



PhotonVisionLib

LabVIEW

Reference

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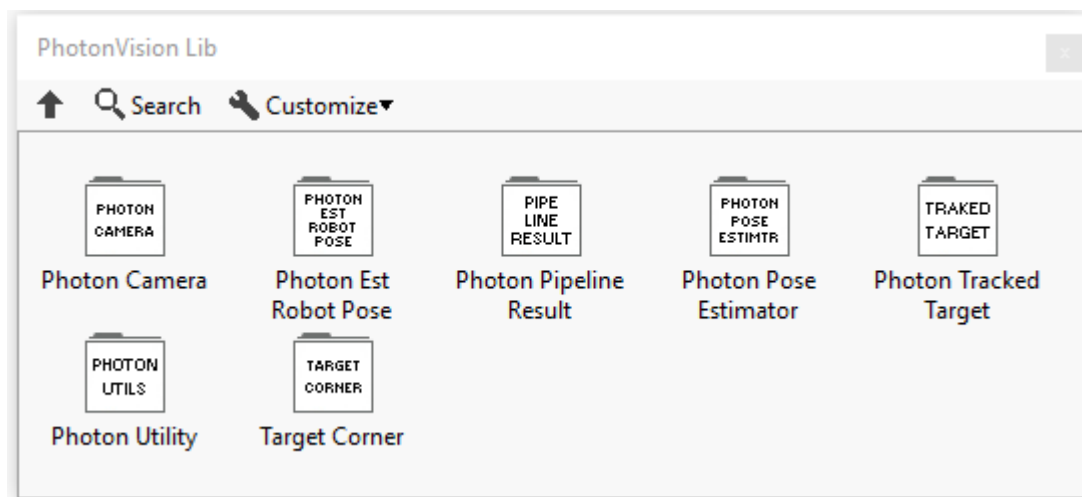
Introduction

The PhotonVision LabVIEW library provides utility functions to read, decode, and interpret data sent from PhotonVision application.

The library source code, package build specifications, and test package can be found here <https://github.com/jsimpso81/PhotonVisionLabVIEW>

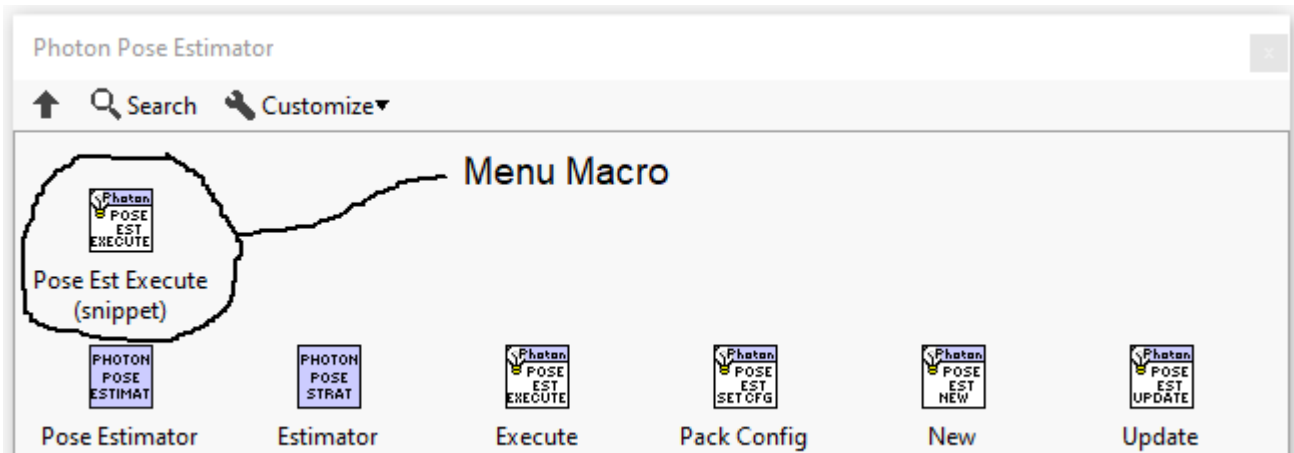
Function Menus

A PhotonVision function palette contains the PhotonVision functions and type definitions. This palette can be accessed from the WPI Robotics Library Third Party palette.



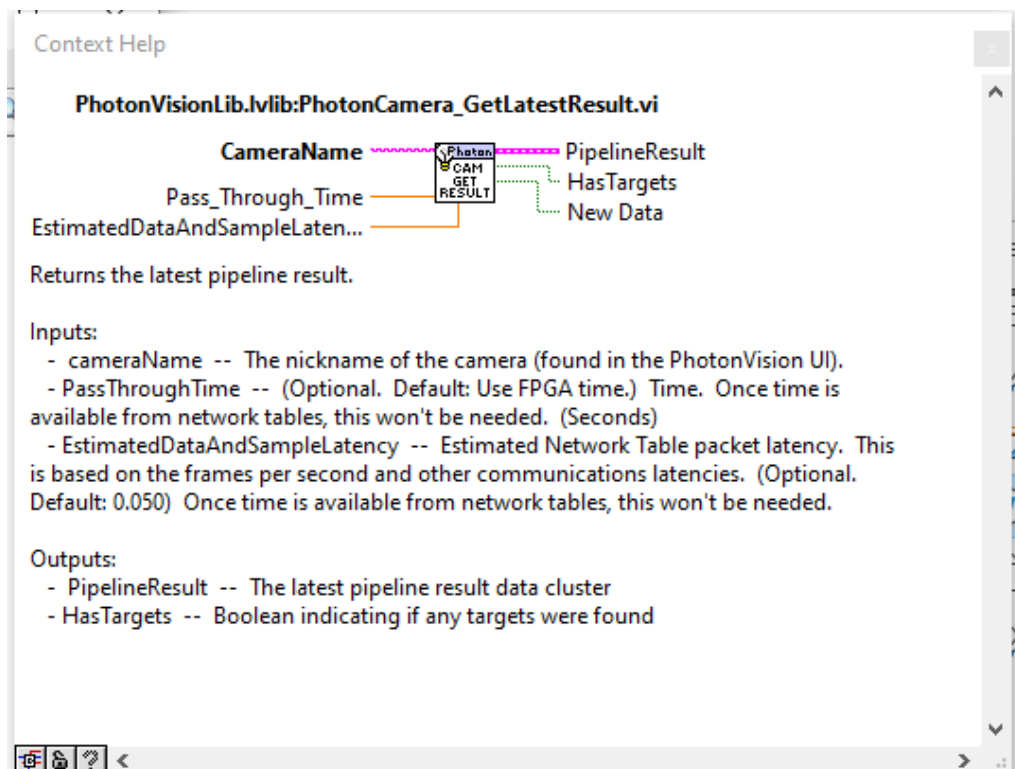
Menu Macros

Some of the menu items place “snippets” of code into a VI. These “macros” can greatly speed up development by placing large sections of mostly completed code in a VI. Usually macros have a different color menu palette icon and may contain “(snippet)” in the description.



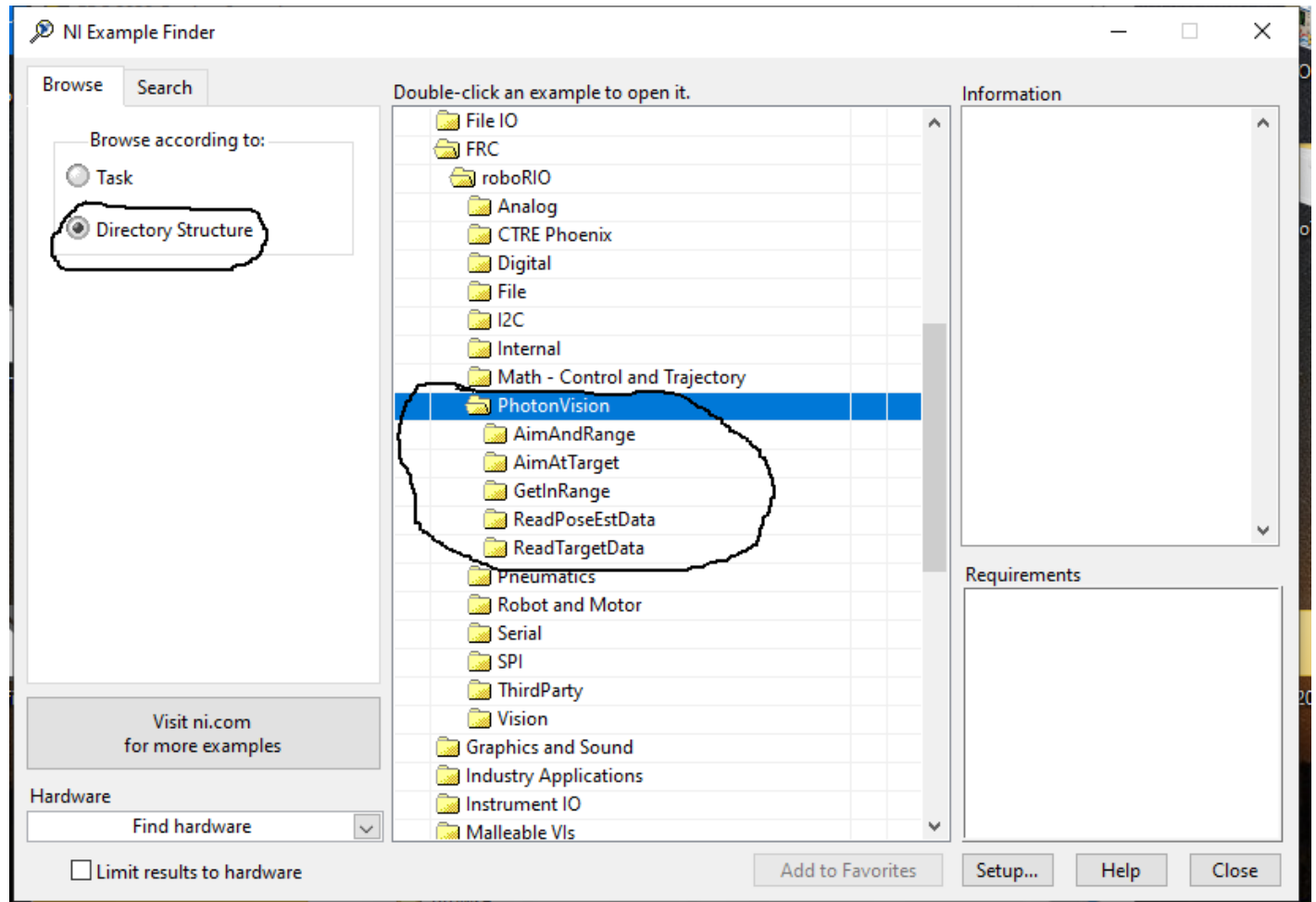
Function Help

Each VI includes help that can be accessed using the standard LabVIEW help toggle (Ctrl H).



