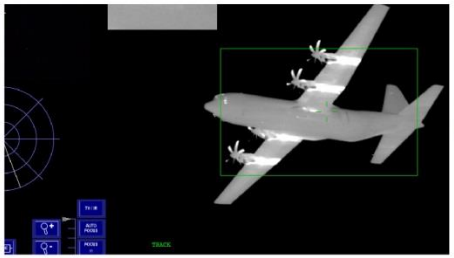
Naval Fire Control Solutions: Addressing the challenges posed by new evolving asymmetric threats







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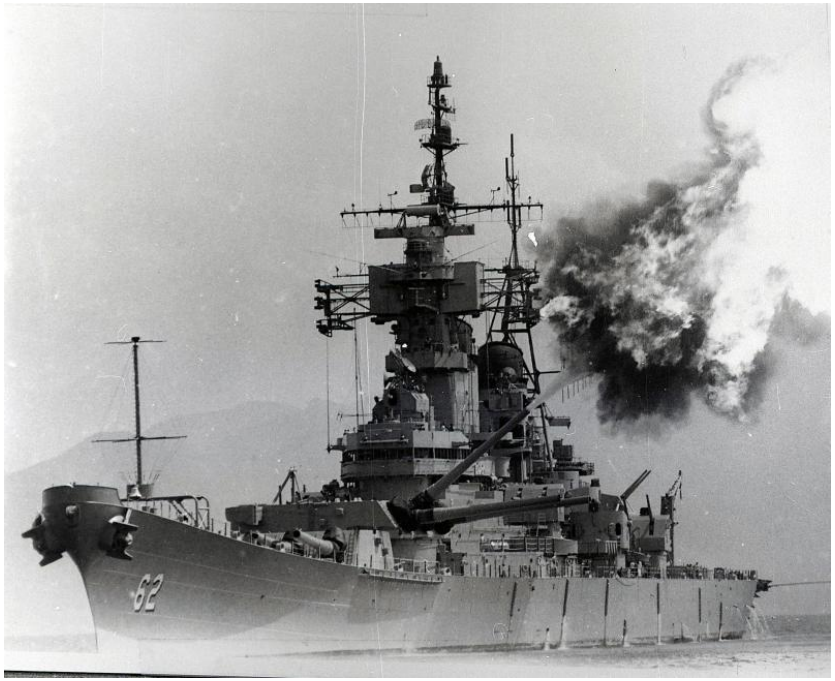
Gentleman's Gunnery Throughout the Ages

Up close and personal

Gentleman's Gunnery Throughout the Ages



Improved Guns – longer range, stand off battles - Battleships

Evolution of the Threat

- No longer an obvious adversary
- Not a “traditional war” with lines drawn up slugging it out
- The threat hides within the innocents

- Smaller, more agile threats
- Self-defence weapon systems adapted to match
- Layered defence

Modern Layered Defence

- Radar for Long-Target detection
- EO for closer Situation Awareness
- Missiles
- Medium Calibre Guns
- Automated Small Calibre Gun Systems
- Close In Weapon Systems
- Mini-guns
- GPMG

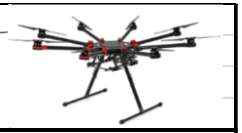
- Active when in Defence posture on patrol

The CNN Challenge

- When entering a “friendly” port, main weapon systems are stood down
- Peacetime resistance to showering friendly civilian buildings and populace with spent stores
- Risk of “friendly fire” casualties
- However, due to emerging UAV threat, ships are vulnerable

