AUTONOMOUS VEHICLES - NAVAL APPLICATIONS
SCOPED

- Introduction
- Types of Autonomous Vehicles
- Major Components
- Roles
- Desired Capabilities
- Opportunities – Indian Industry
- Future Plans
- Conclusion
Maritime & Coastal Surveillance

- *IN* the first to deploy in SE Asian region for Maritime ops
- Autonomous Vehicles deployed as Force Multipliers
- Instrumental in transforming Naval Operational Philosophy
TYPES

- **UNMANNED AERIAL VEHICLE**
  - MICRO AND NANO
  - HIGH AND MEDIUM ALTITUDE LONG ENDURANCE SYSTEMS
  - UNMANNED COMBAT AERIAL VEHICLES

- **UNMANNED MARINE VEHICLE**
  - UNDERWATER UNMANNED VEHICLE (ROV, UUV & AUV)
  - UNMANNED SURFACE VEHICLE

- **UNMANNED GROUND VEHICLES**
  - CUSTOM BUILD UGVs
  - APPLIQUE SYSTEMS
MAJOR COMPONENTS - UAV

➔ FIXED COMPONENT
  • AIRFRAME / BODY
  • PROPULSION SYSTEM
  • CONTROL SYSTEM

➔ FLEXIBLE COMPONENT
  • SENSORS/ ROLE EQUIPMENT
  • WEAPON SYSTEM
MAJOR COMPONENTS - AUV / UUV

- Sub Systems AUV
- Sensors (SSS, Bottom profilers, Camera, Multi Beam Echo Sounders)
- Navigation (Acoustic, Inertial)
- Propulsion
- Power
• ISR MISSIONS
• OVER THE HORIZON TARGETING
• PROBE & SECTOR SEARCH
• BATTLE DAMAGE ASSESSMENT

• HARBOUR SECURITY & MINE MITIGATION
• COASTAL & HYDROGRAPHICAL SURVEY
• ANTI SUBMARINE WARFARE
• ARMED
ISR/NCW GRID

HALE UAV/BAMS

SHIP BASED UAV

MALE UAV

USV

UUV

ROV
DESIRED CAPABILITIES
DESIRED CAPABILITIES

- STEALTH AND LOW RCS COMPOSITE STRUCTURES
- INTEGRATION OF VAST ARRAY OF SENSORS
- MINIATURISATION OF SENSORS AND PAYLOADS
- HIGH BANDWIDTH SATELLITE DATA LINK NETWORKS
- AUTONOMOUS ADAPTIVE FLIGHT CONTROL CAPABILITY
- SATELLITE CONTROL AND LONG ENDURANCE
REAL TIME INTELLIGENCE WITH ENGAGEMENT ACCURACY

AUTO TARGET RECOGNITION AND HIGHER RESOLUTION

IMPROVISED SELF PROTECTION CAPABILITY

ELINT PAYLOADS - HIGHER GEO LOCATION ACCURACY

IED DETECTION & HYPER-SPECTRAL PAYLOADS

VR BASED REALISTIC TRAINING SIMULATOR
TECHNOLOGIES

- High End
  - Reliable Propulsion System
  - Miniaturization of capable sensors/payloads
  - Autonomous Adaptive Flight Controls

- Medium End
  - Integration of Sensors
  - Ground Control/ Support Centers
  - Mission Management Systems

- Low End
  - Modular Air frame Structures
  - Assembly / Integration using COTS equipment
OPPORTUNITIES FOR INDIAN INDUSTRY
OPPORTUNITIES

- Huge opportunities view high anticipated demands
- Indian Industry highly capable
- DRDO labs spearheading R&D efforts
- Private industry also developing indigenous Autonomous Vehicles
- Actively supported by DPSUs.
OPPORTUNITIES

- Leverage domain expertise of MSMEs
- Progress strategic projects with Industry participation
- Adopting ISRO model for greater Industry participation
- Target key technologies in domains of expertise
OPPORTUNITIES

- Target key technologies in domains of expertise
- Utilizing Off Sets
- TOTs with JVs
- Participating in Life Cycle Sustenance – ROH Centres.
OPPORTUNITIES –
MAKE IN INDIA INITIATIVES

- Buy (Indian) & Buy and Make (Indian)
- Private firms as Strategic Partners
- Opportunities to avail defence offset obligations
- Utilizing FDI initiatives in Defence Sector
- India as a Manufacturing hub
- Generate intellectual capital and not remain only
  Assemble in India
- Leverage Indian defence orders for exports
FUTURE PLANS
FUTURE PLANS

- Naval Rotary UAVs (NRUAV)
- Ship- Borne UAVs
- Remotely Operated Vehicle, UUVs & AUVs
- Medium Altitude Long Endurance UAVs (MALE)
- High Altitude Long Endurance UAVs (HALE)
- Broad Area Maritime Surveillance UAV
CONCLUSION

- LOW COST, ADAPTABLE, EASY TO MAINTAIN & EFFECTIVE STRATEGIC ASSET
- NETWORK CENTRIC GRID & FASTER DECISION MAKING
- INTEGRAL PART OF NAVAL OPERATIONS
- IMMENSE OPPORTUNITIES FOR PRIVATE INDUSTRY
- GREAT EXPORT POTENTIAL
- FUTURE GROWTH LIMITED BY OUR IMAGINATION
THANK YOU