Function Examples

Many of the functions have examples that can be found under the LabVIEW "Find examples..." function. (Help -> Find Examples...). The function examples are easiest to find when "Directory Structure" is selected.



Function Groups

Packet

Packet_decode_Boolean



Decode (or strip out) a boolean an array of bytes. No conversion or decoding is actually done, the memory is just copied, and the value is cast to the correct type. A TRUE boolean is stroed as an integer value = 1.

Inputs

- RawData -- Array of bytes containing the data to be extracted.
- StartByte -- The starting byte number (the first byte starts at 0)

Outputs

- Boolean_Value -- Boolean value.
- NextByte -- The starting byte index for the next value (regardless of type).

Packet_decode_ByteI8



Decode (or strip out) an unsigned byte from an array of bytes. No conversion or decoding is actually done, the memory is just copied, and the value is cast to the correct type.

Inputs

- RawData -- Array of bytes containing the data to be extracted.
- StartByte -- The starting byte number (the first byte starts at 0)

Outputs

- Int8_Value -- Byte in the form of an INT 8 value.
- NextByte -- The starting byte index for the next value (regardless of type).

Packet_decode_Flt64



Decode (or strip out) a double precision floating point value FLT 64. No conversion or decoding is actually done, the memory is just copied, and the value is cast to the correct type.

Inputs

- RawData -- Array of bytes containing the data to be extracted.
- StartByte -- The starting byte number (the first byte starts at 0)

Outputs

- FLT64_Value -- Extracted float 64 (double) value.
- NextByte -- The starting byte index for the next value (regardless of type).

Packet_decode_Int16



Decode (or strip out) a 16 bit integer value from the provided byte array. No conversion or decoding is actually done, the memory is just copied, and the value is cast to the correct type.

Inputs

- RawData -- Array of bytes containing the data to be extracted.
- StartByte -- The starting byte number (the first byte starts at 0)

Outputs

- INT16_Value -- Extracted 16 bit integer value.
- NextByte -- The starting byte index for the next value (regardless of type).

Packet_decode_Int32



Decode (or strip out) a 32 bit integer value from the provided byte array. No conversion or decoding is actually done, the memory is just copied, and the value is cast to the correct type.

Inputs

- RawData -- Array of bytes containing the data to be extracted.
- StartByte -- The starting byte number (the first byte starts at 0)

Outputs

- INT32_Value -- Extracted 32 bit integer value.
- NextByte -- The starting byte index for the next value (regardless of type).

Packet_decode_Transform3d



Decode (or strip out) a Transform3d value from the provided byte array. No conversion or decoding is actually done, the memory is just copied, and the value is cast to the correct type.

Inputs

- RawData -- Array of bytes containing the data to be extracted.
- StartByte -- The starting byte number (the first byte starts at 0)

Outputs

- Transform3d -- Extracted Transform3d cluster.
- NextByte -- The starting byte index for the next value (regardless of type).

Packet_encode_Boolean



Encode (or append) a boolean to the end of an array of bytes. The boolean is stored as an unsigned integer byte, where TRUE = 1, FALSE = 0.

Inputs

- RawData In -- Array of bytes to be appended to..
- Boolean_Value -- Boolean value.

Outputs

- RawData Out -- Array of bytes containing the appended value.
-

Packet_encode_ByteI8



Encode (or append) an unsigned byte at the end of an array of bytes. No conversion is actually done, the memory is just copied to the end of the array.

Inputs

- RawData In -- Array of bytes to be appended to..
- Int8_Value -- Byte in the form of an INT 8 value.

Outputs

- RawData Out -- Array of bytes containing the appended value.
-

Packet_encode_FLT64



Encode (or append) a double floating point value (FLT 64) at the end of an array of bytes. No conversion is actually done, the memory is just copied to the end of the array.

Inputs

- RawData In -- Array of bytes to be appended to..
- FLT64_Value -- Double floating point value.

Outputs

- RawData Out -- Array of bytes containing the appended value.

Packet_encode_Int16



Encode (or append) a 16 bit integer at the end of an array of bytes. No conversion is actually done, the memory is just copied to the end of the array.

Inputs

- RawData In -- Array of bytes to be appended to..
- Int16_Value -- 16 bit integer the form of an INT 16 value.

Outputs

- RawData Out -- Array of bytes containing the appended value.

Packet_encode_Int32



Encode (or append) a 32 bit integer at the end of an array of bytes. No conversion is actually done, the memory is just copied to the end of the array.

Inputs

- RawData In -- Array of bytes to be appended to..
- In32_Value -- 32 bit integer the form of an INT 32 value.

Outputs

- RawData Out -- Array of bytes containing the appended value.

Packet_encode_Transform3d



Encode (or append) a double floating point value (FLT 64) at the end of an array of bytes. No conversion is actually done, the memory is just copied to the end of the array.

Inputs

- RawData In -- Array of bytes to be appended to..
- FLT64_Value -- Double floating point value.

Outputs

- RawData Out -- Array of bytes containing the appended value.

PhotonCamera

PhotonCamera_GetCameraMatrix



Returns the camera matrix

Inputs:

- cameraName -- The nickname of the camera (found in the PhotonVision UI).

Outputs:

- CameraMatrix - matrix - 3 x 3 matrix of camera intrinsics. If empty, nothing was returned or nothing exists.

PhotonCamera_GetDistCoeffs



Returns the distortion coefficients

Inputs:

- cameraName -- The nickname of the camera (found in the PhotonVision UI).

Outputs:

- DistCoeffs - matrix - 5 x 1 matrix of distortion coefficients. If empty, nothing was returned or nothing exists.

PhotonCamera_GetDriverMode



Returns whether the camera is in driver mode.

Inputs:

- CameraName -- The nickname of the camera (found in the PhotonVision UI).

Outputs:

- DriverMode -- Boolean indicating whether the camera is in driver mode.

PhotonCamera_GetLEDMode



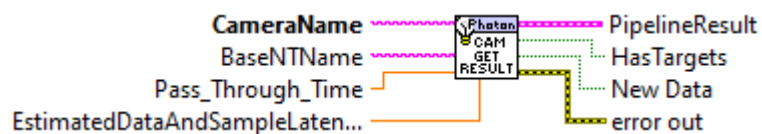
Returns the current LED mode.

Inputs:

Outputs:

- LedMode -- The current LED mode.

PhotonCamera_GetLatestResult



Returns the latest pipeline result.

Inputs:

- cameraName -- The nickname of the camera (found in the PhotonVision UI).
- PassThroughTime -- (Optional. Default: Use FPGA time.) Time. Once time is available from network tables, this won't be needed. (Seconds)
- EstimatedDataAndSampleLatency -- Estimated Network Table packet latency. This is based on the frames per second and other communications latencies. (Optional. Default: 0.050) Once time is available from network tables, this won't be needed.

Outputs:

- PipelineResult -- The latest pipeline result data cluster
- HasTargets -- Boolean indicating if any targets were found

PhotonCamera_GetPipelineIndex

Returns the active pipeline index.

Inputs:

- cameraName -- The nickname of the camera (found in the PhotonVision UI).

Outputs:

- PipelineIndex -- Active Pipeline Index

PhotonCamera_GetVersion

Returned photonvision version string

Inputs:

- CameraName -- The nickname of the camera (found in the PhotonVision UI).

Outputs:

- Version - string - Photonvision version string

PhotonCamera_IsConnected



Determines if communications to camera is valid.

Inputs:

- CameraName -- The nickname of the camera (found in the PhotonVision UI).

Outputs:

- IsConnected -- TRUE if communications have been received within the last 0.5 seconds.

PhotonCamera_SetDriverMode



Toggles driver mode.

Inputs:

- cameraName -- The nickname of the camera (found in the PhotonVision UI).
- DriverMode -- Whether to set driver mode.

Outputs:

- >none<

PhotonCamera_SetLEDMode



Sets the LED mode.

Inputs:

- CameraName -- The nickname of the camera (found in the PhotonVision UI).
- LedMod -- The mode to set to.

Outputs:

- >none<

PhotonCamera_SetPipelineIndex



Allows the user to select the active pipeline index.



Inputs:

- cameraName -- The nickname of the camera (found in the PhotonVision UI).
- index The active pipeline index.

Outputs:

- >none<

PhotonCamera_TakeInputSnapshot

CameraName  BaseNTName 

Request the camera to save a new image file from the input camera stream with overlays. Images take up space in the filesystem of the PhotonCamera. Calling it frequently will fill up disk space and eventually cause the system to stop working. Clear out images in /opt/photonvision/photonvision_config/imgSaves frequently to prevent issues.