Modern Drone Threats

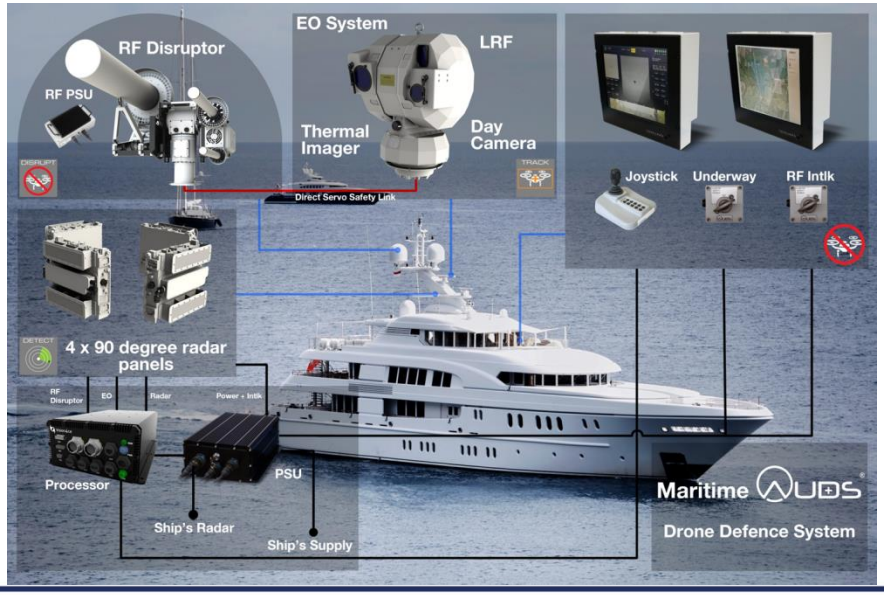
Typical Drone Speeds

DJI Summary							
		Phantom 1	***Phantom 2***	***Phantom 3***	***Inspire 1***	***Spreading Wings***	
	Type	***Quad***	***Quad***	***Quad***	***Quad***	***900 Hex***	***1000 Octo***
	Est Cost	***£100***	***£500***	***£1,000***	***£2,500***	***£2,500***	***£3,500***
Basic weight	**Kg**	1.2	1.0	1.2	2.9	4.4	4.4
Payload capacity	**Kg**					6.6	6.6
Size front view	**mm**	350 x 190	290 x 180	350 x 190	451 x 301	1045 x 200?	1045 x 200?
Max Ascent	**m/sec**	6	6	5	5	6	6
Max Descent	**m/sec**	6	2	3	4		
Max speed	**m/sec**	10	15	16	22	15	15
Time to cover 1Km	**Sec**	100	67	63	45	67	67
Max flight time	**Mins**	25	25	25	18	15	15
Comms distance	**m**	1000	1000	1000	5000	2000	2000
Range Distance	**Km**	15	22.5	24	23.76	13.5	13.5
Range from operator	**Km**	1	1	1	5	2	2

Potential Solutions

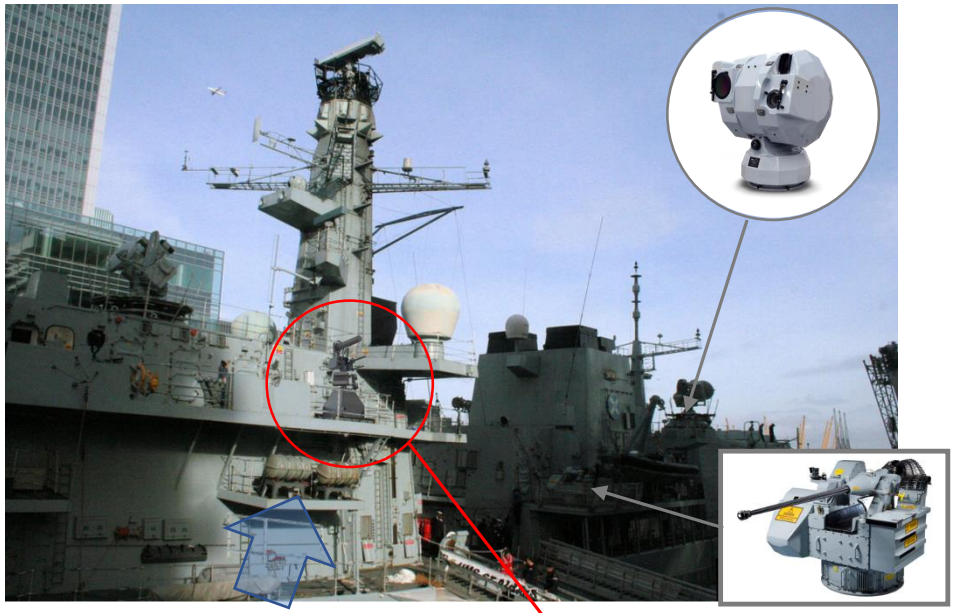
- Protection at Anchor and Close Inshore Transit (CIT)
- Stops Drones and Remote Controlled Small Boats (USV)
- RF Disruptor/inhibitor concealed within the Radome
- Disrupts: Telemetry, Control and GPS
- Effective range 6Km
- 180° coverage per system, 2 system per vessel
- Interfaces to ships navigation radars/security systems
- Provides 24/7 Protection and Security
- Optional fixed panel Ku radar for in port operation

