Autonomous Vehicle Simulation (AVS) Laboratory, University of Colorado

Basilisk Technical Memorandum

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DISCRETIZATE UTILITY

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Status: Tested
Scope/Contents
The Basilisk Discretize Utility discretizes a given state vector.

Rev	Change Description	By	Date
1.0	First draft	S Carnahan	20180116

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1 Model Description

The discretize utility discretizes a given state vector according to a set of given least significant bits (LSBs). It can round toward zero, away from zero, or to the nearest multiple fo the LSB.

2 Model Functions

The Gauss Markov functions are:

- **Set LSB**: Sets the least significant bit as a vector of length n.
- **Set Round Direction**: Sets the round direction when discretizing as to zero, away from zero, or nearest LSB multiple.
- **Set Carry Error**: Takes a boolean to state whether or not to carry over discretization error.
- **Discretize**: Discretizes a state vector of size n by corresponding LSBs
- **Get Discretization Error**: retrieves the discretization error for use by user.

3 Model Assumptions and Limitations

- **LSB Only**: Right now, discretization can only be set by giving a least significant bit. In the future, capability should be added to allow for discretization by max/min and number of bits.

4 Test Description and Success Criteria

This test is located at `src/simulation/utilitiesSelfCheck`.

4.1 Test Descriptions

1. To Zero Checks discretization toward zero.
2. From Zero: Checks discretization away from zero.
3. Near Checks discretization to the closest LSB multiple.
4. Carry Checks error carrying.

5 Test Results

All test results below

Table 2: Test results

Test	Pass/Fail
All Tests	PASSED

6 User Guide

For the best examples of the using the discretize utility, please see the IMU unit test and .cpp files.