Inputs:

- cameraName -- The nickname of the camera (found in the PhotonVision UI).

Outputs:

- >none<
-
-

PhotonCamera_TakeOutputSnapshot

CameraName  BaseNTName 

Request the camera to save a new image file from the output stream with overlays. Images take up space in the filesystem of the PhotonCamera. Calling it frequently will fill up disk space and eventually cause the system to stop working. Clear out images in /opt/photonvision/photonvision_config/imgSaves frequently to prevent issues.

Inputs:

- CameraName -- The nickname of the camera (found in the PhotonVision UI).

Outputs:

- >none<

PhotonEstimatedRobotPose

PhotonEstimatedRobotPose_GetAll



Extracts individual data items from a Photon Estimated Robot Pose cluster.

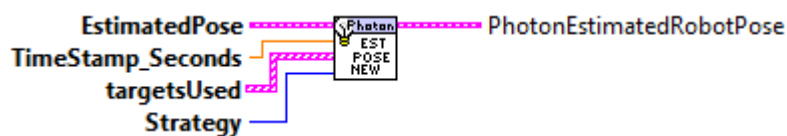
Inputs:

- PhotonEstimatedRobotPose -- PhotonEstimatedRobotPose -- Data cluster..

Outputs:

- EstimatedPose -- Pose3d -- Estimated absolute position of robot on field.
- TimeStamp -- Double -- Time stamp (seconds) of the packet from photonvision. This uses the FGPA elapsed time.

PhotonEstimatedRobotPose_New



Create a new Photon Estimated Robot Pose cluster.

Inputs:

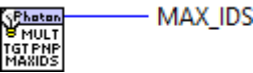
- EstimatedPose -- Pose3d -- Estimated absolute position of robot on field.
- TimeStamp -- Double -- Time stamp (seconds) of the packet from photonvision. This uses the FGPA elapsed time.

Outputs:

- PhotonEstimatedRobotPose -- Created data cluster..

PhotonMultiTargetPNPResult

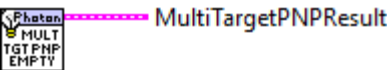
PhotonMultiTargetPNPResult_MAX_IDS



PhotonMultiTargetPNPResult_New



PhotonMultiTargetPNPResult_New_Empty



PhotonMultiTargetPNPResult_pack



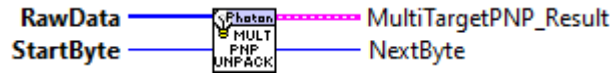
Encode a TrackedTarget cluster into an array of bytes.

Inputs:

- TrackedTarget -- TrackedTarget cluster.

Outputs:

- RawDataOut -- Byte array containing the encoded data.

PhotonMultiTargetPNPResult_unpack

Internal function to parse the data for each target returned by `PhotonCamera_GetLatestResult`.

Inputs:

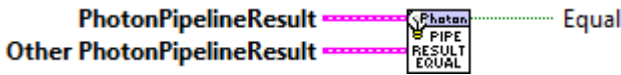
- `RawData` -- Byte array containing the data to parse.

Outputs:

- `TrackedTarget` -- Parsed `TrackedTarget` cluster.

PhotonPipelineResult

PhotonPipelineResult_Equals



Determines if two PipelineResults are equal.

Inputs:

- PipelineResult -- PipelineResult cluster.
- Other PipelineResult -- Other PipelineResult cluster.

Outputs:

- Equal -- Returns TRUE, if both pipeline results are equal..

PhotonPipelineResult_GetBestTarget



Returns the best target in this pipeline result. If there are no targets, this method will return an empty target. The best target is determined by the target sort mode in the PhotonVision UI.

Inputs:

- PipelineResult -- Parsed PipelineResult cluster.

Outputs:

- TrackedTarget -- Cluster containing the best target
-

PhotonPipelineResult_GetBestTargetById



Returns the best target in this pipeline result filtered by fiducial ID (April tag number). If there are no targets, or no targets with this fiducial ID, this method will return an empty target. IF more than 1 targets have the same fiducial ID, the best target is determined by the sort mode in the PhotonVision UI.

Inputs:

- PipelineResult -- Parsed PipelineResult cluster.
- Fiducial ID -- The April tag number being searched for.

Outputs:

- TrackedTarget -- Cluster containing the best target
- TargetFound -- TRUE if a target matching the search criteria exists.
- TargetIndex -- Index into the targets array of the best target matching the search criteria.

PhotonPipelineResult_GetLatency_Millis



Returns the latency in the pipeline.

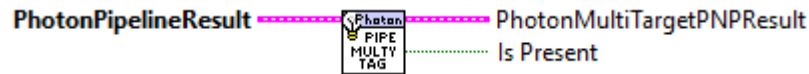
Inputs:

- PipelineResult -- Parsed PipelineResult cluster.

Outputs:

- Latency_Millis -- The latency in the pipeline.
- TimeStampSec -- Time stamp of packet (FPGA elapsed time) seconds

PhotonPipelineResult_GetMultiTagResult



Returns the best target in this pipeline result. If there are no targets, this method will return an empty target. The best target is determined by the target sort mode in the PhotonVision UI.

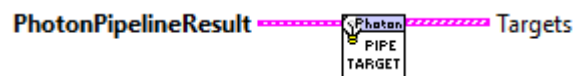
Inputs:

- PipelineResult -- Parsed PipelineResult cluster.

Outputs:

- MultiTargetPNPResult-- Cluster containing the multitarget PNP result
- IsPresent - boolean - TRUE if a MultiTarget PNP result contains a pose.

PhotonPipelineResult_GetTargets



Returns the targets in this pipeline result. If there are no targets, this method will return an empty target array.

Inputs:

- PipelineResult -- Parsed PipelineResult cluster.

Outputs:

- Targets -- Array of Target clusters.

PhotonPipelineResult_GetTimeStampSecs



Returns pipeline packet time stamp

Inputs:

- PipelineResult -- Parsed PipelineResult cluster.

Outputs:

- TimeStampSec -- Time stamp of packet (FPGA elapsed time) seconds

PhotonPipelineResult_HasTargets



Returns whether the pipeline has targets.

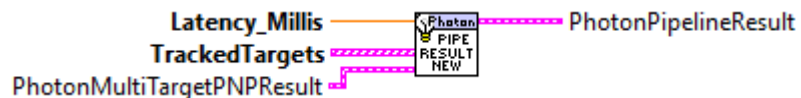
Inputs:

- PipelineResult -- Parsed PipelineResult cluster.

Outputs:

- HasTargets -- Whether the pipeline has targets.

PhotonPipelineResult_New



Create a new PhotonPipelineResult cluster.

Inputs:

- Latency_Millis -- Latency, milliseconds
- TrackedTargets -- Array of TracedTarget clusters

Outputs:

- PipelineResult -- Parsed PipelineResult cluster.

PhotonPipelineResult_Pack



Convert a PipelineResult to a Packet array of bytes ready for writing to a Network Table variable.

Inputs:

- PipelineResult -- PipelineResult cluster.

Outputs:

- Pacet_RawData -- Byte array containing the encoded PipelineResult.

PhotonPipelineResult_SetTimeStampSecs



Returns pipeline packet time stamp

Inputs:

- PipelineResult -- Parsed PipelineResult cluster.
- TimeStampSec -- Time stamp of packet (FPGA elapsed time) seconds

Outputs:

- Out PipelineResult -- Updated PipelineResult cluster.

PhotonPipelineResult_Unpack



Internal function to parse the data returned by PhotonCamera_GetLatestResult.

Inputs:

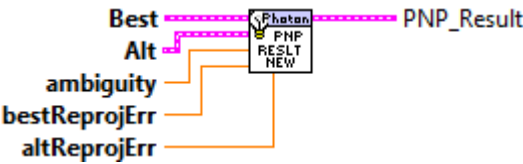
- RawData -- Byte array containing the data to parse.

Outputs:

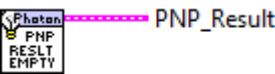
- PipelineResult -- Parsed PipelineResult cluster.

PhotonPNPResult

PhotonPNPResult_New



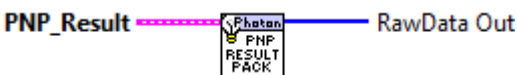
PhotonPNPResult_New_Empty



PhotonPNPResult_New_OnlyBest



PhotonPNPResult_pack



Encode a TrackedTarget cluster into an array of bytes.

Inputs:

- TrackedTarget -- TrackedTarget cluster.

Outputs:

- RawDataOut -- Byte array containing the encoded data.

PhotonPNPResult_unpackt

Internal function to parse the data for each target returned by PhotonCamera_GetLatestResult.

Inputs:

- RawData -- Byte array containing the data to parse.

Outputs:

- TrackedTarget -- Parsed TrackedTarget cluster.

PhotonPoseEstimator

PhotonPoseEstimator_CalcDifference



This is an internal function. Use Update or Update_Pipeline instead of this function.

It calculates an overall difference between two poses. Difference is defined as the vector magnitude between the two poses

PhotonPoseEstimator_Execute



Provided data from polling a camera, update the estimated position of the robot. Returns empty if there are no cameras set or no targets were found from the cameras.

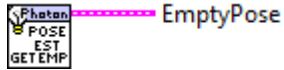
Inputs:

- PhotonPoseEstimator -- data cluster -- Data guiding how the position determination is done.
- PipelineResults -- data cluster -- Data provided from PhotonCamera_GetLatestResults.
- HasResults -- boolean - TRUE if targets have been identified in the Pipeline results. This can be provided by PhotonCamera_GetLatestResults.

