to failed trials.