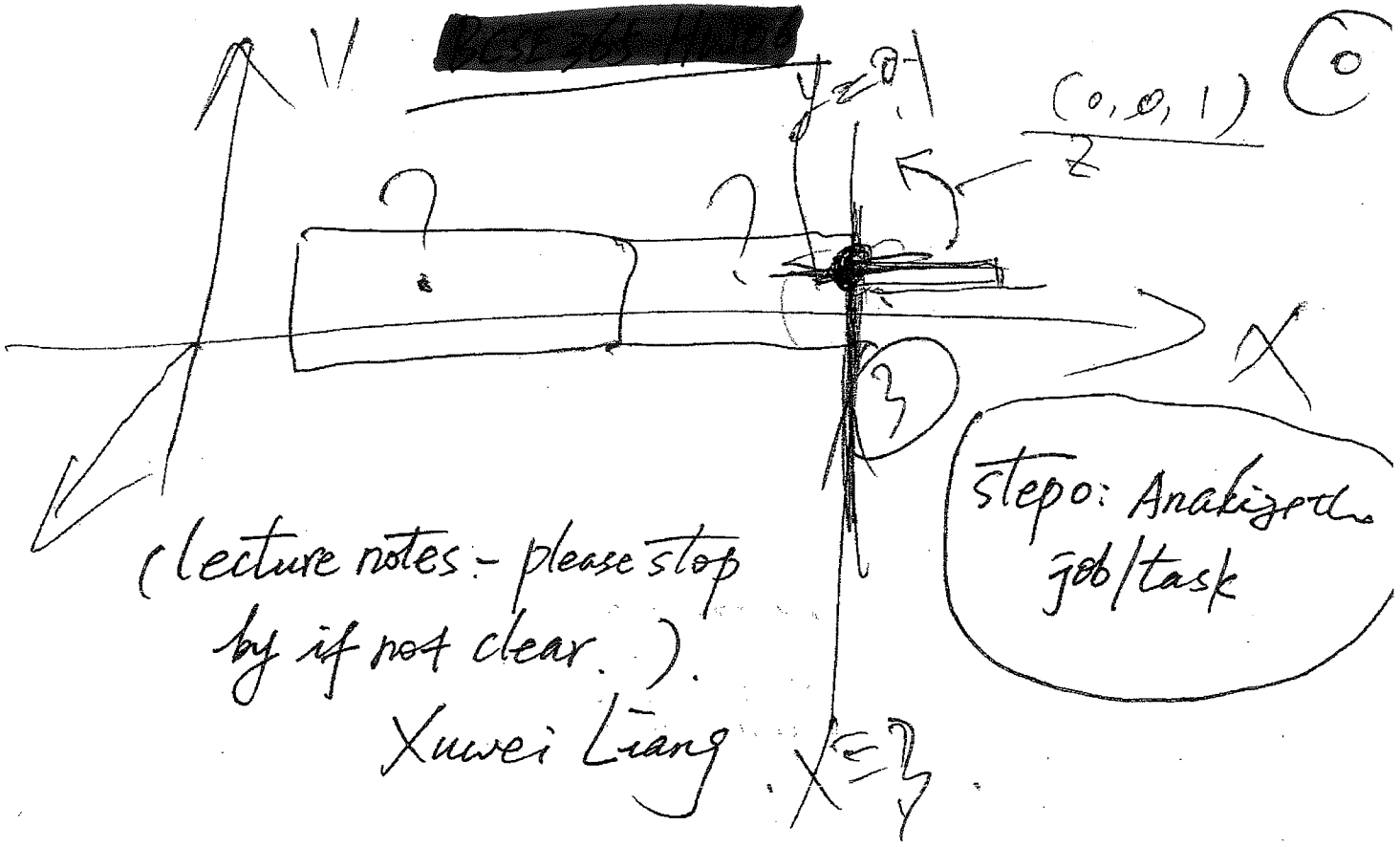


(lecture notes - please stop by if not clear.)

