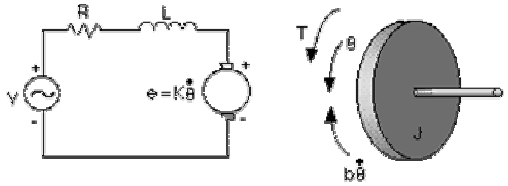
Lift Desain

Motor Model

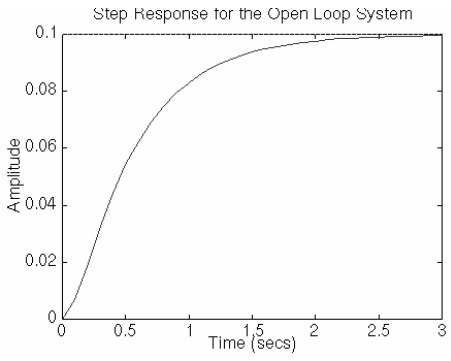
$$\tau = K_t i \qquad J_m\ddot{\theta} + b\dot{\theta} = K_t i$$

$$e = K_e\dot{\theta} \qquad L\frac{di}{dt} + Ri = V - K_e\dot{\theta}$$



$$s(J_m s + b)\theta(s) = K_t I(s)$$

$$(Ls + R)I(s) = V(s) - K_e\theta(s)$$



$$\frac{\dot{\theta}(s)}{V(s)} = \frac{\Omega(s)}{V(s)} = \frac{K_t}{(J_m s + b)(Ls + R) + K_t K_e}$$

Model Simple (asumsi) $\longrightarrow \quad \dfrac{a}{s+a}$, $a = 2$

Motor Discrete Model

$T = 0.01$

dengan SCILAB

```
s = poly(0,'s');
Sys = syslin('c',[2/(s + 2)])
dsys = ss2tf(dscr(tf2ss(Sys),0.01))
```

$$\frac{\Omega(z)}{V(z)} = \frac{0.0198}{z - 0.9802}$$

$360° = 2\pi r \qquad , r = 0.01m(misal)$

$$x = \frac{2\pi r}{360°}\theta$$

$$\dot{x} = \frac{2\pi r}{360°}\dot{\theta}$$

Misal dari putaran di konversi ke translasi

$$1volt \rightarrow 1\ derajat/s$$
$$\rightarrow 0.0001745\ m/s$$
$$\rightarrow 0.01745cm/s$$

$$\frac{\dot{X}(z)}{V(z)} = 0.0001745\frac{0.0198}{z - 0.9802}$$
$$= \frac{3.4551 \cdot 10^{-6}}{z - 0.9802}$$

$$\dot{x}(k+1) = 0.9802\dot{x}(k) + 3.4551 \cdot 10^{-6} v(k)$$

$$x = \frac{1}{s}\dot{x}$$

$$x(k+1) = x(k) + x(k) \cdot T$$

Parameter Program Lift

- Jumlah lantai : 5 (1 lantai terpisah 3 meter, pintu 1m (0.5m), 1 Voltage motor = 2piR/360 m/s)
- Variable:
  - Tempat lift berhenti :
    - lift_dilantai[1..5]
  - Button luar :
    - button_luar_up[1..5]
    - button_luar_down[1..5]
  - Button dalam :
    - button_dalam_lantai[1..5]
    - button_dalam_pintu_buka
    - button_dalam_pintu_tutup
  - Kondisi pintu
    - terbuka
    - tertutup
    - State (1/-1) : 1→sedang membuka, -1 → sedang menutup
  - Kondisi beban
    - Beban
  - Motor (Voltage)
    - Lift
    - Pintu

Basic Program C

```
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <math.h>
#include <sys/time.h>
#define uPERIOD 10000                    // Sampling time dalam micro second
#define PERIOD ((float)uPERIOD/1000000.0)  // Sampling time dalam second

struct timeval tv0, tv, tv1, tv2;
long waktu() // dalam milisecond
{
      gettimeofday(&tv, NULL);
      return (tv.tv_sec-tv0.tv_sec)*1000 + (tv.tv_usec-tv0.tv_usec)/1000;
}

void wait() {
      int i;
      tv1.tv_usec += uPERIOD;
      if(tv1.tv_usec > 1000000) {
                tv1.tv_usec -= 1000000;
                tv1.tv_sec++;
      }
      gettimeofday(&tv2, NULL);
      i = (tv1.tv_usec - tv2.tv_usec) +
                1000000 * (tv1.tv_sec - tv2.tv_sec);
      if(i > 0) usleep(i);
}
```

```
main() {
  gettimeofday(&tv0, NULL);
  tv1=tv0;
  LOOP (t=waktu()){
    // Program
    wait()
  }
}
```

Struktur Shared Memory

```
typedef struct {
      int lift_dilantai;        // kondisi lift ada di lantai [1..5]
      int lift_state;  // (1/-1/0) : 1 --> sedang naik, -1 --> sedang turun, 0 sedang diam
      float lift_position;          // HIDDEN for use only in OpenGL
      bool button_luar_up[6];       // kondisi button UP di luar [1..5]
      bool button_luar_down[6];     // kondisi button DOWN di luar [1..5]
      bool button_dalam_lantai[6];  // kondisi button (lantai) di dalam lift
      bool button_dalam_pintu_buka;
      bool button_dalam_pintu_tutup;
      bool pintu_terbuka;
      bool pintu_tertutup;
      int pintu_state;  // (1/-1/0) : 1 --> sedang membuka, -1 --> sedang menutup, 0 sedang diam
      float pintu_position;
      float beban;
      float bebanmax;
      float motor_Lift;
      float motor_Pintu;
} lift_t;
lift_t*lift1;
lift_t*lift2;
```

```
void ShareMemInit(void) {
#ifdef __CYGWIN__
        lift1=new lift_t;
        lift2=new lift_t;
#else
        lift1=(volatile lift_t*) mbuff_alloc("lift_1",sizeof(lift_t));
        if(lift1 == NULL) {
                printf("lift 1 mbuff_alloc failed¥n");
                return;
        }
        lift2=(volatile lift_t*) mbuff_alloc("lift_2",sizeof(lift_t));
        if(lift2 == NULL) {
                printf("lift 2 mbuff_alloc failed¥n");
                return;
        }
#endif

  lift1->lift_position=4.5;
  lift1->pintu_position=0.3;

  lift2->lift_position=2.5;
  lift2->pintu_position=0.1;
}

void DestroyMem(void){
#ifdef __CYGWIN__
        delete(lift1);
        delete(lift2);
#else
        mbuff_free("lift_1",(void*)lift1);
        mbuff_free("lift_2",(void*)lift2);
#endif
}
```

Contoh Header

```
#include <math.h>
#include <stdio.h>
#include <stdlib.h>
#include <rtl_fifo.h>  // belum tentu terpakai
#include <rtl_time.h> // belum tentu terpakai
#include <rtl.h>

#ifdef __cplusplus
extern "C" {
        #define new _new
        #include <mbuff.h>
        #undef new
}
#else
        #include <mbuff.h>
#endif //Cplusplus
```