Cool IEEE template for homework 2!

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***Abstract*—The abstract goes here.**

I. Introduction

We follow the geometry from this picture:

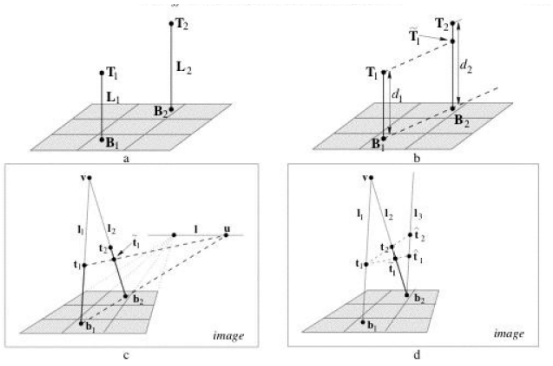

Fig. 8.20. **Computing length ratios of parallel scene lines.** *(a)* **3D geometry:** *The vertical line segments* $L_1 = B_1, T_1$ *and* $L_2 = B_2, T_2$ *have length* d_1 *and* d_2 *respectively. The base points* B_1, B_2 *are on the ground plane. We wish to compute the scene length ratio* $d_1 : d_2$ *from the imaged configuration. (b) In the scene the length of the line segment* L_1 *may be transferred to* L_2 *by constructing a line parallel to the ground plane to generate the point* T_1*. (c)* **Image geometry:** l *is the ground plane vanishing line, and* v *the vertical vanishing point. A corresponding parallel line construction in the image requires first determining the vanishing point* u *from the images* b_i *of* B_i*, and then determining* $\tilde{t}_1$ *(the image of* T_1*) by the intersection of* l_2 *and the line* t_1, u *. (d) The line* l_3 *is parallel to* l_1 *in the image. The points* $\hat{t}_1$ *and* $\hat{t}_2$ *are constructed by intersecting* l_3 *with the lines* $t_1, \tilde{t}_1$ *and* t_1, t_2 *respectively. The distance ratio* $d(b_2, \hat{t}_1) : d(b_2, \hat{t}_2)$ *is the computed estimate of* $d_1 : d_2$*.*

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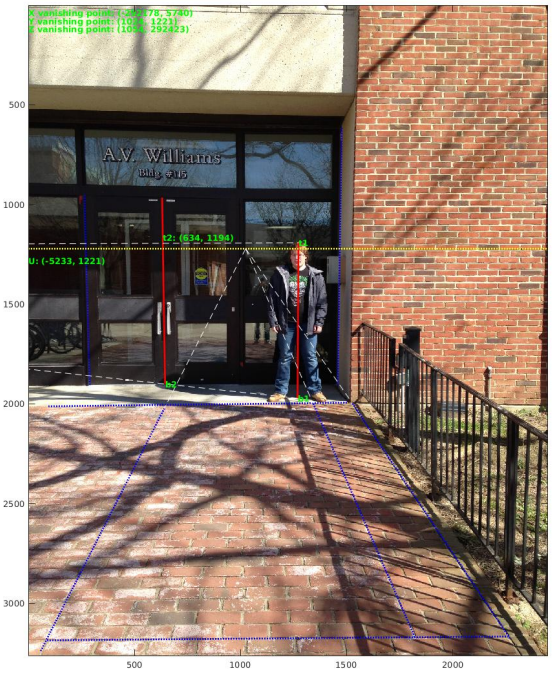
A. Door height estimation:



So in short:

Vanishing point on 'x' axis: (-292177.8, 5740.5) - concidered infinite

Vanishing point on 'z' axis: (1054.4, 292423.3) - concidered infinite

Vanishing point on 'y' axis: (1024.5, 1221.8)

Yellow line is the horizon line.

Now follow the image from intro (everything is solved geometrically, by finding intersections between lines):

u: (-5232.9744, 1221.7722)

t2: (634.4427, 1194.9221)

d1 = 705.1569

d2 = 935.1048

h1 = 1780 - my height in mm

h2 = h1*d2/d1 - the result!

So the resulting door height is (in mm):

2360 mm

B. Camera height estimation:

In pixels: 1900 - 1221 = 679 (door base - horizon).

So camera height = 679/935.1 * 2360 = 1713.7mm (which is close to truth - Chinmaya was taking a picture)