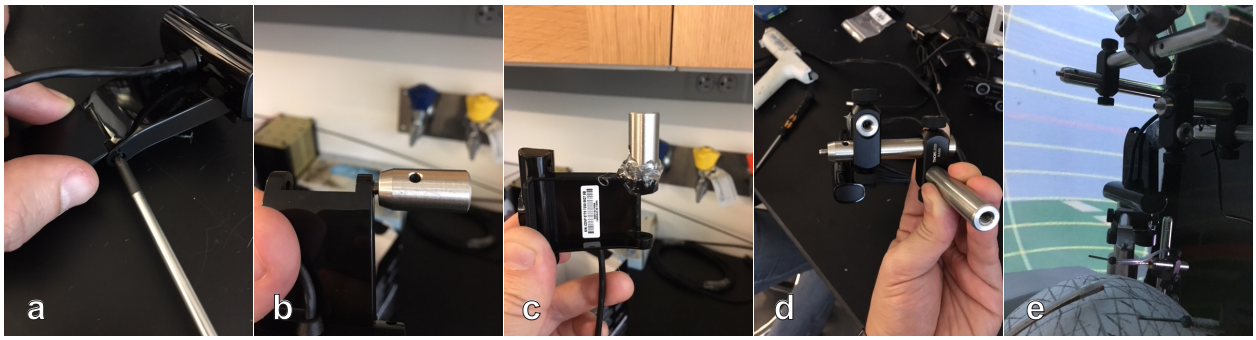
Headplate reference hardware and software

Hardware installation

1. Webcam: https://en.creative.com/p/peripherals/live-cam-sync-hd (Creative Live Cam Sync), or really anything with a small footprint. High resolution not a requirement.
2. Mounting the webcam on the rig
    a. Unscrew the plastic hinge from the webcam
    b. Attach a TR1 on the side of the webcam that will be closest to the rig door. The 8/32 set screw that comes attached to the TR1 almost fits the socket, but not quite. Just get it as stable as possible
    c. Use a glue gun to secure the TR1 to the webcam.
    d. Using two RA90's and two TR3's, build a goose-neck-like structure as shown in the picture
    e. Using another RA90, attach the structure to the post used to hold the dummy microscope (the dummy will have to be removed if it's there).
    f. Connect the webcam to the computer using a USB extension, install software as described below
    g. Position the whole structure such that the animal's head is roughly centered in the image (using the GUI while doing it, see below), adjusting angle, height and x-y position. Tighten all screws with a hex key to ensure stability. If the camera moves all headplate references will have to be redrawn



Software installation

1. Install the Matlab webcam toolbox (easiest way to get there is to type webcamlist on the command prompt. It will generate an error and give you a link for installing it)
2. RigParameters.m: add property webcam_name = 'Live! Cam Sync HD VF0770'; (or whatever is your webcam name)
3. RigParameters.m: Change the savepath to where your images will be saved
4. RigParameters.m: if oyu are using image registration (not that necessary, change relevant parameters)
5. Create folder headplateRef in savepath
6. Installing drivers is not necessarily, everything should be handled automatically by Windows and Matlab

Using the GUI

1. Opening: call ‘headplateReference’ from the command line. A snapshot of the GUI is shown below.
2. Type in the name of the animal in the edit box ‘Mouse ID’ and press return. If a headplate outline exists, it will be automatically loaded, otherwise a folder with the mouse’s name will be created under C:\Data\headplateRef
3. To turn cam on or off, toggle the ‘cam ON’ button. Image should refresh at ~20Hz. Reference headplate outline will be displayed if it exists.
4. If this is an image that will be used as a reference, press ‘grab frame’
5. To draw a headplate outline, press ‘draw plate’. A new window will pop up with the reference image acquired as in step (4). The mouse cursor will become a crosshair (in case you are familiar, this is done with the function roipoly). To draw the headplate outline, click once to create a vertex and move the mouse to extend a line, and proceed until you close the shape. This is done by double clicking the last vertex such that it overlaps with the first one. The double click will trigger saving the outline image.
6. Remember to turn the webcam off before running the training session
7. It is highly recommended that the RESET button gets pressed between every animal, otherwise the cam starts acting up.
8. Sometimes communication with the webcam fails, in which case you will get an error when initiating the GUI. Resetting/quitting one or a few times solves this.
9. The button ‘register’ should register the current image with the reference using rigid transformations. As of 3/27/18, however, it has not been debugged properly for this use. Image registration does require constant illumination from day to day. I figured this function would be overkill for training, since visual alignment with the headplate outline should suffice.
10. No special illumination beyond background projector light should be necessary.