

NDIA Robotics Division R&D sub-Group

Robotics “Taxonomy”

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“Taxonomy” Objective:

- Developed out of discussions with Ellen Purdy at Army War College
- Work through the NDIA Robotics Panel to build a reference framework for constituent technical elements of robotics useful for DOD and Service R&D planning

Taxonomy Scope

- Identifies technologies and component elements of robotics relevant to DOD interests
- Biased towards inclusion-not strict constructionist exclusion
- Basic premise: many relevant technologies and components exist outside DOD direct sponsorship
- “Strict constructionist” definitions of robotics tend toward emphasis on perception, intelligent control, and human robot interface, alone. Proposed inclusionary approach means that areas such as mission packages or high energy density power sources, which would typically not fall within the usual robotics definition, would be included because they are critical to DOD robotics performance and capabilities

Taxonomy Utility

(When fully realized)

- Provides visibility for relevant technologies and components
- Shows functional interrelationships among technologies providing means to identify a variety of possible technical solutions or investments
- Enables a look at the current “portfolio” or conversely gaps in the portfolio
- Could provide another perspective for evaluating alternative tasks for execution within RTC

Building the “Taxonomy”-Step 1

- Begin by canvassing relevant documents and organizations for participation and reference materials,
 - Documents: Master Plans, R-2's, Databases etc.
 - Organizations:
 - NDIA industrial, academic, and government partners e.g. NIST, NASA, SPAWARS, RS JPO, ARL, TARDEC, COE, DARPA, USAF, USN, USMC, DOE, DOT etc.
 - Others

Building the Taxonomy-Step 2

- Start at top tier:

-Mobility Perception -Intelligent Control -HRI -Processors -Comms -Platforms -Msn Pkg -Power - Nav References

- Progress down with increasing detail-(For Example):

-Mobility Perception

Sensors:

LADAR

-Line Scanner
-2-D scanner

Scan angle

360 degree
<360 degree

Cameras

CCD
CMOS
Image intensifier
FLIR

Cooled
Uncooled

Radar

Algorithms:

LADAR Processing

Static Object Detection
Moving Object Detection

Camera processing

Stereo
Structure from motion
Object classification

Building the Taxonomy-Possible Later Steps

- Handoff of “Taxonomy” to organization entrusted with building a database in support of OSD objectives (expanding existing DB or growing a new one) to include:
 - » Locations of technical activity
 - » Products
- Effort to maintain a current taxonomy could be continued within NDIA panel if desired

Next Step in Building Taxonomy

- Need names and email addresses for those interested in participating
- Send to cshoemaker@gdrs.com

BACKUP CHARTS

NDIA Robotics Taxonomy

What's Different?

- Purpose built to serve needs of NDIA panel
- Builds on prior efforts largely within government
- Complements existing government program oriented models by providing more encompassing input from industry and academia
- Taxonomy focus on framework of non branded-components/technology (see chart 6)
- Database adds the 5P's (products, performers, programs, performance, price etc) and much that is probably proprietary; hence likely handoff of that function