Outputs:

- PhotonPoseEstimator -- data cluster -- Updated data cluster.
 - PhotonEstimatedRobotPose -- data cluster -- Estimated robot position and timestamp.
 - PosFound -- boolean -- A position has been determined.
-

PhotonPoseEstimator_GetEmptyPose



This is an internal function.

This returns an empty pose3d.

Inputs:

--

Outputs:

-- EmptyPose -- Pose3d -- Empty Pose

PhotonPoseEstimator_GetFieldTags



Get the AprilTagFieldLayout cluster from the PhotonPoseEstimator cluster.

Inputs:

-- PhotonVisionPoseEstimator -- cluster -- The estimator.

Outputs:

-- AprilTagFieldLayout -- cluster -- Contains the absolute definitions of the April tags on a field.

PhotonPoseEstimator_GetHighestAmbiguity



Get the highest allowed ambiguity from the PhotonPoseEstimator cluster.

Inputs:

-- PhotonVisionPoseEstimator -- cluster -- The estimator.

Outputs:

-- HighestAmbiguity -- double -- This is the highest allowed ambiguity for targets to be considered valid. Ambiguity describes the difference between the "best" and "alternate" targets. Lower numbers are better.

PhotonPoseEstimator_GetLastPose



Get the last pose3d calculated by the PhotonPoseEstimator.

Inputs:

-- PhotonVisionPoseEstimator -- cluster -- The estimator.

Outputs:

-- LastPose -- Pose3d -- Last robot pose calculated by the PhotonPoseEstimator

PhotonPoseEstimator_GetReferencePose



Get the reference pose from the PhotonPoseEstimator cluster.

Inputs:

-- PhotonVisionPoseEstimator -- cluster -- The estimator.

Outputs:

-- referencePose -- Pose3d -- This is the reference pose being used by the Photon Pose Estimator. Often this would be set the the current Pose calculated by the robot's odometry.

PhotonPoseEstimator_GetRobotToCameraTransform



Get the robot to camera transform from the PhotonPoseEstimator cluster.

Inputs:

-- PhotonVisionPoseEstimator -- cluster -- The estimator.

Outputs:

-- RobotToCamera -- Transform3d -- This describes the location of the camera relative to the robot.

PhotonPoseEstimator_GetStrategy



Get the current strategy being used by the PhotonPoseEstimator.

Inputs:

-- PhotonVisionPoseEstimator -- cluster -- The estimator.

Outputs:

-- PhotonPoseStrategy -- enum -- Current strategy being used by the Photon Pose Estimator

PhotonPoseEstimator_GetTagModel



Get the current tag model used by the PhotonPoseEstimator.

Inputs:

-- PhotonVisionPoseEstimator -- cluster -- The estimator.

Outputs:

-- TagModel -- cluster -- Current tag model.

PhotonPoseEstimator_InvalidatePoseCache



Invalidate Pose Cache.

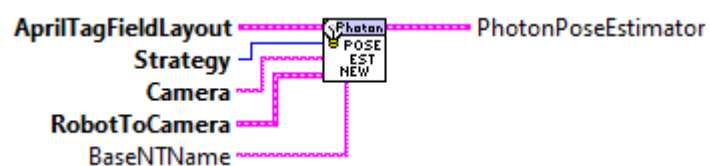
Inputs:

-- PhotonVisionPoseEstimator -- cluster -- The estimator.

Outputs:

-- PhotonVisionPoseEstimator -- cluster -- The updated estimator.

PhotonPoseEstimator_New



Create a new Photon Pose Estimator data cluster.

The PhotonPoseEstimator functions filters or combines readings from all the AprilTags visible at a given timestamp on the field to produce a single robot in field pose, using the strategy set below. Example usage can be found under the LabVIEW Find Examples..

Inputs:

-- AprilTagFieldLayout -- cluster -- A WPILib LabVIEW Math cluster defining the absolute positions of April Tags on a FIRST field. with respect to the FIRST field

-- Strategy -- Enum -- The strategy it should use to determine the best pose. Current strategies include:

LOWEST_AMBIGUITY -- Choose the Pose with the lowest ambiguity

CLOSEST_TO_CAMERA_HEIGHT -- Choose the Pose which is closest to the camera height.

CLOSEST_TO_REFERENCE_POSE -- Choose the Pose which is closest to a set Reference position.

CLOSEST_TO_LAST_POSE -- Choose the Pose which is closest to the last pose calculated

AVERAGE_BEST_TARGETS -- Weight average of acceptable targets based on ambiguity..

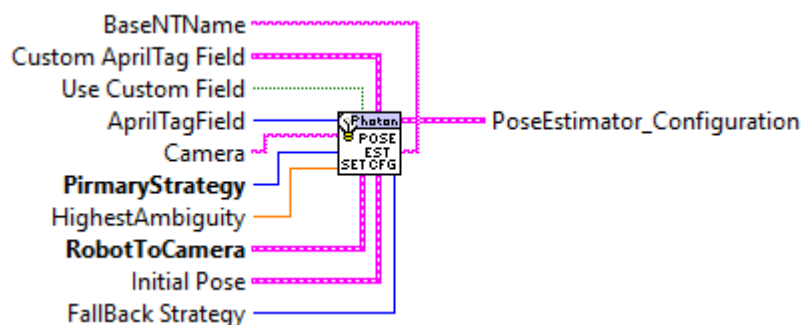
-- CameraName -- String -- Name of the photon camera.

-- RobotToCamera -- Transform3d -- Transform from the center of the robot to the camera mount positions

Outputs:

-- PhotonPoseEstimator -- cluster -- created data cluster.

PhotonPoseEstimator_PackConfig



Provided data from polling a camera, update the estimated position of the robot. Returns empty if there are no cameras set or no targets were found from the cameras.

Inputs:

- PhotonPoseEstimator -- data cluster -- Data guiding how the position determination is done.
- PipelineResults -- data cluster -- Data provided from PhotonCamera_GetLatestResults.
- HasResults -- boolean - TRUE if targets have been identified in the Pipeline results. This can be provided by PhotonCamera_GetLatestResults.

Outputs:

- PhotonPoseEstimator -- data cluster -- Updated data cluster.
- PhotonEstimatedRobotPose -- data cluster -- Estimated robot position and timestamp.
- PosFound -- boolean -- A position has been determined.

PhotonPoseEstimator_SetCamera

Set the current strategy being used by the PhotonPoseEstimator.

Inputs:

- PhotonVisionPoseEstimator -- cluster -- The estimator.
- PhotonPoseStrategy -- enum -- Current strategy being used by the Photon Pose Estimator. Current strategies include:
 - LOWEST_AMBIGUITY -- Choose the Pose with the lowest ambiguity
 - CLOSEST_TO_CAMERA_HEIGHT -- Choose the Pose which is closest to the camera height.
 - CLOSEST_TO_REFERENCE_POSE -- Choose the Pose which is closest to a set Reference position.
 - CLOSEST_TO_LAST_POSE -- Choose the Pose which is closest to the last pose calculated
 - AVERAGE_BEST_TARGETS -- Weight average of acceptable targets based on ambiguity..

Outputs:

-- PhotonVisionPoseEstimator -- cluster -- The updated estimator.

PhotonPoseEstimator_SetFieldTags



Set the AprilTagFieldLayout cluster into the PhotonPoseEstimator cluster.

Inputs:

-- PhotonVisionPoseEstimator -- cluster -- The estimator.

-- AprilTagFieldLayout -- cluster -- Contains the absolute location definitions of the April tags on a field.

Outputs:

-- PhotonVisionPoseEstimator -- cluster -- The updated estimator.

PhotonPoseEstimator_SetHighestAmbiguity



Set the highest allowed ambiguity from the PhotonPoseEstimator cluster.

Inputs:

-- PhotonVisionPoseEstimator -- cluster -- The estimator.

-- HighestAmbiguity -- double -- This is the highest allowed ambiguity for targets to be considered valid. Ambiguity describes the difference between the "best" and "alternate" targets. Lower numbers are better.

Outputs:

-- PhotonVisionPoseEstimator -- cluster -- The updated estimator.

PhotonPoseEstimator_SetLastPose



Set the last pose3d calculated by the PhotonPoseEstimator.

Inputs:

- PhotonVisionPoseEstimator -- cluster -- The estimator.
- LastPose -- Pose3d -- Last robot pose calculated by the PhotonPoseEstimator

Outputs:

- PhotonVisionPoseEstimator -- cluster -- The updated estimator.

PhotonPoseEstimator_SetLastPose_Pose2d



Set the last pose3d calculated by the PhotonPoseEstimator.

Inputs:

- PhotonVisionPoseEstimator -- cluster -- The estimator.
- LastPose -- Pose2d -- Last robot pose calculated by the PhotonPoseEstimator

Outputs:

- PhotonVisionPoseEstimator -- cluster -- The updated estimator.

PhotonPoseEstimator_SetMultiTagFallbackStrategy



Set the current fallback strategy being used by the PhotonPoseEstimator.

Inputs:

- PhotonVisionPoseEstimator -- cluster -- The estimator.
- Fallback Strategy -- enum -- Current strategy being used by the Photon Pose Estimator. Current strategies include:
 - LOWEST_AMBIGUITY -- Choose the Pose with the lowest ambiguity
 - CLOSEST_TO_CAMERA_HEIGHT -- Choose the Pose which is closest to the camera height.
 - CLOSEST_TO_REFERENCE_POSE -- Choose the Pose which is closest to a set Reference position.
 - CLOSEST_TO_LAST_POSE -- Choose the Pose which is closest to the last pose calculated
 - AVERAGE_BEST_TARGETS -- Weight average of acceptable targets based on ambiguity..

Outputs:

- PhotonVisionPoseEstimator -- cluster -- The updated estimator.

PhotonPoseEstimator_SetPrimaryStrategy



Set the current strategy being used by the PhotonPoseEstimator.