Xuwei Liang

Q: ① What is the finger size?

② Where is the joint point to assemble the finger to the elbow?

— Need to analize the sample code

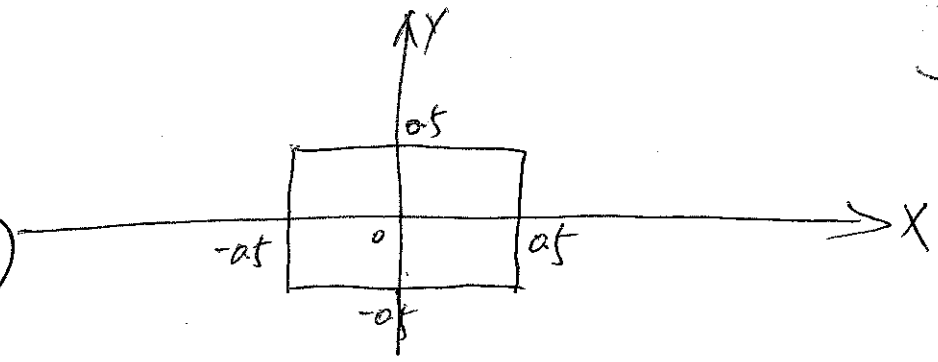
Idea:

1. The finger should move together with the elbow & shoulder.
2. The elbow should move together with shoulder.

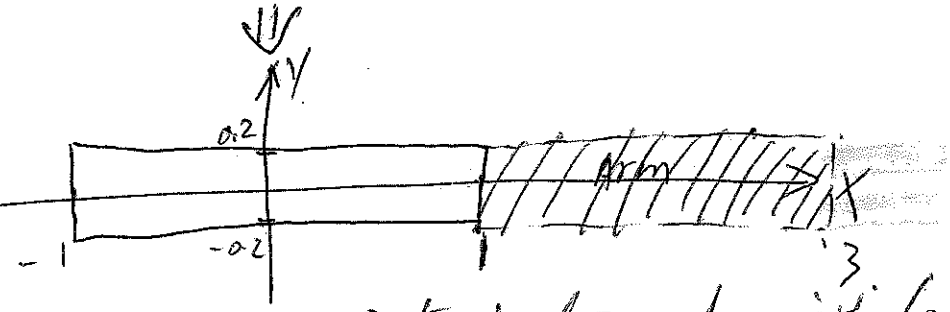
step1: Assemble fingers to the elbow → step2: Assemble "finger+elbow" to shoulder

Shoulder:

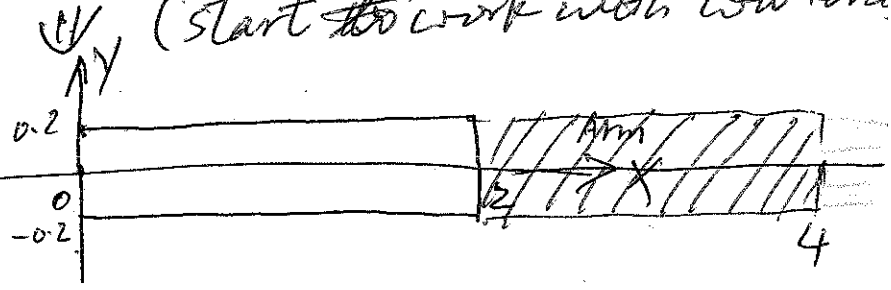
① obj S



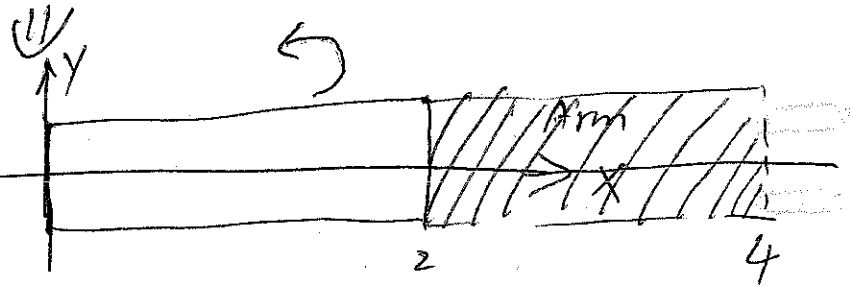
② Scale S_S



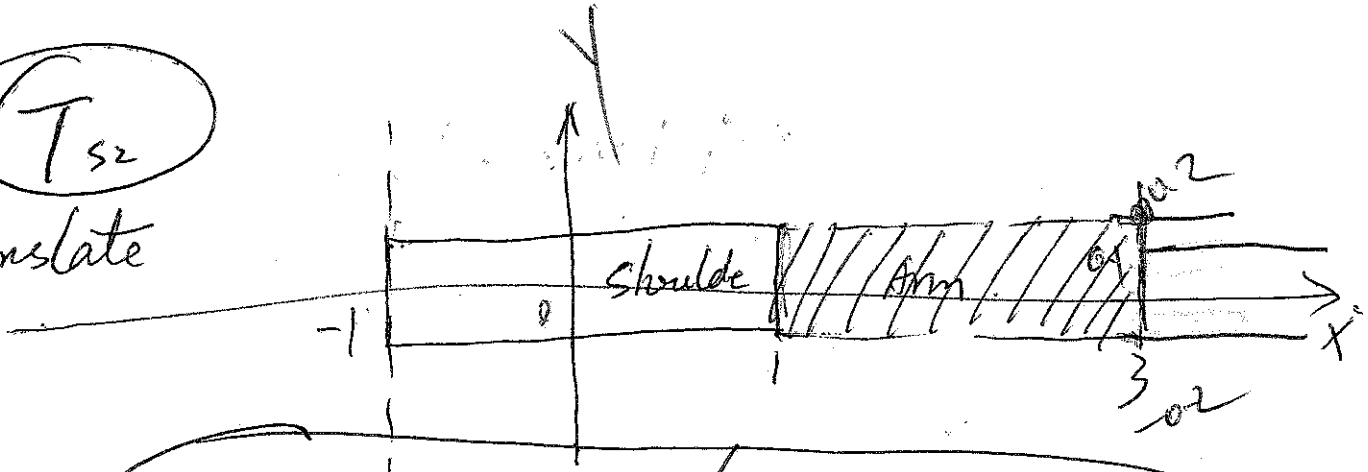
③ Translate T_{S1} (start to work with low level



④ Rotate R_S (Left edge)



⑤ T_{S2} Translate



step: design/develop the solution

Arm:

