The code in this library produces results like those in [1]. Note that results may vary depending on the random number seed. Please contact Sheila Seidel (Sheila.werth@gmail.com) with questions.

Each major experiment in the paper corresponds to a different subdirectory in paperCode/Examples. Subdirectories include:

1. twoTarget – the test scenario where two white planar facets move past each other along arcs in the hidden scene
2. facetAngularSweep – the test scenario where a single white planar facet is fixed in range at 1.25 m and moved in angle along an arc through the hidden scene. Here we also test the effect of frame length on the reconstruction quality.
3. facetRangeSweep – the test scenario where a single white planar facet is fixed in angle at pi/2 and swept in range from 0.5 m to 1.75 cm
4. foregroundInterference – the test scenario where a single white planar facet is swept in range past a large, bright object in the foreground.
5. modelMismatch – the test scenario where we evaluate different types of hidden target. Here we test a white facet, a gray facet, a mannequin, and a non-rectangular stair-shaped facet. All targets are fixed in position at pi/2 in angle and a range of 1.25m from the occluding edge.
6. Ambient light – the test scenario where we test high levels of ambient light by turning on the laboratory light. The object is fixed at pi/2 in angle and at a range of 1.25m from the occluding edge.

The scripts in paperCode/Examples call functions in other major directories. These directories are:

- cornerCamera – code to implement the passive corner camera in [2]
- forwardModel – code to implement the fast forward model computation described in [1]
- MCMC – code to estimate unknown hidden facet parameters using Markov chain Monte Carlo techniques
- objectProposal – In each iteration of our MCMC parameter estimation routine, we propose different object parameters. The code in objectProposal creates an object structure, given a set of proposed parameters.
- utilities – this directory contains miscellaneous utilities, including plotting tools and other useful functions.

[1] S. W. Seidel, H. Rueda-Chacon, I. Cusini, F. Villa, F. Zappa, C. Yu, and V. K. Goyal, “Non-line-of-sight tracking and mapping with an active corner camera,” arXiv:2208.01702[cs.CV], Aug. 2022.
[2] S. W. Seidel, Y. Ma, J. Murray-Bruce, C. Saunders, W. T. Freeman, C. Yu, and C. K Goyal, “Corner occluder computational periscopy: Estimating a hidden scene from a single photograph,” in *Proc. IEEE Int. Conf. Computational Photography (ICCP)*, May 2019.

How to run an example:

The main script in each subdirectory of paperCode/Examples is names inversionAlgorithm_<*example name*>.m.

Change codepath and dirpath to match your local directory.

nsec is the length of each frame in units of *acquisition time*, defined in [1]. In the facetAngularSweep example, data to test three different frame lengths is provided: 10 seconds, 30 seconds, and 60 seconds. Change nsec to switch between these different test cases.

Although parameters are largely the same for all examples, copies of the scripts setupExperimentalParams.m, passiveCornerCameraParameters.m, foregroundEstimationParameters.m, and backgroundEstimationParameters.m are in each subdirectory of paperCode/Examples so that parameters can be tweaked separately for each example.

Interim result plots are saved in directories named Figures_nsecXX_bgYY, where XX is the value of nsec and YY is the value of numBackgroundInt. NumBackgroundInt is the number of 2 min long stationary scene measurements used together to estimate the stationary scene rates.

Resulting estimates are saved in directories named Results_nsecXX_bgYY, where XX and YY are defined above. Results from the p*th* test frame are saved in a file named Facet_pos<p>.mat. Located in this same directory, the script plotSequence_wall_paper.m can be run to load the saved results and produce results plots. Those results plots are saved to the same directory.

The following table explains different variables defined in the code. Whether or not these variables are tuning parameters is discussed in the table.

Variable name	**Explanation**	**Tuning parameter?**
nshift	Number of time bins required to shift the measured histograms so that the first bounce is at time zero. This is required to match our forward model.	Determined easily from data.
Parameter initialization		
thresh_mult_time	This is the multiplicative factor used to determine the threshold that is applied to spatially averaged measurement frame. Used to determine which time bins to sum together into a passive measurement.	Not changed.
window_grow	The number of time bins to add to either side of the interval of threshold crossings in the spatially averaged measurement frame. Used to determine which time bins to sum together into a passive measurement.	Not changed.
scene_recon_dim	The number of angular bins in the passive corner camera's 1D reconstruction.	Not changed.
hidden_scene_height	An assumed height in meters of the hidden scene used to produce the passive corner camera forward model	Not changed.
lam2	regularization parameter for the passive corner camera. Larger values lead to more sparsity of the estimated scene in the db4 wavelet basis	May be tuned for different datasets

nds	In creating our passive corner camera forward model, rather than describe each camera pixel as a point, we describe it as nds^2 smaller sub-pixels.	Not changed.
stepsize	The stepsize used for the iterative passive corner camera algorithm.	Not changed.
nIter		Not changed.
threshMult	This is the multiplicative factor used to determine the threshold that is applied to the 1D scene estimate passive corner camera output.	May be tuned for different datasets.
angle_window	The amount, in radians, to add to each side of an objects angular extent. Angular extent is determined by threshold crossings in the 1D passive corner camera output.	Not changed.
minSeparation	Threshold crossings that are not separated by more than minSeparation angular bins are merged together into a single object.	Not changed.
anglePad	Because of artifacts that typically occur at the edges of our passive corner camera reconstructions, we do not look for threshold crossings that are within anglePad [radians] of the reconstruction edges at 0 and pi.	Not changed.
Foreground parameter estimation		
rmin, rmax	Min and max allowable values for object range.	May be tuned to reflect reasonable experiment specific bounds.
amin, amax	Min and max allowable values for object albedo.	
hmin, hmax	Min and max allowable values for object height.	
std_mult	A scaling factor used to keep the proposal acceptance rate in the desired range. Every 100 iterations, we multiply our proposal standard deviation by std_mult (to decrease proposal variance) if the acceptance rate is too low or we multiply by	Not changed.

	1/std_mult if the acceptance rate is too high.	
Background parameter estimation		
abmin, abmax	Min and max allowable values for occluded region albedo.	May be tuned to reflect reasonable experiment specific bounds.
rbmin, rbmax	Min and max allowable values for occluded region range.	