Inputs:

- PhotonVisionPoseEstimator -- cluster -- The estimator.
- PhotonPoseStrategy -- enum -- Current strategy being used by the Photon Pose Estimator. Current strategies include:
 - LOWEST_AMBIGUITY -- Choose the Pose with the lowest ambiguity

CLOSEST_TO_CAMERA_HEIGHT -- Choose the Pose which is closest to the camera height.

CLOSEST_TO_REFERENCE_POSE -- Choose the Pose which is closest to a set Reference position.

CLOSEST_TO_LAST_POSE -- Choose the Pose which is closest to the last pose calculated

AVERAGE_BEST_TARGETS -- Weight average of acceptable targets based on ambiguity..

Outputs:

-- PhotonVisionPoseEstimator -- cluster -- The updated estimator.

PhotonPoseEstimator_SetReferencePose



Set the reference pose from the PhotonPoseEstimator cluster.

Inputs:

-- PhotonVisionPoseEstimator -- cluster -- The estimator.

-- referencePose -- Pose3d -- This is the reference pose being used by the Photon Pose Estimator. Often this would be set the the current Pose calculated by the robot's odometry.

Outputs:

-- PhotonVisionPoseEstimator -- cluster -- The updated estimator.

PhotonPoseEstimator_SetReferencePose_Pose2d



Set the reference pose from the PhotonPoseEstimator cluster.

Inputs:

- PhotonVisionPoseEstimator -- cluster -- The estimator.
- referencePose -- Pose2d -- This is the reference pose being used by the Photon Pose Estimator. Often this would be set the the current Pose calculated by the robot's odometry.

Outputs:

- PhotonVisionPoseEstimator -- cluster -- The updated estimator.

PhotonPoseEstimator_SetRobotToCameraTransform



Set the current strategy being used by the PhotonPoseEstimator.

Inputs:

- PhotonVisionPoseEstimator -- cluster -- The estimator.
- PhotonPoseStrategy -- enum -- Current strategy being used by the Photon Pose Estimator. Current strategies include:

LOWEST_AMBIGUITY -- Choose the Pose with the lowest ambiguity

CLOSEST_TO_CAMERA_HEIGHT -- Choose the Pose which is closest to the camera height.

CLOSEST_TO_REFERENCE_POSE -- Choose the Pose which is closest to a set Reference position.

CLOSEST_TO_LAST_POSE -- Choose the Pose which is closest to the last pose calculated

AVERAGE_BEST_TARGETS -- Weight average of acceptable targets based on ambiguity..

Outputs:

- PhotonVisionPoseEstimator -- cluster -- The updated estimator.

PhotonPoseEstimator_SetTagModel



Set the current tag model used by the PhotonPoseEstimator.

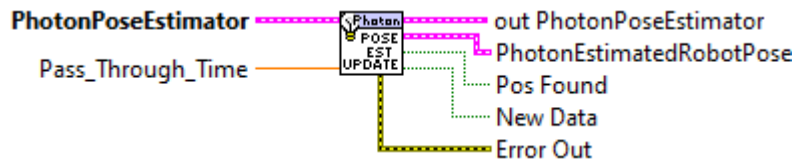
Inputs:

- PhotonVisionPoseEstimator -- cluster -- The estimator.
- TagModel -- cluster -- Current April Tag model used by the Photon Pose Estimator.

Outputs:

- PhotonVisionPoseEstimator -- cluster -- The updated estimator.

PhotonPoseEstimator_Update



Poll data from the configured cameras and update the estimated position of the robot. Returns empty if:

- New data has not been received since the last call to {@code update()}.
- No targets were found from the camera
- There is no camera set

Inputs:

- PhotonPoseEstimator -- data cluster -- Data guiding how the position determination is done.
- PassThroughTime -- double -- FPGA time stamp in seconds. (Optional. Default: Read FPGA time.)

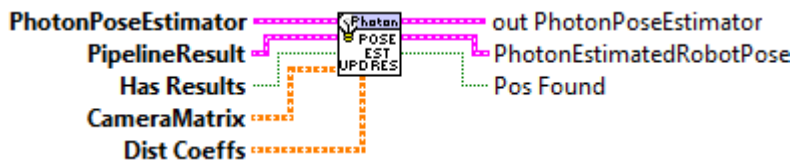
Outputs:

- PhotonPoseEstimator -- data cluster -- Updated data cluster
- PhotonEstimatedRobotPose -- data cluster -- Estimated robot with an estimated pose, timestamp, and targets used to create the estimate.

-- PosFound -- boolean -- A position has been determined.

-- NewData -- boolean -- The data from photonvision is newer than the last time this routine was called.

PhotonPoseEstimator_Update_All



Provided data from polling a camera, updates the estimated position of the robot. Returns empty if:

- The timestamp of the provided pipeline result is the same as in the previous call to Update
- No targets were found in the pipeline results.

Inputs:

-- PhotonPoseEstimator -- data cluster -- Data guiding how the position determination is done.

-- PipelineResults -- data cluster -- Data provided from PhotonCamera_GetLatestResults.

-- HasResults -- boolean - TRUE if targets have been identified in the Pipeline results. This can be provided by PhotonCamera_GetLatestResults.

-- cameraMatrix -- matrix -- Camera calibration data that can be used in the case of no assigned PhotonCamera.

-- distCoeffs -- matrix -- Camera calibration data that can be used in the case of no assigned PhotonCamera

Outputs:

-- PhotonPoseEstimator -- data cluster -- Updated data cluster.

-- PhotonEstimatedRobotPose -- data cluster -- Estimated robot position, timestamp, and targets used to create the estimate.

-- PosFound -- boolean -- A position has been determined.

PhotonPoseEstimator_Update_PipeResult



Provided data from polling a camera, updates the estimated position of the robot. Returns empty if:

- The timestamp of the provided pipeline result is the same as in the previous call to update
- No targets were found in the pipeline results.

Inputs:

- PhotonPoseEstimator -- data cluster -- Data guiding how the position determination is done.
- PipelineResults -- data cluster -- Data provided from PhotonCamera_GetLatestResults.
- HasResults -- boolean - TRUE if targets have been identified in the Pipeline results. This can be provided by PhotonCamera_GetLatestResults.

Outputs:

- PhotonPoseEstimator -- data cluster -- Updated data cluster.
- PhotonEstimatedRobotPose -- data cluster -- Estimated robot position, timestamp, , and targets used to create the estimate.
- PosFound -- boolean -- A position has been determined.

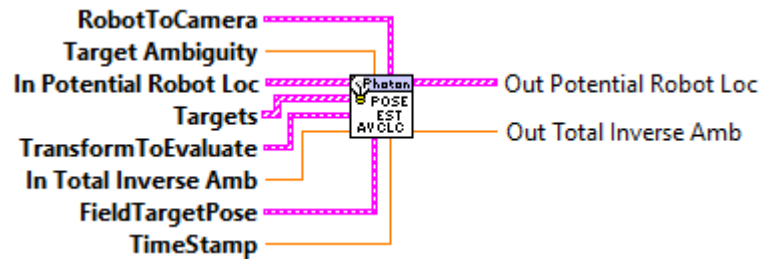
PhotonPoseEstimator_averageBestTargetsStrategy



This is an internal function. Use Update or Update_Pipeline instead of this function.

Determine the best target based the weighted average position of valid potential positions.

PhotonPoseEstimator_averageBestTargetsStrategy_calc



This is an internal function. Use Update or Update_Pipeline instead of this function.

Determine the best target based the weighted average position of valid potential positions.

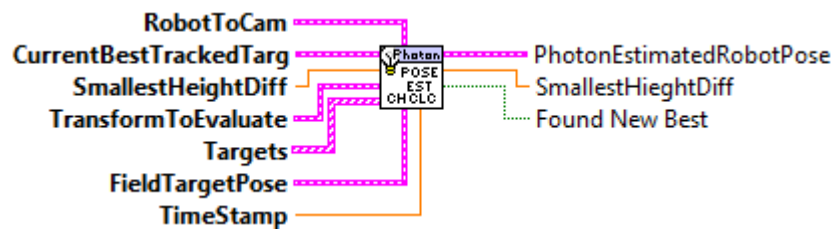
PhotonPoseEstimator_closestToCameraHeightStrategy



This is an internal function. Use Update or Update_Pipeline instead of this function.

Determine the best target based on the target height closed to the camera height.

PhotonPoseEstimator_closestToCameraHeightStrategy_calc



This is an internal function. Use Update or Update_Pipeline instead of this function.

Determine the best target based on the target height closed to the camera height.

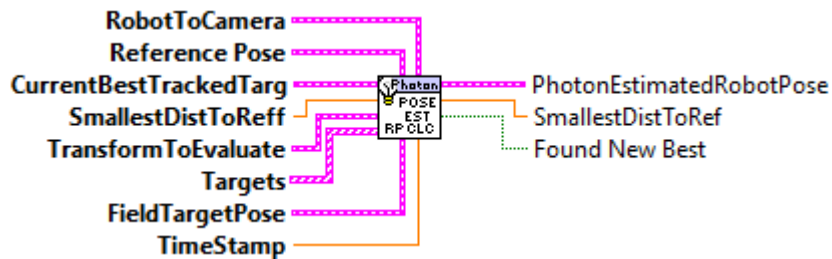
PhotonPoseEstimator_closestToReferencePoseStrategy



This is an internal function. Use `Update` or `Update_Pipeline` instead of this function.

Determine the best target based on the closest to a set Reference position

PhotonPoseEstimator_closestToReferencePoseStrategy_calc



This is an internal function. Use `Update` or `Update_Pipeline` instead of this function.