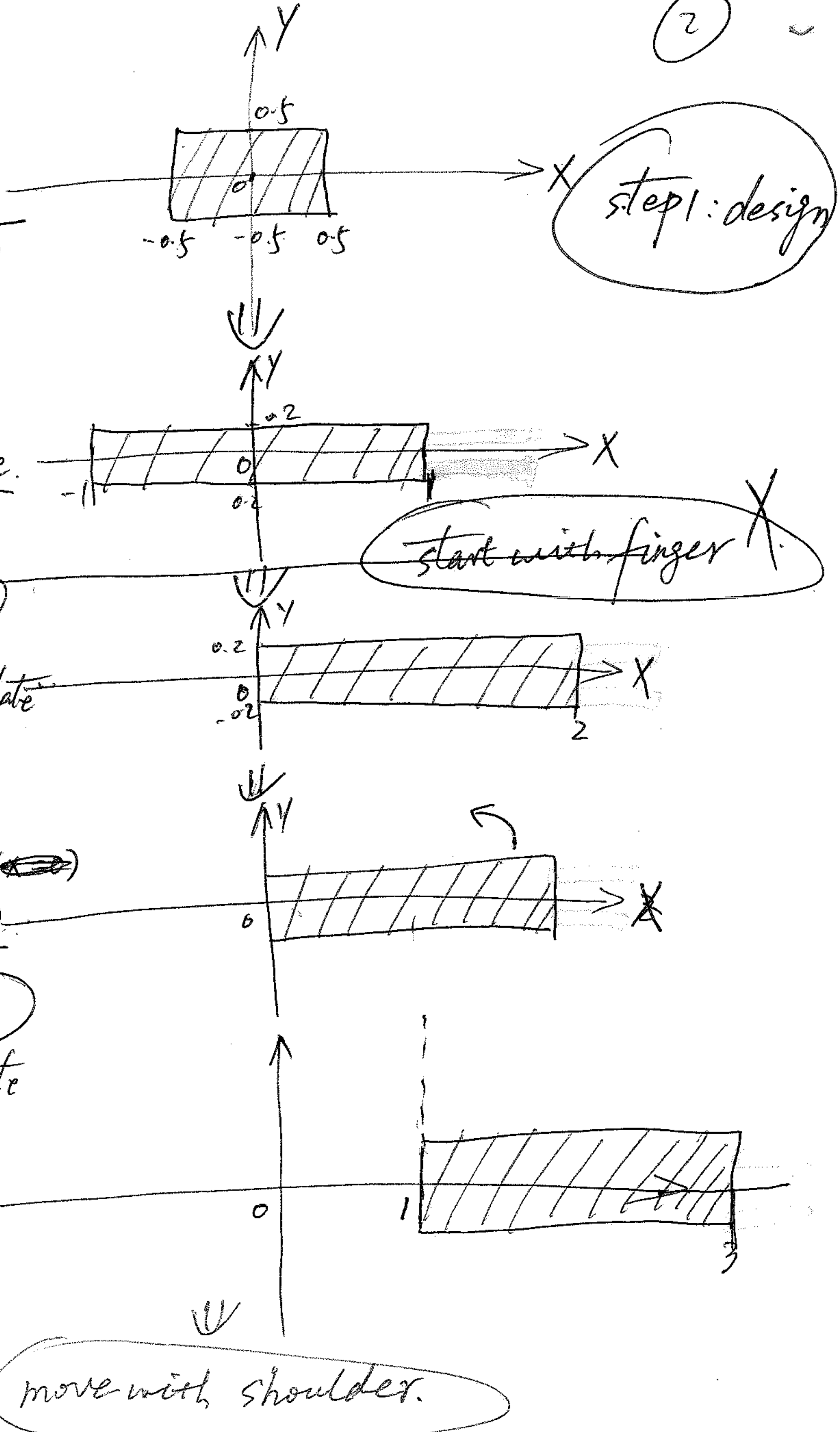
① Obj
(A)

(S_A)
② Scale

(T_A1)
③ Translate

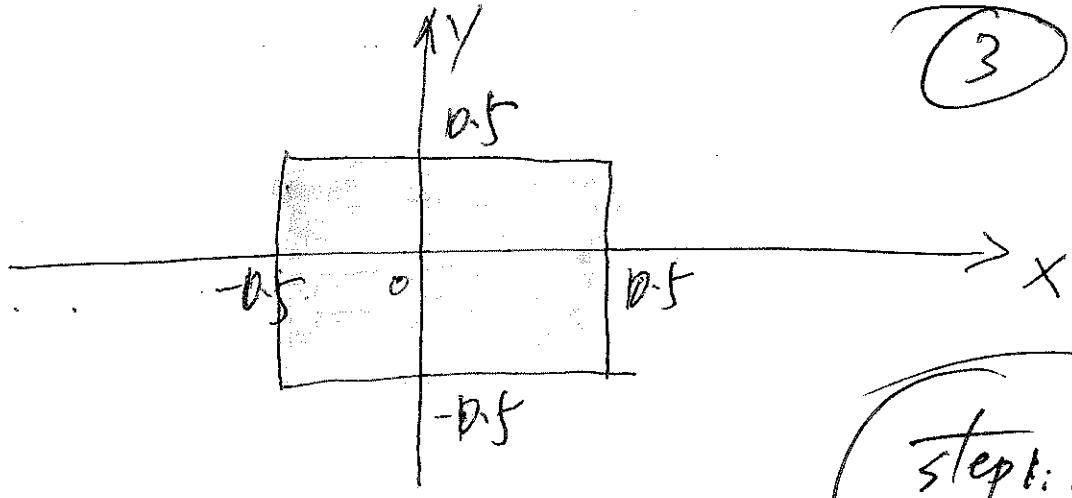
(R_A)
④ Rotate (left edge)

