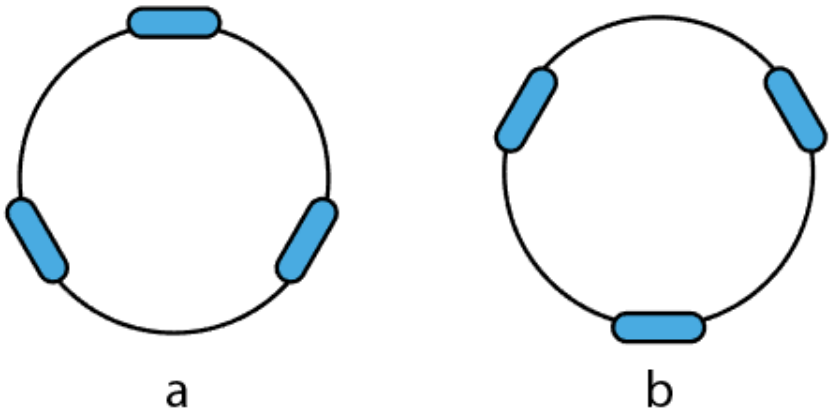
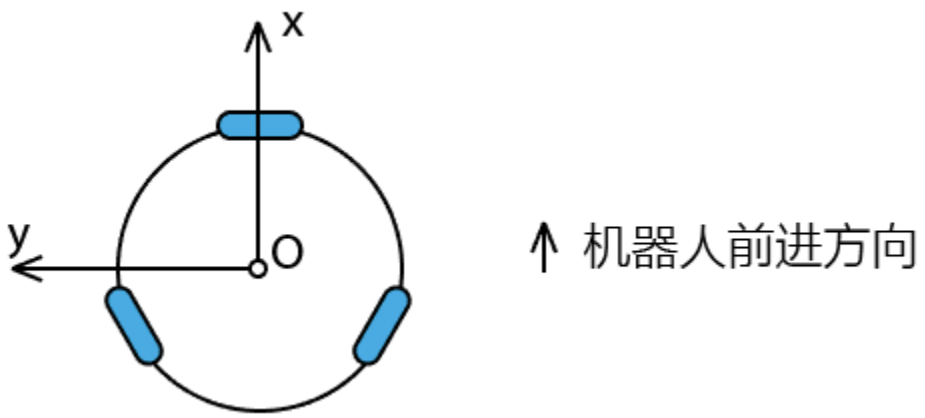
KBSW180148 Instruction for Integrating SLAMWARE Solution in Tri-omini-wheeled Base