Determine the best target based on the closest to a set Reference position

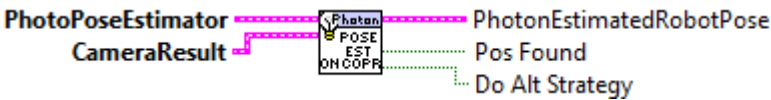
PhotonPoseEstimator_lowestAmbiguityStrategy



This is an internal function. Use `Update` or `Update_Pipeline` instead of this function.

Determine the best target based the lowest ambiguity.

PhotonPoseEstimator_multiTagOnCoproStrategy



This is an internal function. Use Update or Update_Pipeline instead of this function.

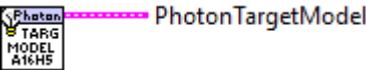
Determine the best target based the multi-target routine on the coprocessor

PhotonTargetModel

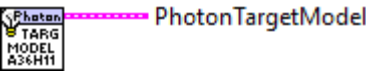
PhotonTargetModel_New



PhotonTargetModel_New_AprilTag16h5



PhotonTargetModel_New_AprilTag36H11

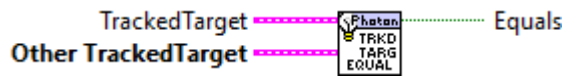


PhotonTargetModel_New_RectPlanar



PhotonTrackedTarget

PhotonTrackedTarget_Equals



Determines if two tracked targets are equal

Inputs:

- TrackedTarget -- TrackedTarget cluster.
- OtherTrackedTarget -- Second TrackedTarget cluster.

Outputs:

- Area -- Boolean, equals TRUE if both TrackedTargets are the same.
-

PhotonTrackedTarget_GetAltCameraToTarget



Get CameraToTarget Transform2d from Tracked Target

Inputs:

- TrackedTarget -- Parsed TrackedTarget cluster.

Outputs:

- CameraToTarget -- Camera to Target Transform2d
-

PhotonTrackedTarget_GetArea



Get Area from Tracked Target

Inputs:

- TrackedTarget -- Parsed TrackedTarget cluster.

Outputs:

- Area -- Area value

PhotonTrackedTarget_GetBestCameraToTarget



Get CameraToTarget Transform2d from Tracked Target

Inputs:

- TrackedTarget -- Parsed TrackedTarget cluster.

Outputs:

- CameraToTarget -- Camera to Target Transform2d

PhotonTrackedTarget_GetDetectedCorners



Get Detected Corners from Tracked Target

Inputs:

- TrackedTarget -- Parsed TrackedTarget cluster.

Outputs:

- Detected Corners -- Array of TargetCorner cluster containing detected corners

PhotonTrackedTarget_GetFiducialId



Get Area from Tracked Target

Inputs:

- TrackedTarget -- Parsed TrackedTarget cluster.

Outputs:

- Area -- Area value

PhotonTrackedTarget_GetMinAreaRectCorners



Get Minimum Area Rectagle Corners from Tracked Target

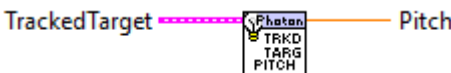
Inputs:

- TrackedTarget -- Parsed TrackedTarget cluster.

Outputs:

- MinAreaRectCorners -- Corners array of TargetCorner cluster

PhotonTrackedTarget_GetPitch



Get Pitch from Tracked Target

Inputs:

- TrackedTarget -- Parsed TrackedTarget cluster.

Outputs:

- Pitch -- Pitch value

PhotonTrackedTarget_GetPoseAmbiguity



Get Area from Tracked Target

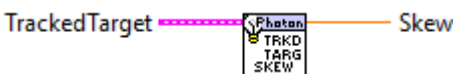
Inputs:

- TrackedTarget -- Parsed TrackedTarget cluster.

Outputs:

- Area -- Area value

PhotonTrackedTarget_GetSkew



Get Skew from Tracked Target

Inputs:

- TrackedTarget -- Parsed TrackedTarget cluster.

Outputs:

- Skew -- Skew value

PhotonTrackedTarget_GetYaw

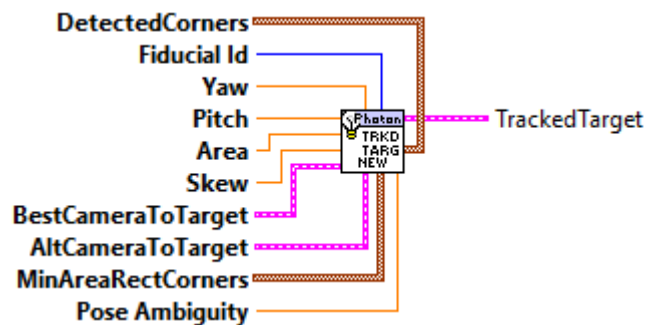
Get Yaw from Tracked Target

Inputs:

- TrackedTarget -- Parsed TrackedTarget cluster.

Outputs:

- Yaw -- Yaw value

PhotonTrackedTarget_New

Create a new TracedTarget data cluster

Inputs:

- Yaw --
- Pitch --
- Area --
- Skew --
- CameraToTarget -- Transform2d
- MinAreaRectCorners -- Array of 4 corners.
- Pose Ambiguity
- Fiducial ID

- Detected Corners

Outputs:

- TrackedTarget -- Created TrackedTarget cluster.

PhotonTrackedTarget_Pack



Encode a TrackedTarget cluster into an array of bytes.

Inputs:

- TrackedTarget -- TrackedTarget cluster.

Outputs:

- RawDataOut -- Byte array containing the encoded data.

PhotonTrackedTarget_Unpack



Internal function to parse the data for each target returned by PhotonCamera_GetLatestResult.

Inputs:

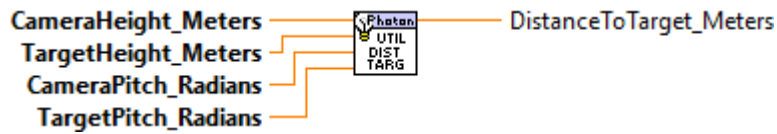
- RawData -- Byte array containing the data to parse.

Outputs:

- TrackedTarget -- Parsed TrackedTarget cluster.

PhotonUtils

PhotonUtils_CalculateDistanceToTarget



Algorithm from https://docs.limelightvision.io/en/latest/cs_estimating_distance.html Estimates range to a target using the target's elevation. This method can produce more stable results than SolvePNP when well tuned, if the full 6d robot pose is not required. Note that this method requires the camera to have 0 roll (not be skewed clockwise or CCW relative to the floor), and for there to exist a height differential between goal and camera. The larger this differential, the more accurate the distance estimate will be.

Units can be converted using the `{@link edu.wpi.first.math.util.Units}` class.

Inputs:

- CameraHeight_Meters -- The physical height of the camera off the floor
in meters.
- TargetHeightMeters -- The physical height of the target off the floor in meters.

This should be the height of whatever is being targeted (i.e. if the targeting region is set to top, this should be the height of the top of the target).

- CameraPitch_Radians -- The pitch of the camera from the horizontal plane
in radians.
Positive values up.

- TargetPitchRadian -- The pitch of the target in the camera's lens in radians.
Positive values up.

Outputs

- DistanceToTarget_Meters -- The estimated distance to the target in meters.

PhotonUtils_EstimateCameraToTarget



Estimates a Transform2d that maps the camera position to the target position, using the robot's gyro. Note that the gyro angle provided *must* line up with the field coordinate system -- that is, it should read zero degrees when pointed towards the opposing alliance station, and increase as the robot rotates CCW.

Inputs:

- CameraToTargetTranslation -- A Translation2d that encodes the x/y position of the target relative to the camera.
- FieldToTarget -- A Pose2d representing the target position in the field coordinate system.
- GyroAngle -- The current robot gyro angle, likely from odometry.

Outputs:

- EstimateCameraToTarget -- A Transform2d that takes us from the camera to the target.

PhotonUtils_EstimateCameraToTargetTrans



Estimate the Translation2d of the target relative to the camera.

Inputs:

- TargetDistance_Meters -- The distance to the target in meters.
- Yaw -- The observed yaw of the target.

Outputs:

- CameraToTarget -- The target's camera-relative translation.

PhotonUtils_EstimateFieldToCamera



Estimates the pose of the camera in the field coordinate system, given the position of the target relative to the camera, and the target relative to the field. This *only* tracks the position of the camera, not the position of the robot itself.

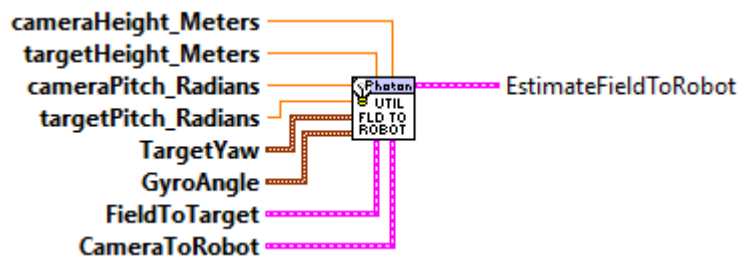
Inputs:

- CameraToTarget -- The position of the target relative to the camera.
- FieldToTarget -- The position of the target in the field.

Outputs:

- EstimateFieldToCamera -- The position of the camera in the field.

PhotonUtils_EstimateFieldToRobot



Estimate the position of the robot in the field.

Inputs:

- CameraHeightMeters The physical height of the camera off the floor in meters.

- TargetHeightMeters The physical height of the target off the floor in meters.

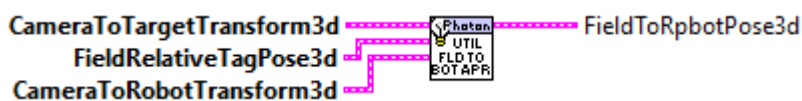
This should be the height of whatever is being targeted (i.e. if the targeting region is set to top, this should be the height of the top of the target).