(T_A2)
⑤ Translate



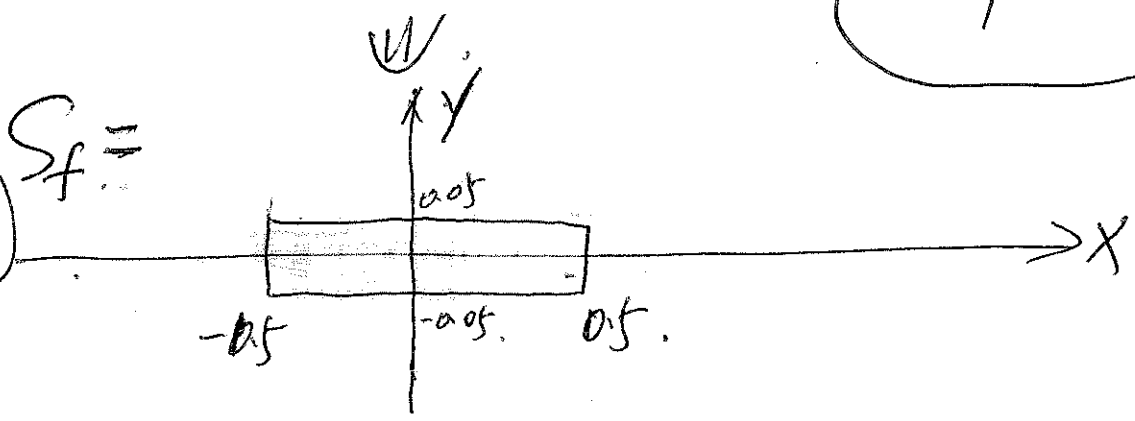
Finger:

