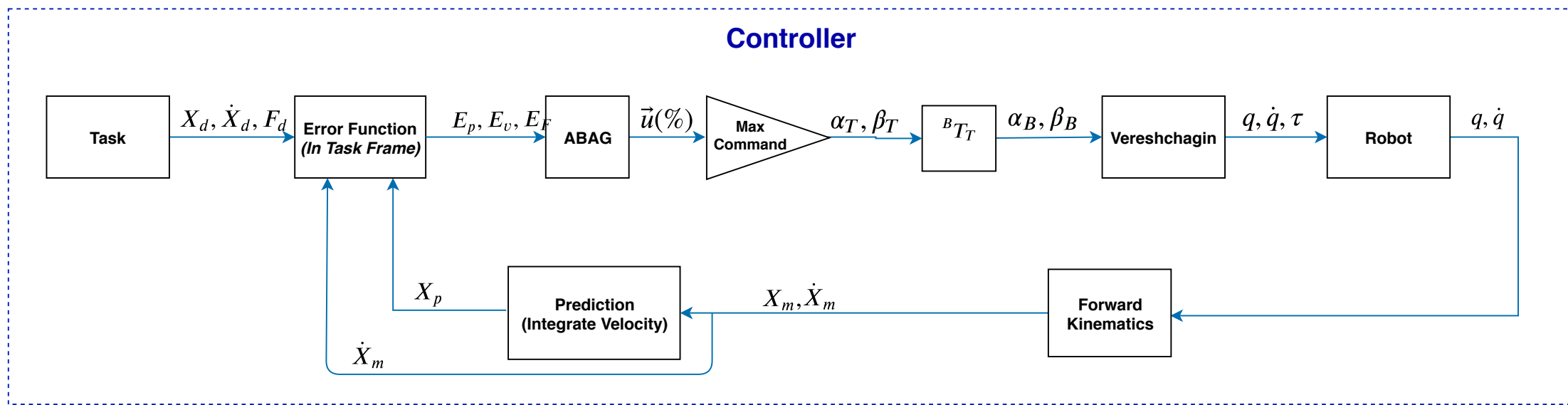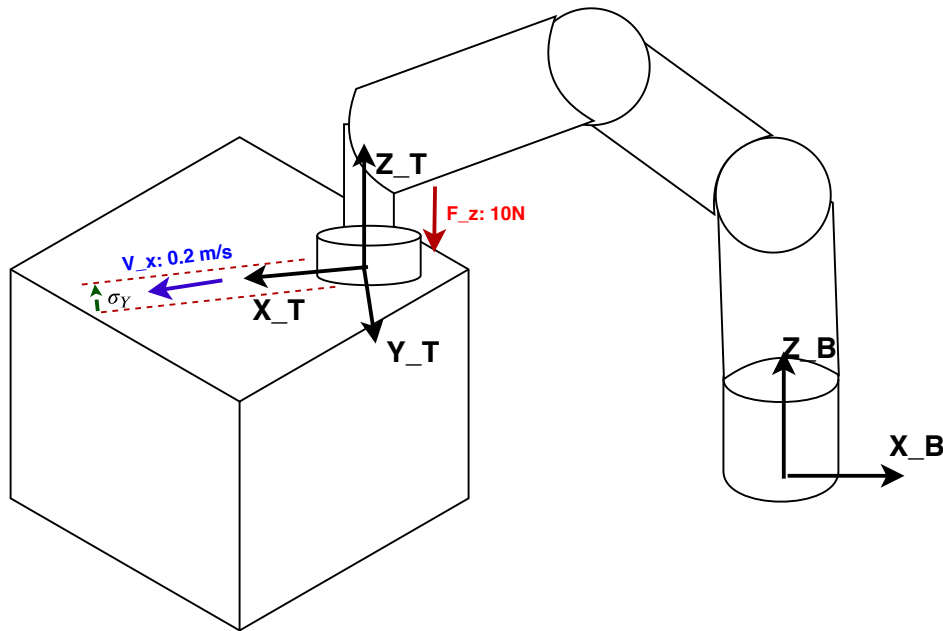## Example of **moveConstrained** task definition

move compliantly { // *with task frame directions*

   * X_T: velocity motion profile, tube 0.01 m/s
   * Y_T: position tube 0.03 m
   * Z_T: force profile, tube 0.5 N
   * aX_T: force 0 N, tube 0.1 N
   * aY_T: force 0 N, tube 0.1 N
   * aZ_T: no specs / orientation tube 10 deg