- CameraPitchRadians The pitch of the camera from the horizontal plane in radians. Positive values up.
- TargetPitchRadians The pitch of the target in the camera's lens in radians. Positive values up.
- TargetYaw The observed yaw of the target. Note that this *must* be CCW-positive, and Photon returns CW-positive.
- GyroAngle The current robot gyro angle, likely from odometry.
- FieldToTarget A Pose2d representing the target position in the field coordinate system.
- CameraToRobot The position of the robot relative to the camera. If the camera was mounted 3 inches behind the "origin" (usually physical center) of the robot, this would be Transform2d (3 inches, 0 inches, 0 degrees).

Outputs

- EstimateFieldToRobot -- The position of the robot in the field.

PhotonUtils_EstimateFieldToRobotAprilTag



Estimates the pose3d of the robot in the field coordinate system, given the pose3d of the fiducial tag, the robot relative to the camera, and the target relative to the camera.

Inputs:

- CameraToTarget -- Transform3D of the target relative to the camera, returned by PhotonVision

- FieldRelativeTagPose3d -- The field relative pose3d of the target
- CameraToRobot -- Transform3D of the robot relative to the camera. Origin of the robot is defined as the center.

Outputs

- FieldToRobot -- Transform3d Robot position relative to the field

PhotonUtils_EstimateFieldToRobot_Alt



Estimates the pose of the robot in the field coordinate system, given the position of the target relative to the camera, the target relative to the field, and the robot relative to the camera.

Inputs:

- CameraToTarget -- The position of the target relative to the camera.
- FieldToTarget -- The position of the target in the field.
- CameraToRobot -- The position of the robot relative to the camera. If the camera was mounted 3 inches behind the "origin" (usually physical center) of the robot, this would be Transform2d(3 inches, 0 inches, 0 degrees).

Outputs:

- EstimateFieldToRobot -- The position of the robot in the field.

PhotonUtils_GetDistanceToPose



Returns the distance between two poses

Inputs:

- RobotPose -- Pose2d of the robot.
- TargetPose -- Pose2d of the target

Outputs

- DistanceToPose -- The calculated distance to the pose.

PhotonUtils_GetYawToPose



Returns the yaw between your robot and a target.

Inputs:

- RobotPose -- Pose2d of the robot.
- TargetPose -- Pose2d of the target

Outputs

- YawToPose -- Yaw to the target

TargetCorner

TargetCorner_Equals



Determines if two target corners are equal

Inputs:

- TargetCorner -- TargetCorner cluster
- OtherTargetCorner -- TargetConrer cluster to compare

Outputs:

- Equals -- TRUE if both TargetCorners are equal

TargetCorner_GetAll



Get the individual components of a TargetCorner

Inputs:

- TargetCorner -- TargetCorner cluster

Outputs:

- X --
- Y --

TargetCorner_New

Create a new TargetCorner data cluster

Inputs:

- X --
- Y --

Outputs:

- TargetCorner -- Created TargetCorner cluster.

Type Definitions

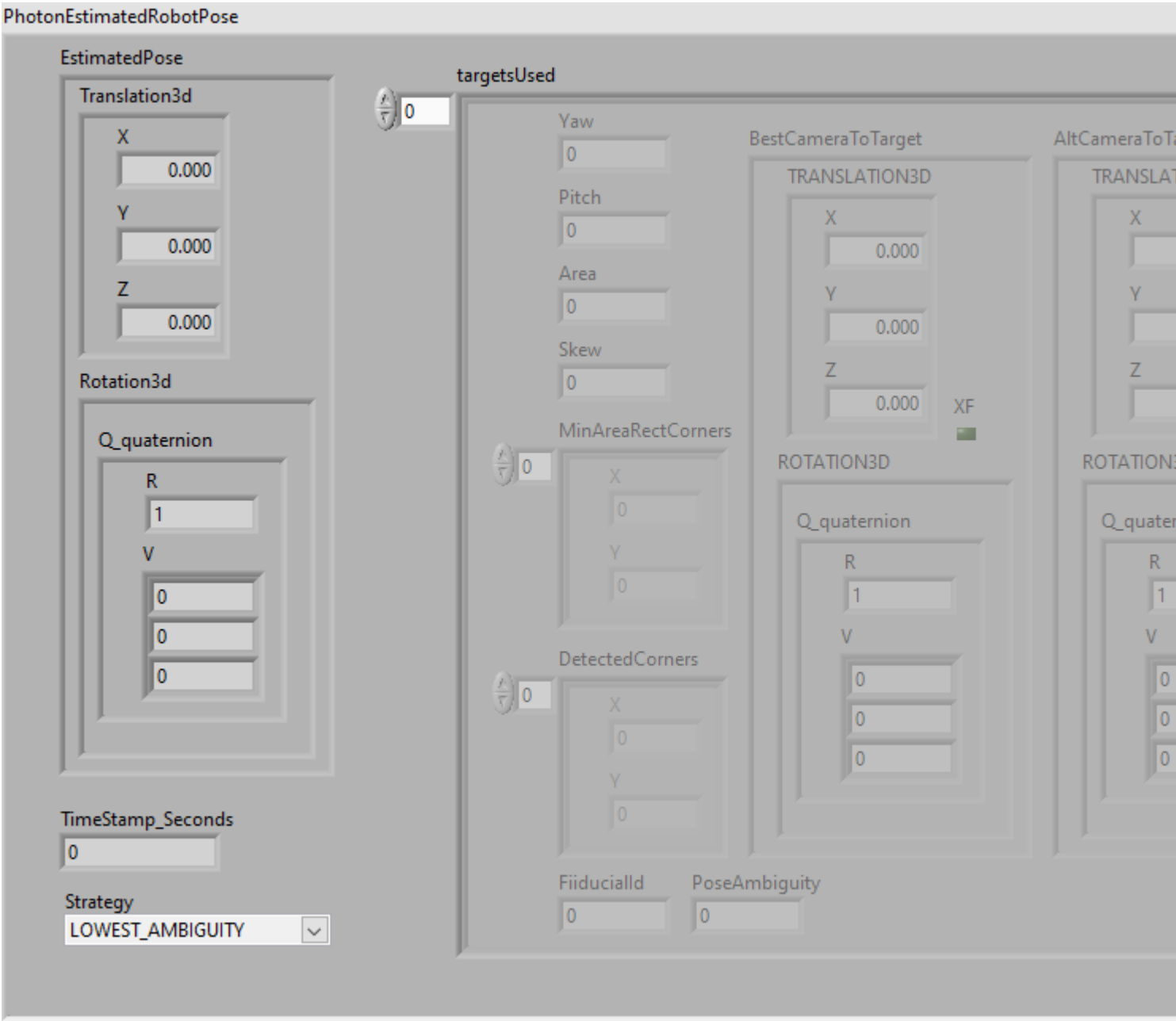
TypeDef

TypeDef-PhotonEstimatedRobotPoseType



An estimated pose based on pipeline result. This cluster contains:

- EstimatedPose -- Pose3d -- Estimated absolute robot position based on vision location of April Tags
- TimeStamp_Seconds -- Double -- Timestamp of data from photonvision. This can be set by the user to add latency or other time offsets.



TypeDef-PhotonMultiTargetPNPResultType



/**

- * If this result is valid. A false value indicates there was an error in estimation, and this
- * result should not be used.

```
*/

public final boolean isPresent;

/**
 * The best-fit transform. The coordinate frame of this transform depends on the method which gave
 * this result.
 */
public final Transform3d best;

/** Reprojection error of the best solution, in pixels */
public final double bestReprojErr;

/**
 * Alternate, ambiguous solution from solvepnp. If no alternate solution is found, this is equal
 * to the best solution.
 */
public final Transform3d alt;

/** If no alternate solution is found, this is bestReprojErr */
public final double altReprojErr;

/** If no alternate solution is found, this is 0 */
public final double ambiguity;
```

PhotonMultiTargetPNPResult

PhotonPNPResult

IsPresent

bestReprojErr

0

altReprojErr

0

ambiguity

0

Best

TRANSLATION3D

X

0.000

Y

0.000

Z

0.000

XF

ROTATION3D

Q_quaternion

R

1

V

0

0

0

Alt

TRANSLATION3D

X

0.000

Y

0.000

Z

0.000

XF

ROTATION3D

Q_quaternion

R

1

V

0

0

0

FiducialIDsUsed

0

0

TypeDef-PhotonPNPResultType



- /**
- * If this result is valid. A false value indicates there was an error in estimation, and this
 - * result should not be used.

```
*/

public final boolean isPresent;

/**
 * The best-fit transform. The coordinate frame of this transform depends on the method which gave
 * this result.
 */
public final Transform3d best;

/** Reprojection error of the best solution, in pixels */
public final double bestReprojErr;

/**
 * Alternate, ambiguous solution from solvepnp. If no alternate solution is found, this is equal
 * to the best solution.
 */
public final Transform3d alt;

/** If no alternate solution is found, this is bestReprojErr */
public final double altReprojErr;

/** If no alternate solution is found, this is 0 */
public final double ambiguity;
```