obj F



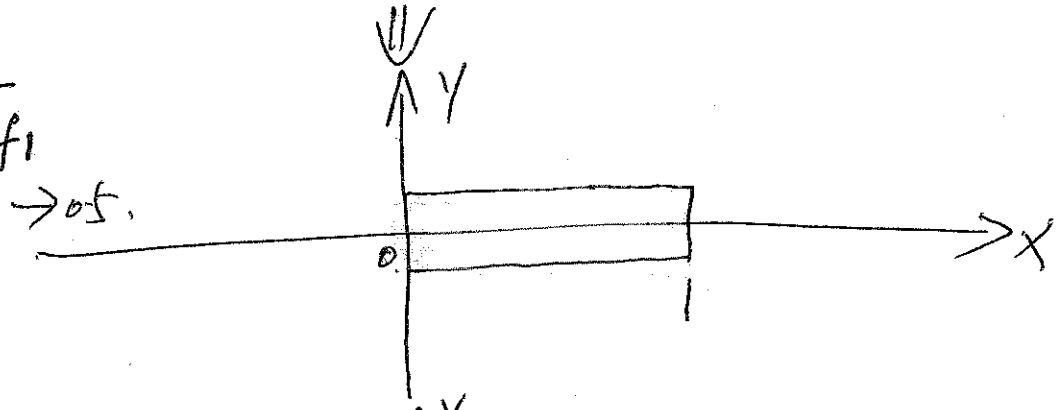
step 1: design

Scaling S_f =



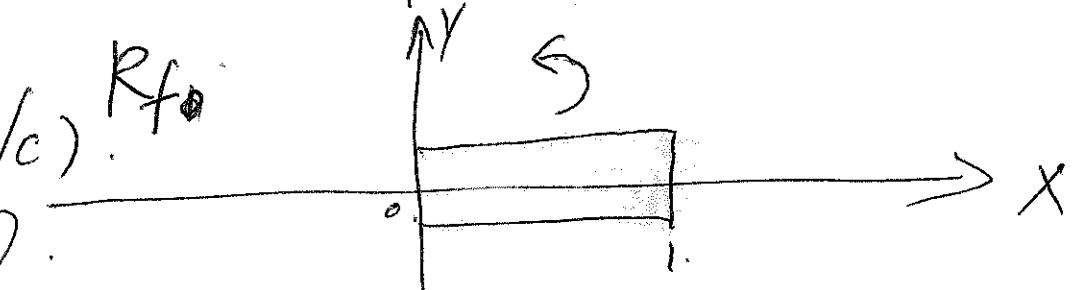
T_{f1}

Translate →0.5.



Rotate (o/c) R_{f0}

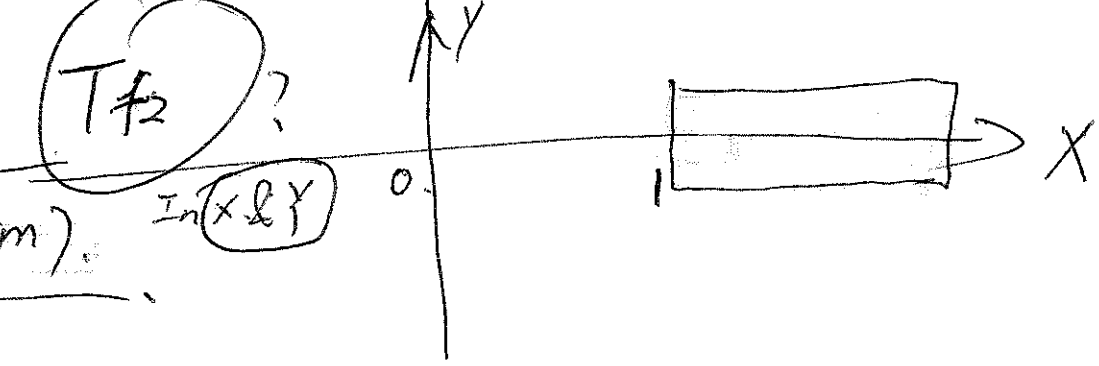
(left edge).



Translate T_{f2} ?

In (x & y)

(Add to arm).



Transformations applied to finger 1:

$$T_{S2} \cdot R_S \cdot T_{S1} \cdot T_{A2} \cdot R_A \cdot T_{A1} \cdot T_{f2} \cdot R_f \cdot T_{f1} \cdot S_f \cdot F_1 = F_1'$$

other issues:

① 'O'/'C' control:

If 'O'
  Increase the rotation angle for R_f;
    if the angle > 360
      reset the angle;

② ——— ——

step1: design

step 2: coding

step 3: checking :

① M_0 (Initial).

M_0
M_0

$M_0 \cdot T_{S2}$
M_0

$M_0 T_{S2} \cdot R_S$
M_0

$M_0 T_{S2} \cdot R_S \cdot T_{S1}$
M_0

$M_0 T_{S2} \cdot R_S \cdot T_{S1}$
$M_0 T_{S2} R_S \cdot T_{S1}$
M_0

$M_0 T_{S2} \cdot R_S \cdot T_{S1} \cdot S_S \cdot$
$M_0 T_{S2} R_S \cdot T_{S1}$
M_0

transformations to the shoulder. → $M_0 \cdot T_{S2} \cdot R_S \cdot T_{S1} \cdot S_S \cdot S$
$M_0 \cdot T_{S2} \cdot R_S \cdot T_{S1}$
M_0