  } until: * distance in X > d m
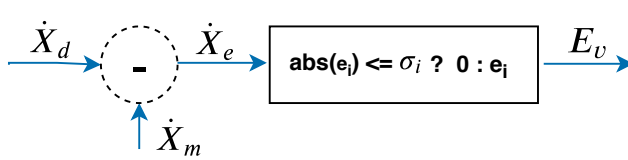   * F_x/F_y > 0.5 N
            * time > 20 sec

Objective (Error) function
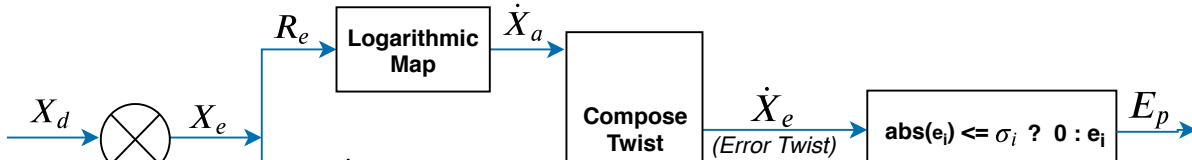
Monitors (FSM)

Controller

Error Function (In Task Frame)
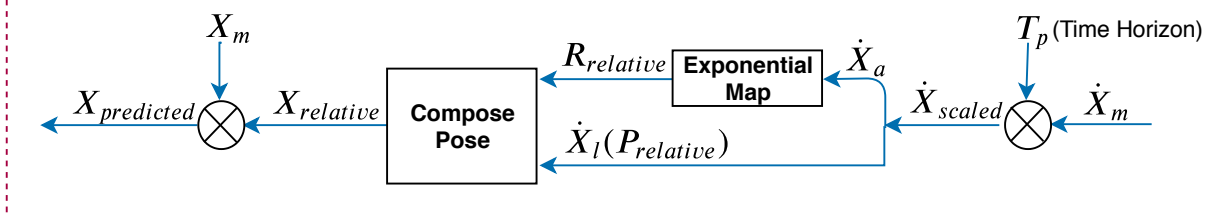
Current Speed Error

Predicted Pose Error

Current Force Error

ABAG

$E_{x,v}$ — 1D ABAG
$E_{y,p}$ — 1D ABAG
$E_{z,F}$ — 1D ABAG
$E_{ax,F}$ — 1D ABAG
$E_{ay,F}$ — 1D ABAG
$E_{az,p}$ — 1D ABAG
E_p, E_v, E_F → $\vec{u}(\%)$
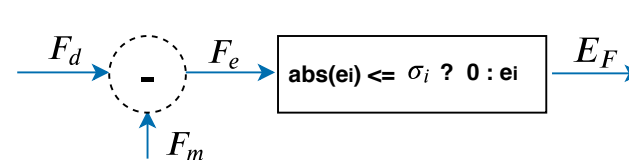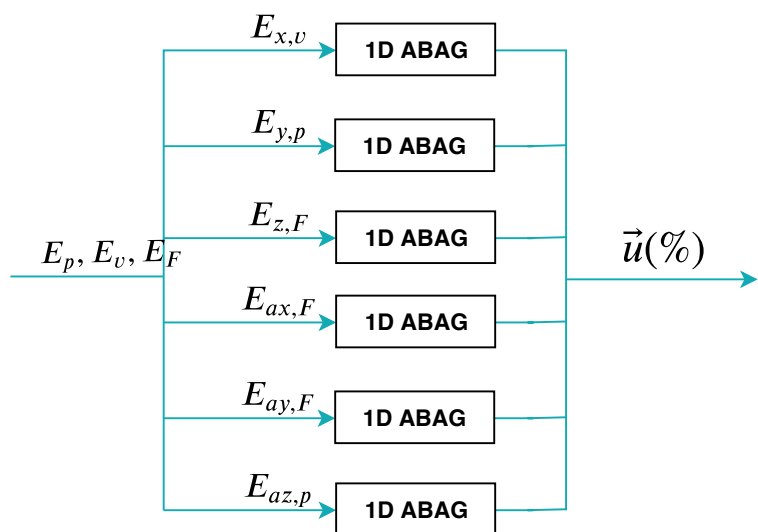
Prediction (Integrate Velocity)

FSM For **moveConstrained** force and path following task

START *STOP*

Initialize Timeout

NO_MOTION (STOP)

Whole Tube Covered / Contact Detected

Contact Detected

Tube Not Covered

Out Of Tube (Disturbance Occurred)

START_TO_CRUISE

Inside Tube

Tube Following

CRUISE_THROUGH_TUBE

Tube Section Covered

CHANGE_TUBE_SECTION

Tube Section Changed