

DARTS Lab Course – August 7-11, 2017

Main Track

Special Topic

Case Study

	Mon	Tue	Wed	Thu	Fri
8am	01 Welcome & Agenda Agenda, notebooks, Python, history, resources, docs, Dsends, Roams, etc <i>Notebooks: Day1-MAM-1Agenda</i>	06 Dshell Architecture Goals, overview of models and assemblies and other fundamental simulation components <i>Day2-TuAm-1Architecture</i>	13 Simulation Manager SimulationExecutive, options, methods, creating, deleting, calling seq data flow	20 Creating a model getting ready, autocode gen, deriving, rules for methods enums, ext models, helper classes	25 Hands on assignment
9am	02 Sim case study Quadcopter example Create basic simulation Ndarts gui Scaling up Explore adding variations Scaling up challenges Path forward options Dshell approach overview	07 Dshell models Model classes, Flows, Darts models, I/F with DARTS params methods, multirate, sequencing, masking <i>Day2-TuAm-2Models</i>	14 Masking & Prescribing Forcing joint motions <i>Day3-WAm-1Simulations</i>	<i>Day4-ThAm-1NewModels</i>	
10am	Dshell based simulation Quadcopter Dshell sim	08 Assemblies Config/context, Params, Checking, Builder, pre-fabs, Methods, signal ties, pending ties, using tags <i>Day2-TuAm-3Assemblies</i>	15 Data Logging Logging with DwatchHDF5, cfg files, special DVar utilities for logging, unit conversions <i>Day3-WAm-2Logging</i>	21 Creating an assembly desired/optional, basic methods, deriving, deleting/adding, testing assemblies, custom methods key specs, breaks/constraints	
11am	Explore adding variations Dshell gui <i>Notebooks: Day1-MAM-2Demo</i>	09 Building Simulations How to build a simulation, run scripts, simulation tools <i>Day2-TuAm-4Simulations</i>	16 Geometry models DScene family Client/server <i>Day3-WAm-3Geometry</i>	<i>Day4-ThAm-2NewAssemblies</i>	<i>Day5-FAM-1Assignments</i>
12pm	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
1pm	03 Math library Vectors, matrices, Spatial vectors & inertia, quaternions, Euler, Aerospace vs robotics, Hom Trans, Phi/PhiStar <i>Notebooks: Day1-MPm-1Math</i>	10 Spatial Operator Algebra Key concepts, minimal cords, O(N), gather, scatter, operators <i>Day2-TuPm-1SOA</i>	17 Visualization Part graphics, Viewing frames, lighting, viewports, visibility, etc. <i>Day3-WPm-1Viz</i>	22 SimScape Terrain modeling Representations Import/export <i>Day4-ThPm-1SimScape</i>	26 Case study 4 Mars Helicat Matlab i/f, control
2pm	04 Frames Frames layer, edges, chains transoms, vels, accels, callbacks <i>Notebooks: Day1-MPm-2Frames</i>	11 Multibody (Ndarts) Bodies, nodes, hinges, subgraphs, prescribed motion <i>Day2-TuPm-2Ndarts</i>	18 Timekeeper Basic usage, Spice usage, Date/time objects <i>Day3-WPm-2TimeKeeper</i>	23 Case study 3 Roams, ground, vehicles, assemblies <i>Day4-ThPm-2ROAMS</i>	27 Case study 5 RoboDarts, Robotics, URDF/ROS, embedded model manager <i>Day5-FPm-1Robot</i>
3pm	Access to simulation variables <i>Notebooks: Day1-MPm-3DVar</i>	12 Case study 1 JSC COMPASS, SLS/Orion ISS, use cases: DOLILU, PERA etc	19 Case study 2 Dsends, JPL flight dynamics example (MSL, Europa, LDSD)	24 Integrators family, selecting, soft/hard reset, rollback <i>Day2-ThPm-3Integrators</i>	28 pyam/make/dtest sandbox content, dtest, srun, building, rules, site config
4pm	Discussion/Follow ups	Discussion/Follow ups	Discussion/Follow ups	Discussion/Follow ups	Wrap Up