

Appendix (B)

Forward computer program codes

Private Sub OK_Click()

On Error GoTo Err_OK_Click

qq1 = Me.z1 * 3.14159265358979 / 180

qq2 = Me.z2 * 3.14159265358979 / 180

qq3 = Me.z3 * 3.14159265358979 / 180

qq4 = Me.z4 * 3.14159265358979 / 180

w1 = Me.s1 * 3.14159265358979 / 180

w2 = Me.s2 * 3.14159265358979 / 180

w3 = Me.s3 * 3.14159265358979 / 180

w4 = Me.s4 * 3.14159265358979 / 180

Me.b1 = Cos (w1)

Me.b2 = - (Sin (w1) * Cos (qq1))

Me.b3 = Sin (w1) * Sin (qq1)

Me.b4 = a1 * Cos (w1)

Me.b5 = Sin (w1)

Me.b6 = Cos (w1) * Cos (qq1)

Me.b7 = -(Cos(w1) * Sin(qq1))

Me.b8 = a1 * Sin (w1)

Me.b9 = 0

Me.b10 = Sin (qq1)

$$\text{Me.b11} = \text{Cos} (qq1)$$

$$\text{Me.b12} = \text{Me.d1}$$

$$\text{Me.b13} = 0$$

$$\text{Me.b14} = 0$$

$$\text{Me.b15} = 0$$

$$\text{Me.b16} = 1$$

$$\text{Me.e1} = \text{Cos} (w2)$$

$$\text{Me.e2} = - (\text{Sin} (w2) * \text{Cos} (qq2))$$

$$\text{Me.e3} = \text{Sin} (w2) * \text{Sin} (qq2)$$

$$\text{Me.e4} = a2 * \text{Cos}(w2)$$

$$\text{Me.e5} = \text{Sin} (w2)$$

$$\text{Me.e6} = \text{Cos} (w2) * \text{Cos} (qq2)$$

$$\text{Me.e7} = - (\text{Cos} (w2) * \text{Sin} (qq2))$$

$$\text{Me.e8} = a2 * \text{Sin} (w2)$$

$$\text{Me.e9} = 0$$

$$\text{Me.e10} = \text{Sin} (qq2)$$

$$\text{Me.e11} = \text{Cos} (qq2)$$

$$\text{Me.e12} = \text{Me.d2}$$

$$\text{Me.e13} = 0$$

$$\text{Me.e14} = 0$$

$$\text{Me.e15} = 0$$

$$\text{Me.e16} = 1$$

$$\text{Me.h1} = \text{Cos} (w3)$$

$$\text{Me.h2} = - (\text{Sin} (w3) * \text{Cos} (qq3))$$

$$\text{Me.h3} = \text{Sin} (w3) * \text{Sin} (qq3)$$

$$\text{Me.h4} = a3 * \text{Cos} (w3)$$

$$\text{Me.h5} = \text{Sin} (w3)$$

$$\text{Me.h6} = \text{Cos} (w3) * \text{Cos} (qq3)$$

$$\text{Me.h7} = -(\text{Cos}(w3) * \text{Sin}(qq3))$$

$$\text{Me.h8} = a3 * \text{Sin} (w3)$$

$$\text{Me.h9} = 0$$

$$\text{Me.h10} = \text{Sin} (qq3)$$

$$\text{Me.h11} = \text{Cos} (qq3)$$

$$\text{Me.h12} = \text{Me.d3}$$

$$\text{Me.h13} = 0$$

$$\text{Me.h14} = 0$$

$$\text{Me.h15} = 0$$

$$\text{Me.h16} = 1$$

$$\text{Me.k1} = \text{Cos} (w4)$$

$$\text{Me.k2} = - (\text{Sin} (w4) * \text{Cos} (qq4))$$

$$\text{Me.k3} = \text{Sin} (w4) * \text{Sin} (qq4)$$

$$\text{Me.k4} = a4 * \text{Cos} (w4)$$

$$\text{Me.k5} = \text{Sin} (w4)$$

$$\text{Me.k6} = \text{Cos} (w4) * \text{Cos} (qq4)$$

$$\text{Me.k7} = - (\text{Cos} (w4) * \text{Sin} (qq4))$$

$$\text{Me.k8} = a4 * \text{Sin} (w4)$$

$$\text{Me.k9} = 0$$

$$\text{Me.k10} = \text{Sin}(\text{qq4})$$

$$\text{Me.k11} = \text{Cos}(\text{qq4})$$

$$\text{Me.k12} = \text{Me.d4}$$

$$\text{Me.k13} = 0$$

$$\text{Me.k14} = 0$$

$$\text{Me.k15} = 0$$

$$\text{Me.k16} = 1$$

$$\text{bbb} = \text{Cos}(\text{w4})$$

$$\text{rr} = (\text{Cos}(\text{w2}) * \text{Cos}(\text{w3})) - (\text{Sin}(\text{w2}) * \text{Sin}(\text{w3}))$$

$$\text{rr2} = ((\text{Sin}(\text{w2}) * \text{Cos}(\text{w3}))) + (\text{Cos}(\text{w2}) * \text{Sin}(\text{w3}))$$

$$\text{f1} = (\text{Cos}(\text{w1}) * ((\text{rr}) * \text{Cos}(\text{w4})) - ((\text{rr2}) * \text{Sin}(\text{w4}))))$$

$$\text{f2} = -\text{Cos}(\text{w1}) * ((\text{rr} * \text{Sin}(\text{w4})) + (\text{rr2} * \text{Cos}(\text{w4})))$$

$$\text{f3} = \text{Sin}(\text{w1})$$

$$\text{v1} = \text{rr} * \text{a4} * \text{Cos}(\text{w4})$$

$$\text{v2} = \text{rr2} * \text{a4} * \text{Sin}(\text{w4})$$

$$\text{v3} = \text{a3} * \text{rr}$$

$$\text{v4} = \text{a2} * \text{Cos}(\text{w2})$$

$$\text{f4} = \text{Cos}(\text{w1}) * (\text{v1} - \text{v2} + \text{v3} + \text{v4})$$

$$\text{f5} = \text{Sin}(\text{w1}) * ((\text{rr} * \text{Cos}(\text{w4})) - (\text{rr2} * \text{Sin}(\text{w4})))$$

$$\text{f6} = -(\text{Sin}(\text{w1}) * ((\text{rr} * \text{Sin}(\text{w4})) - (\text{rr2} * \text{Cos}(\text{w4}))))$$

$$\text{f7} = -\text{Cos}(\text{w1})$$

$$\text{f8} = \text{Sin}(\text{w1}) * ((\text{rr} * \text{a4} * \text{Cos}(\text{w4})) - (\text{rr2} * \text{a4} * \text{Sin}(\text{w4})) + ((\text{a3} * \text{rr}) + (\text{a2} * \text{Cos}(\text{w2}))))$$

$$\text{f9} = (\text{rr2} * \text{Cos}(\text{w4})) + (\text{rr} * \text{Sin}(\text{w4}))$$

$$f_{10} = -(r_2 * \sin(w_4)) + (r * \cos(w_4))$$

$$f_{11} = 0$$

$$u_1 = r_2 * \cos(w_4)$$

$$u_2 = r * \sin(w_4)$$

$$u_3 = a_3 * r_2$$

$$u_4 = a_2 * \sin(w_2)$$

$$f_{12} = a_4 * (u_1 + u_2) + u_3 + u_4 + d_1$$

$$f_{13} = 0$$

$$f_{14} = 0$$

$$f_{15} = 0$$

$$f_{16} = 1$$

Exit_OK_Click: