Directory Structure:

1) **Code:** contains the code.

2) **ProjectedImages:** contains the projected images. A few sample sets of projected images are included. Each sub-directory contains one set of projected images, along with the frequency information.

   For example, sub-directory 16-05 contains projected images for a frequency-band around 16 pixels, and 5 frequencies. There are 7 images. Similarly, directory 32-15 contains projected images for a frequency-band 32 pixels, and 15 frequencies. In this case, there are 17 images in total.

   Each sub-directory also contains the frequencies (periods) for the images in the mat file freqData.mat. This mat file is important for decoding images, and will be called in the decoding code.

   Finally, the projected images will need to be **radiometrically calibrated** to account for projector's non-linear radiometric response before projection. Each sub-directory contains radiometrically corrected images for one projector (an old SANYO projector). **Note** that most likely, your projector's response will be different, and you will have to perform radiometric calibration again.

3) **Data:** contains the captured images. Example data-sets for a wax-bowl are included, corresponding to all the frequency sets in the ProjectedImages directory. Each sub-directory also contains the decoded column correspondence values in the matlab file IC.mat in Results.

Code:

1) The main script file is MicroPhaseShiftingDecodeScript.m. Call this to perform decoding.
2) All the parameters are in this file (directory locations, file naming conventions, image size, etc.).
3) The function PhaseUnwrapCosSinValsToColumnIndex has a parallel loop. It uses MATLAB parallel toolbox. You can specify the number of cores in your machine in the function. If you don't have the parallel toolbox, simply change

parfor to for, and remove the "matlabpool open 8" and "matlabpool close" commands.

4) The computed correspondence map is median-filtered to mitigate noise. medfiltParam (in the main script file) is the median filter parameters. Usual values are between [1 1] to [7 7], depending on image size, image noise levels, number of images used, and the frequencies. Use smaller values of medfiltParam for small images, low noise levels, large number of input images, and low frequencies. For example, if the image size is less than 1000x1000, 15 frequencies (17 images are used), and the average frequency is 64 pixels, use medFiltParam = [1 1]. On the other hand, if 5 frequencies (7 images) are used, and the average frequency is 16 pixels, use medFiltParam = [9 9].

File Naming Convention:

1) The code assumes that the captured images are numbered starting from 1 to N, where N is the total number of images. It is assumed that each captured image has the same prefix, same suffix, and the same length of index.

   For example, following are valid name sequences:

   Frame1.tiff, Frame2.tiff,…

   Image001.bmp, Image002.bmp,…

   Following are not valid:

   Frame04.tiff, Frame05.tiff, Frame06.tiff,…

   Frame1.tiff, Frame02.tiff, Frame03.tiff,…

   Frame1.tiff, Image2.tiff,…

What and How Many Frequencies to use?:

1) If the scene has very high-frequency interreflections, use higher-frequencies (16 pixels) and more frequencies (8-15).

2) If the scene has defocus/ subsurface scattering and no/weak interreflections, use lower frequencies (32-64 pixels). In this case, a small number of frequencies may be sufficient (5-8).