PhotonPNPResult

IsPresent

bestReprojErr

0

altReprojErr

0

ambiguity

0

Best

TRANSLATION3D

X

0.000

Y

0.000

Z

0.000

XF

ROTATION3D

Q_quaternion

R

1

V

0

0

0

Alt

TRANSLATION3D

X

0.000

Y

0.000

Z

0.000

XF

ROTATION3D

Q_quaternion

R

1

V

0

0

0

TypeDef-PhotonPipelineResultType



PhotonPipelineResult

TargetCount

0

Latency_MilliSec

0

TimeStampSec

0

Targets

Yaw

0

Pitch

0

Area

0

Skew

0

MinAreaRectCorners

0

X

0

Y

0

DetectedCorners

0

X

0

Y

0

FiducialId

0

PoseAmbiguity

0

BestCameraToTarget

TRANSLATION3D

X

0.000

Y

0.000

Z

0.000

XF

ROTATION3D

Q_quaternion

R

1

V

0

0

0

AltCameraToTarget

TRANSLATION3D

X

0.000

Y

0.000

Z

0.000

XF

ROTATION3D

Q_quaternion

R

1

V

0

0

0

PhotonMultiTargetPNPResult

PhotonPNPResult

IsPresent

bestReprojErr

0

altReprojErr

0

ambiguity

0

Best

TRANSLATION3D

X

0.000

Y

0.000

Z

0.000

XF

ROTATION3D

Alt

TRANSLATION3D

X

0.000

Y

0.000

Z

0.000

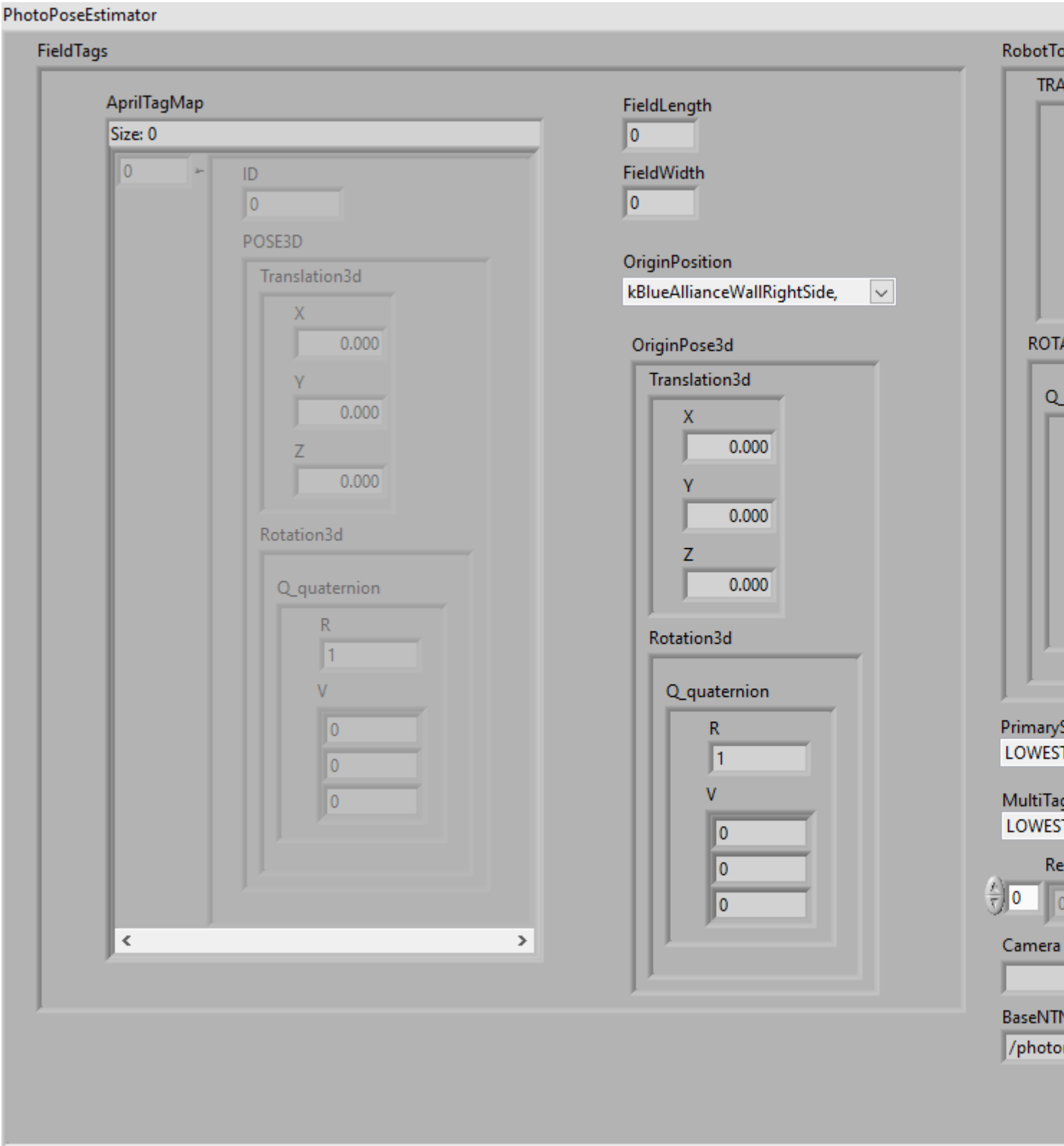
XF

ROTATION3D

TypeDef-PhotonPoseEstimatorType



The PhotonPoseEstimator cluster contains data that filters or combines readings from all the fiducials visible at a given timestamp on the field to produce a single robot in field pose, using the strategy set below. Example usage can be found under LabVIEW Find Examples..



TypeDef-PhotonPoseEstimator_Configuration



PhotonPoseEstimator_Configuration

AprilTagField

2022 Rapid React

Use Custom Field

☐

Primary Strategy

LOWEST_AMBIGUITY

HighestAmbiguity

0

FallBack Strategy

LOWEST_AMBIGUITY

Camera

BaseNTName

/photonvision

RobotToCamera

TRANSLATION3D

X

0.000

Y

0.000

Z

0.000

XF

☐

ROTATION3D

Q_quaternion

R

1

V

0

0

0

Initial Pose

Translation3d

X

0.000

Y

0.000

Z

0.000

Rotation3d

Q_quaternion

R

1

V

0

0

0

Custom AprilTag Field

AprilTagMap

Size: 0

0

ID

0

POSE3D

Translation3d

X

0.000

Y

0.000

Z

0.000

Rotation3d

Q_quaternion

R

1

V

0

0

0

- 74 -

TypeDef-PhotonPoseEstimator_PotentialRobotLocation



This data cluster is used internally by the PhotonPoseEstimator routines to compare individual potential positions.

PotentialRobotLocation

Inverse_Ambiguity

0

PhotonEstimatedRobotPose

EstimatedPose

Translation3d

X

0.000

Y

0.000

Z

0.000

Rotation3d

Q_quaternion

R

1

V

0

0

0

TimeStamp_Seconds

0

Strategy

LOWEST_AMBIGUITY

targetsUsed

0

Yaw

0

Pitch

0

Area

0

Skew

0

MinAreaRectCorners

0

X

0

Y

0

DetectedCorners

0

X

0

Y

0

FiiducialId

0

PoseAmbiguity

0

BestCameraToTarget

TRANSLATION3D

X

0.000

Y

0.000

Z

0.000

XF

ROTATION3D

Q_quaternion

R

1

V

0

0

0

AltCameraToTarget

TRANSLATION3D

X

0.000

Y

0.000

Z

0.000

XF

ROTATION3D

Q_quaternion

R

1

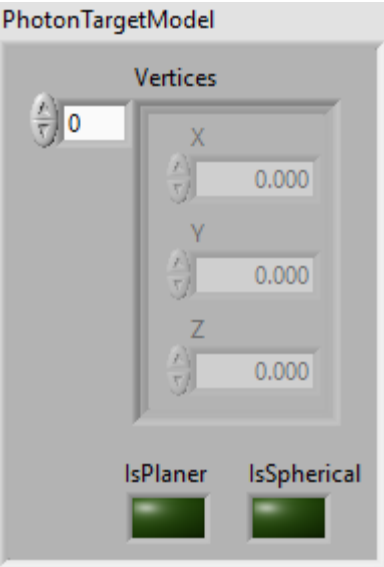
V

0

0

0

TypeDef-PhotonTargetModel



TypeDef-PhotonTrackedTargetType



PhotonTrackedTarget

Yaw

0

Pitch

0

Area

0

Skew

0

MinAreaRectCorners

0

X

0

Y

0

DetectedCorners

0

X

0

Y

0

FiducialId

0

PoseAmbiguity

0

BestCameraToTarget

TRANSLATION3D

X

0.000

Y

0.000

Z

0.000

XF

ROTATION3D

Q_quaternion

R

1

V

0

0

0

AltCameraToTarget

TRANSLATION3D

X

0.000

Y

0.000

Z

0.000

XF

ROTATION3D

Q_quaternion

R

1

V

0

0

0

TypeDef-TargetCornerType



TargetCorner

X

0

Y

0

Enumerated Type Definitions

Enum

Enum-PhotonPoseStrategy_ENUM



Position estimation strategies that can be used by the PhotonPoseEstimator VIs.

Values are:

LOWEST_AMBIGUITY -- Choose the Pose with the lowest ambiguity

CLOSEST_TO_CAMERA_HEIGHT -- Choose the Pose which is closest to the camera height

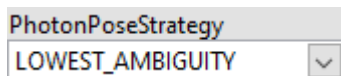
CLOSEST_TO_REFERENCE_POSE -- Choose the Pose which is closest to a set Reference position

CLOSEST_TO_LAST_POSE -- Choose the Pose which is closest to the last pose calculated

AVERAGE_BEST_TARGETS -- Choose the Pose with the lowest ambiguity

MULTI_TAG_PNP_ON_COPROCESSOR -- Use all visible tags to compute a single pose estimate on coprocessor. This option needs to be enabled on the PhotonVision web UI as well.

MULTI_TAG_PNP_ON_RIO -- Use all visible tags to compute a single pose estimate. This runs on the RoboRIO, and can take a lot of time.



Enum-VisionLEDModeType