$M_0 \cdot T_{S2} \cdot R_S \cdot T_{S1}$
M_0

$M_0 \cdot T_{S2} \cdot R_S \cdot T_{S1} \cdot T_{A2}$
M_0

V

steps: checking

$M_0 \cdot T_{S2} \cdot R_S \cdot T_{S1} \cdot T_{A2} \cdot R_A$
M_0

$M_0 \; T_{S2} \cdot R_S \cdot T_{S1} \cdot T_{A2} \cdot R_A \cdot T_{A1}$
M_0

$M_0 \cdot T_{S2} \cdot R_S \cdot T_{S1} \cdot T_{A2} \cdot R_A \cdot T_{A1}$
$M_0 \cdot T_{S2} \cdot R_S \cdot T_{S1} \cdot T_{A2} \cdot R_A \cdot T_{A1}$
M_0

$M_0 \cdot T_{S2} \cdot R_S \; T_{S1} \cdot T_{A2} \cdot R_A \cdot T_{A1} \cdot S_A$
$M_0 \; T_{S2} \cdot R_S \cdot T_{S1} \cdot T_{A2} \; R_A \cdot T_{A1} \cdot$
M_0

---

transformations at the elbow →

$M_0 \cdot T_{S2} \cdot R_S \cdot T_{S1} \cdot T_{A2} \cdot R_A \cdot T_{A1} \cdot S_A \cdot A$
$M_0 \; T_{S2} \; R_S \cdot T_{S1} \cdot T_{A2} \cdot R_A \; T_{A1}$
M_0

$M_0 \cdot T_{S2} \cdot R_S \cdot T_{S1} \cdot T_{A2} \cdot R_A \cdot T_{A1}$
M_0

$M_0 \cdot T_{S2} \cdot R_S \cdot T_{S1} \cdot T_{A2} \cdot R_A \cdot T_{A1} \cdot T_{f2}$
M_0

$M_0 \cdot T_{S2} \cdot R_S \cdot T_{S1} \cdot T_{A2} \cdot R_A \cdot T_{A1} \cdot T_{f2} \; R_f$
M_0

$M_0 \cdot T_{S2} \cdot R_S \cdot T_{S1} \cdot T_{A2} \cdot R_A \cdot T_{A1} \cdot T_{f2} \cdot R_f \cdot T_{f1}$
M_0

✓

$M_0 \cdot T_{s2} \cdot R_s \cdot T_{s1} \cdot T_{A2} \cdot R_A \cdot T_{A1} \cdot T_{f2} \cdot R_f \cdot T_{f1}$

$M_0 \; T_{s2} \; R_s \cdot T_{s1} \; T_{A2} \cdot R_A \cdot T_{A1} \; T_{f2} \cdot R_f \cdot T_{f1}$

M_0

$M_0 \cdot T_{s2} \cdot R_s \cdot T_{s1} \cdot T_{A2} \cdot R_A \cdot T_{A1} \cdot T_{f2} \cdot R_f \cdot T_{f1} \cdot S_f$

$M_0 \cdot T_{s2} \cdot R_s \cdot T_{s1} \cdot T_{A2} \cdot R_A \cdot T_{A1} \cdot T_{f2} \cdot R_f \cdot T_{f1} \cdot$ [illegible]

M_0

---

transformations to a finger →

$M_0 \cdot T_{s2} \cdot R_s \cdot T_{s1} \cdot T_{A2} \cdot R_A \cdot T_{A1} \cdot T_{f2} \cdot R_f \cdot T_{f1} \cdot S_f \cdot F_1$

$M_0 \cdot T_{s2} \cdot R_s \cdot T_{s1} \cdot T_{A2} \cdot R_A \cdot T_{A1} \cdot T_{f2} \cdot R_f \cdot T_{f1}$

M_0

$M_0 \cdot T_{s2} \cdot R_s \cdot T_{s1} \cdot T_{A2} \cdot R_A \cdot T_{A1} \cdot T_{f2} \cdot R_f \cdot T_{f1}$

M_0

M_0 (Initial).

---

step 3 : checking

same as that of the design — conclusion