

# Matlab extracts RGB+D+IMU+pointCloud from the frame data of D435i



Wakaya ✓

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It took three days to finally get this function. This is very important for our current 3D measurement and modeling system.

Among them, for each small pit, I have linked to the corresponding technical blog, hoping to help my colleagues in this work.

## 1. RGB and Depth

RGB+D is the standard configuration of the D400 series, and after data analysis, there is no need for more format adjustments. The simplest.

```
%% 采集RGB影像信息
% Select depth frame
rgb_image = fs.get_color_frame();

% Get actual data and convert into a format imshow can use
% (Color data arrives as [R, G, B, R, G, B, ...] vector)
rgb_image_data = rgb_image.get_data();

imageArrayB = rgb_image_data(1:3:end);
imageArrayG = rgb_image_data(2:3:end);
imageArrayR = rgb_image_data(3:3:end);

imageMatrixB = rot90(flip(reshape(imageArrayB, [rgb_image.get_width(), rgb_image.get_h
imageMatrixG = rot90(flip(reshape(imageArrayG, [rgb_image.get_width(), rgb_image.get_h
imageMatrixR = rot90(flip(reshape(imageArrayR, [rgb_image.get_width(), rgb_image.get_h
```

## 2. Point cloud data

The output of point cloud data requires Depth information.

```
%% 点云数据
% link: https://github.com/IntelRealSense/librealsense/blob/development/wrappers/mat
% Produce with depth data
% Produce pointcloud

if (depth.logical() && color.logical())
% pointcloud.map_to(color);
points = pointcloud.calculate(depth);

% 存储至.ply格式
points.export_to_ply(strcat(folder_project, num2str(ID_Station), '点云数据', num2str(Floc
```

## 3. IMU data

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The export of IMU data is the most difficult.



First of all, IMU data needs to be collected continuously, while RGB+D are collected in frames.

```
%% 采集IMU数据
% link: https://www.programmersought.com/article/23264058748/
% link: https://github.com/IntelRealSense/librealsense/issues/5628
% first_or_default 函数:
imu_accel = fs.first_or_default( RS2_STREAM_ACCEL );
imu_accel_data = imu_accel.get_motion_data();
imu_gyro = fs.first_or_default( RS2_STREAM_GYRO );
imu_gyro_data = imu_gyro.get_motion_data();
```

知乎 @若谷

In any case, the problem was finally solved. Hope this function is useful to everyone.

```
function Get_Capture_Depth_RGB_IMU( Time_Prep, folder_project, ID_Station )
%% 功能: 在Get_Capture_Depth_RGB_IMU的基础上, 升级
% 在Time_Prep秒之后, 连续采集IMU数据, 但RGB和Depth数据, 每隔0.1s采集一帧.
% steps:
% 架设安装设备, 开机, 等待启动自动化过程;
% 电脑端, 启动数据采集程序, 跳过前面Time_Prep秒;
% 电动云台, 按下启动转动按钮;
% 电脑端程序, 在Time_Prep秒之后, 开始采集数据, 包括: 连续的IMU数据, 和10Hz的 RGBD影像数据;
%
% Input: Time_Prep(前期跳过的秒数)、 folder_project (当前观测点的文件夹路径)、 ID_Station(
% Output: 输出RGB、 Depth、 IMU, 存进文件夹
% example:
% {有效连接设备后} Get_Capture_Depth_RGB_IMU( 4, './project2\', 2 )
%   folder_project = './lmars_gen/';
%
% Author: ruogu7, 380545156@qq.com
% See also Get_Capture_Depth_RGB
% Copyright(c) 2019-2021, by ruogu7, ALL rights reserved.
% China Nanhu Academy of CETC, JiaXing, P.R.China
% 30/06/2021, 14/03/2019

%% Make Pipeline object to manage streaming
pipe = realsense.pipeline();

% Make Colorizer object to prettify depth output
colorizer = realsense.colorizer();

% 获取点云数据的方法
pointcloud = realsense.pointcloud();

% Start streaming on an arbitrary camera with default settings
profile = pipe.start();

% Get streaming device's name
dev = profile.get_device();
name = dev.get_info(realsense.camera_info.name);

% Get frames. We discard the first couple to allow
% the camera time to settle
for i_delay = 1:Time_Prep*30 % Time_Prep
    fs = pipe.wait_for_frames();
```

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```

% Now to start to get the rgb + D + IMS
tic
for i = 1:13*30
    fs = pipe.wait_for_frames();

    %% 采集IMU数据
    % link: https://www.programmersought.com/article/23264058748/
    % link: https://github.com/IntelRealSense/LibrealSense/issues/5628
    % first_or_default 函数:
    imu_accel = fs.first_or_default( RS2_STREAM_ACCEL );
    imu_accel_data = imu_accel.get_motion_data();
    imu_gyro = fs.first_or_default( RS2_STREAM_GYRO );
    imu_gyro_data = imu_gyro.get_motion_data();

    % imu_accel = frameset[0].as_motion_frame().get_motion_data()
    % imu_gyro = frameset[1].as_motion_frame().get_motion_data()