SLAMWARE

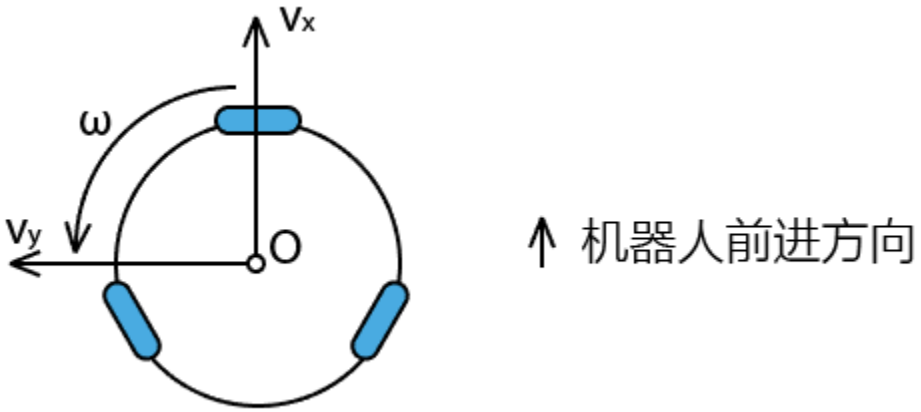
212a21b





xyO

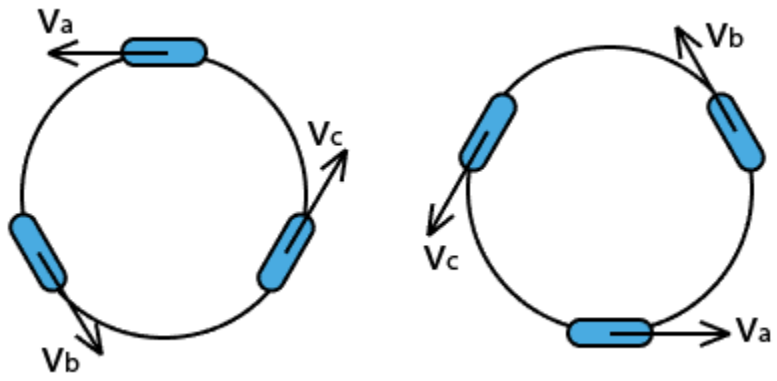
SLAMWARE Core



VxVy

VxVy

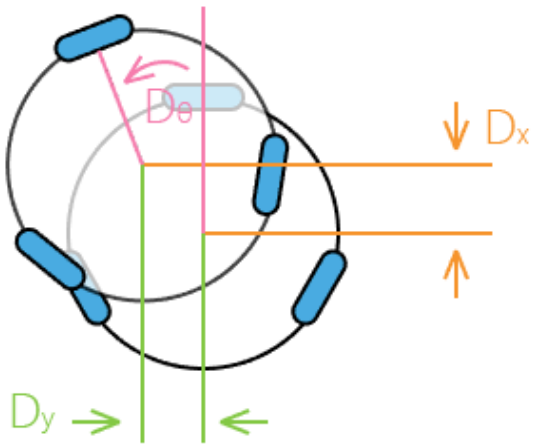
⚠



VaVbVc

SLAMWARE

DxDyD



DxDyD

LaLbLc

SLAMWARECORECB_CMD_GET_BASE_MOTOR_DATASLAMWARECORECB_CMD_SET_BASE_MOTOR

SLAMWARECORECB_CMD_SET_V_AND_GET_DEADRECKON0x41

base_set_velocity_request_t

```
typedef struct _base_set_velocity_request
{
    _s32 velocity_x_q16;
    _s32 velocity_y_q16;
    _s32 angular_velocity_q16;
} __attribute__((packed)) base_set_velocity_request_t;
```

```
base_set_velocity_request_t req;


float vx = req.velocity_x_q16 / 65536.f;
float vy = req.velocity_y_q16 / 65536.f;
float omega = req.angular_velocity_q16 / 65536.f;
```

(dx ,dymm, dtheta)

base_deadreckon_response_t

```
typedef struct _base_deadreckon_response
{
    _s32 base_dx_mm_q16;
    _s32 base_dy_mm_q16;
    _s32 base_dtheta_degree_q16;
    _u8  status_bitmap;
} __attribute__((packed)) base_deadreckon_response_t;
```

```
#ifndef PIf
#        define PIf 3.14159265f
#endif

float dx, dy, dtheta;

base_deadreckon_response_t resp;

resp.base_dx_mm_q16 = (_s32)(dx * 1000 * 65536);
resp.base_dy_mm_q16 = (_s32)(dy * 1000 * 65536);
resp.base_dtheta_degree_q16 = (_s32)(dtheta * 180 / PIf * 65536);
resp.status_bitmap = 0; // 0
```

R

SLAMWARE Core

a12

Va = Vy + R *

Vb = - Vx * cos(30°) - Vy * sin(30°) + R *

Vc = Vx * cos(30°) - Vy * sin(30°) + R *

b21

Va = - Vy + R *

Vb = Vx * cos(30°) + Vy * sin(30°) + R *

Vc = -Vx * cos(30°) + Vy * sin(30°) + R *

DaDbDc

a12

D = (Da + Db + Dc) / R / 3

Dx = (- Db * cos(30°) + Dc / cos(30°)) / 2

Dy = (- Db * sin(30°) - Dc / sin(30°) + Da) / 3

b21

D = (Da + Db + Dc) / R / 3

Dx = (Db / cos(30°) - Dc / cos(30°)) / 2

Dy = (-Da + Db / sin(30°) + Dc / sin(30°)) / 3

```
// a

#ifndef PIf
#        define PIf 3.14159265f
#endif

#define COS30f        0.86602540f
#define SIN30f  0.5f
#define R               0.18f  // robot radius: 18cm

static float wheel_odometer[3];

static void on_set_v_and_get_deadreckon(const base_set_velocity_request_t& req, base_deadreckon_response_t&
resp)
{
    // calculate response
    float current_wheel_odometer[3];
    motion_get_wheel_odometer(current_wheel_odometer);

    float da = current_wheel_odometer[0] - wheel_odometer[0];
    float db = current_wheel_odometer[1] - wheel_odometer[1];
    float dc = current_wheel_odometer[2] - wheel_odometer[2];

        memcpy(wheel_odometer, current_wheel_odometer, sizeof(current_wheel_odometer));

    float dx = (-db / COS30f + dc / COS30f) / 2
        float dy = (da - db / SIN30f - dc / SIN30f) / 3
        float dtheta = (da + db + dc) / R / 3

        resp.base_dx_mm_q16 = (_s32)(dx * 1000 * 65536);
        resp.base_dy_mm_q16 = (_s32)(dy * 1000 * 65536);
        resp.base_dtheta_degree_q16 = (_s32)(dtheta * 180 / PIf * 65536);
        resp.status_bitmap = 0; // 0

        // calculate wheel speed
        float vx = req.velocity_x_q16 / 65536.f;
        float vy = req.velocity_y_q16 / 65536.f;
        float omega = req.angular_velocity_q16 / 65536.f;

        float va = vy + R * omega;
        float vb = - vx * COS30f - vy * SIN30f + R * omega;
        float vc = vx * COS30f - vy * SIN30f + R * omega;

        motion_set_wheel_speed(va, vb, vc);
}
```