Komunikacja i sterowanie dronem za pośrednictwem MATLABa

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```
function position_callback(app, ~, message)
    % pozycja
    pos = [0 0 0];
    pos(1) = message.Pose.Pose.Position.X;
    pos(2) = message.Pose.Pose.Position.Y;
    pos(3) = message.Pose.Pose.Position.Z;
    % orientacja
    w = message.Pose.Pose.Orientation.W;
    x = message.Pose.Pose.Orientation.X;
    y = message.Pose.Pose.Orientation.Y;
    z = message.Pose.Pose.Orientation.Z;
    % roll pitch yaw
    rot = quat2eul([w x y z]);
    rot = rot(end:-1:1);

    position = [pos, rot];
    if strcmp(app.OdomPozycjaSwitch.Value, 'Faktyczna pozycja')
        app.OdomUITable.Data = position;
    end

    % sterowanie pozycyjne
    if app.reached == false
        position = position([1 2 3 6]); % x y z theta(yaw)
        diff = app.goal_position-position;
        timestamp = message.Header.Stamp;

        if app.last_msg_timestamp ~= 0
            dt = timestamp.Sec-app.last_msg_timestamp.Sec + ...
                (timestamp.Nsec-app.last_msg_timestamp.Nsec)/10e9;

            diff_P = diff;
            diff_I = app.diff_sum+diff*dt;
            diff_D = (diff-app.diff_prev)/dt;
        else
            diff_P = diff;
            diff_I = 0;
            diff_D = 0;
        end

        cmd_vel = app.Kp*diff_P + app.Ki*diff_I + app.Kd*diff_D;
        cmd_vel(cmd_vel>1) = 1;
        cmd_vel(cmd_vel<-1) = -1;
```

```
        % obrót od układu współrzędnych drona
        theta = position(4);
        rot_mat = eye(4);
        rot_mat(1, 1) = cos(theta);
        rot_mat(2, 2) = cos(theta);
        rot_mat(1, 2) = -sin(theta);
        rot_mat(2, 1) = sin(theta);
        cmd_vel = cmd_vel*rot_mat;

        set_cmd_vel(app.cmd_vel_pub, cmd_vel)

        app.diff_prev = diff_P;
        app.diff_sum = diff_I;
        app.last_msg_timestamp = timestamp;

        % pozycja docelowa osiągnięta
        if sum(diff(1:3).^2) <= 0.01 && abs(diff(4)) <= 0.1 % 10cm, 5,7deg
            % zresetuj sterowanie pozycyjne
            app.reached = true;
            app.diff_prev = [0 0 0 0];
            app.diff_sum = [0 0 0 0];
            app.last_msg_timestamp = 0;
            % zatrzymaj drona
            set_cmd_vel(app.cmd_vel_pub, [0 0 0 0])
        end
    end
end
```

```
% parametry kontrolera PID
Kp = 1;
Ki = 0.01;
Kd = 0.5;
```

Dziękuję za uwagę