    Accel_AngularVelocity_matrix(i,1) = imu_accel_data.X; % 3 * 1 (x,y,z)
    Accel_AngularVelocity_matrix(i,2) = imu_accel_data.Y; % 3 * 1 (x,y,z)
    Accel_AngularVelocity_matrix(i,3) = imu_accel_data.Z; % 3 * 1 (x,y,z)

    Gyro_imu_AngularVelocity_matrix(i,1) = imu_gyro_data.X; % 3 * 1 (x,y,z)
    Gyro_imu_AngularVelocity_matrix(i,2) = imu_gyro_data.Y; % 3 * 1 (x,y,z)
    Gyro_imu_AngularVelocity_matrix(i,3) = imu_gyro_data.Z; % 3 * 1 (x,y,z)

    % IMU硬件的标定工作

    % 每0.1+0.1/2秒, 采集一帧: RGB、Depth、PointCloud, 以及状态属性
    if ~mod(i, 30)
        % 打印日志
        i

        %% 采集深度信息
        % Select depth frame
        depth = fs.get_depth_frame();

        % Colorize depth frame
        color = colorizer.colorize(depth);

        % Get actual data and convert into a format imshow can use
        % (Color data arrives as [R, G, B, R, G, B, ...] vector)
        data = color.get_data();
        depth_img = permute(reshape(data', [3,color.get_width(),color.get_height()]),[3

        % save depth image
        % folder_project = './Lmars_gen/';
        % ID_Station = 2;
        imwrite(depth_img, strcat(folder_project, num2str(ID_Station), '_ ', num2str(flo

        % Display image
        subplot(1,2,1)
        imshow(depth_img);
        title(sprintf("Colorized depth frame from %s", name));

```



```

%% 采集RGB影像信息
% Select depth frame
rgb_image = fs.get_color_frame();

% Get actual data and convert into a format imshow can use
% (Color data arrives as [R, G, B, R, G, B, ...] vector)
rgb_image_data = rgb_image.get_data();

imageArrayB = rgb_image_data(1:3:end);
imageArrayG = rgb_image_data(2:3:end);
imageArrayR = rgb_image_data(3:3:end);

imageMatrixB = rot90(flip(reshape(imageArrayB,[rgb_image.get_width(), rgb_imag
imageMatrixG = rot90(flip(reshape(imageArrayG,[rgb_image.get_width(), rgb_imag
imageMatrixR = rot90(flip(reshape(imageArrayR,[rgb_image.get_width(), rgb_imag

% D435i中RGB影像的编码方式是rgb8
% 之前, 我的错误在于, 图像的三位矩阵中, 以R、G、B的顺序。正确的顺序是B、G、R
imageMatrix = uint8(zeros(rgb_image.get_height(), rgb_image.get_width(), 3));
imageMatrix(:, :, 1) = imageMatrixB;
imageMatrix(:, :, 2) = imageMatrixG;
imageMatrix(:, :, 3) = imageMatrixR;

% save rgb image
imwrite(imageMatrix, strcat(folder_project, num2str(ID_Station), '_ ', num2str(fl

% Display image
subplot(1,2,2)
imshow(imageMatrix);
title(sprintf("RGB Image frame from %s", name));

%% 点云数据
% Link: https://github.com/IntelRealSense/LibrealSense/blob/development/wrappe
% Produce with depth data
% Produce pointCloud

if (depth.logical() && color.logical())
    % pointCloud.map_to(color);
    points = pointCloud.calculate(depth);

    % 存储至.ply格式
    points.export_to_ply(strcat(folder_project, num2str(ID_Station), '_ ', num2s

    % Adjust frame CS to matlab CS
    vertices = points.get_vertices();
    size(vertices)
    X = vertices(:,1,1);
    Y = vertices(:,2,1);
    Z = vertices(:,3,1);

    plot3(X,Z,-Y, '.');
    grid on
    hold off;
    view([45 30]);

```

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```

ylim([0.3 1])
zlim([-0.5 0.5])

xlabel('X');
ylabel('Z');
zlabel('Y');
end

%% 装备的属性信息: D435i的原点、相机内参、
% Link:

toc

% 暂停0.1s
pause(0.1);
end

end
toc

% Stop streaming
pipe.stop();

end

```



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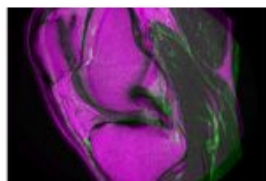
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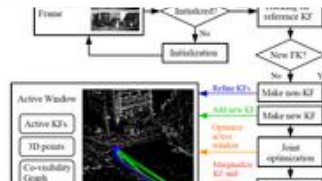


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Sorting out: Tom Hardy Source: 3D Vision Workshop Note 1: At the end of the article, there is a [posture estimation] communication group joining method~ Note 2: Computer...  
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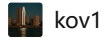
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kov1

2021-11-10

What should I do if RS2\_STREAM\_ACCEL is not defined?

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