Super Yachts – C-UAS / C-USV



Naval – C-UAS / C-USV

Existing ASCG EO linked to the 30mm Bushmaster Cannon and future M230LF Smart Munitions



Dedicated EO

Potential installation

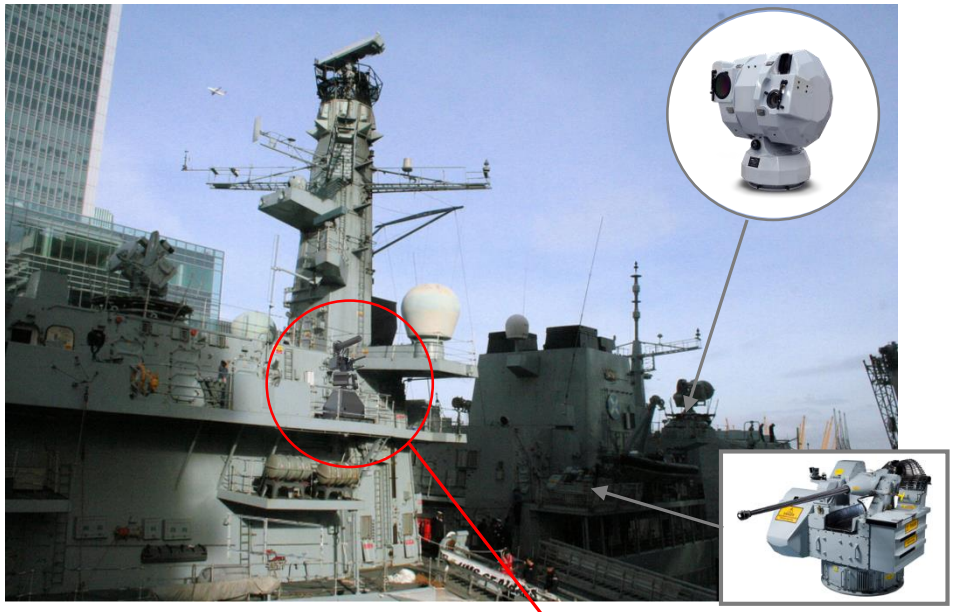
Radome Integrated C-UAS-USV Production Systems

Integration with T23 ASCG

- Modify ASCG to add CMS link as for River Class Batch 2
  - Enables Target Indication from Navigation Radar / CMS, in addition to existing TDS functionality.
- Modify ASCG to drive Effector instead of Gun Mount (rotary switch selection of serial links)
- Add Pre-mission pages for Effector mount configuration
- Add new control panel with buttons for Effector control plus Emission Control key switch.

- If Drone Alert Radar is required for Harbour Watch, separately integrate to CMS to provide cueing via CMS link.

Existing ASCG EO linked to the 30mm Bushmaster Cannon



Proposed System

Integration with River Class Batch 2 ASCG

- Existing ASCG to CMS link enables Target Indication from Navigation Radar / CMS / TDS
- Modify ASCG to drive Effector instead of Gun Mount (rotary switch selection of serial links)
- Add Pre-mission pages for Effector mount configuration
- Add new control panel with buttons for Effector control plus Emission Control key switch.

- If Drone Alert Radar is required for Harbour Watch, separately integrate to CMS to provide cueing via CMS link.
- Alternatively, add dedicated console adjacent to ROC in Control Center

Integration into Type 26 and upgrade Type 45

- EODS provides EO track capability, fully integrated with CMS
- Existing Capability with 3/5-off EO Directors

- Effector to be integrated, via new Control System Interface Unit, into the CMS
- New HMI application to be added to SCE

- If Drone Alert Radar is required for Harbour Watch, integrate, via new Control System Interface Unit, into the CMS
- New HMI application to be added to SCE
- New Safety Keys (Emission Control) to be added adjacent to existing LRF Emission Control Keys

Questions ?