Agenda

11:30 am Lunch & Networking
11:45 am Presentations
  Teresa Colella, OTT
  Mike Misumi, ITSD
  John Schuster, GED
  Norma Lee Todd, OTT
  Al Fasulo, OPC
Special Recognition of APL Researchers
  Rick Hutley, Cisco
12:58 pm Door Prize Raffle
Following the terrorist attacks of Sep. 11, 2001, the U.S. mail was utilized to propagate bioterrorist attacks upon high level governmental representatives and important members of the media.

APL’s patented technology provides the advantage of allowing real-time screening of parcels for detection of possible contaminants. This screening can be performed either prior to or following irradiation or other parcel sterilization processes.
Unless large, inflexible plates are added to present day body armor it is only protects the wearer from low energy projectiles. In addition to restricting movement, these plates do not prevent shock waves from damaging sensitive internal organs.

APL’s improved body armor device protects the wearer from high velocity rounds of military weapons, while allowing for freedom of motion.
Battery health monitors record the current and voltage, and/or coulombs of electric charges during the charging and discharging periods. Unfortunately, these monitors are large, complex, expensive, inaccurate, and high in power consumption.

APL’s patented battery health monitor is relatively small and light, accurate, and low in complexity, cost, and power consumption.
Arcing faults are high-impedance, short circuits in power supply systems caused by the heat generated by dirty and loose circuit connections. An arc generates a white-hot light and pressure shockwave that vaporizes metals and disables power distribution centers.

APL’s arcing fault detection system has both a high probability of detection and a low false alarm rate for a broad range of amperages and fault-types.
Space-time codes provide diversity in multiple-input multiple-output (MIMO) antenna systems over fading channels. However, challenges for wireless communication systems arise from the harsh RF propagation environment characterized by channel fading and co-channel interference (CCI).

APL has developed space-time codes for multi-radii AM-PSK constellations, as well as a "super-unified" space-time code construction that incorporates multi-radii AM-PSK codes with Lu-Kumar unified codes. APL’s multi-radii space-time codes transmit information at the maximum rate possible for the given signaling constellation and the achieved transmit diversity level.
As satellites become smaller and larger satellites require highly precise motion control, there is a need for improved plasma thrusters.

APL’s Pulsed Plasma Thrusters (PPTs) are compact, easy to manufacture, include no moving parts and are easy to deploy and integrate into satellite architecture. APL’s PPTs also have a greater fuel capacity than existing systems, thus increasing their duration of operation.
Moderate to severe jaundice (hyperbilirubinemia) is associated with hearing loss, encephalopathy and kernicterus, which can result in irreversible brain damage, and even death. Frequent heel pricks of high risk infants are impractical and painful and visual skin readings often underestimate jaundice severity.

APL’s device allows for continuous, minimally invasive, real-time monitoring of bilirubin levels in either blood or amniotic fluid. This device will improve early detection of bilirubin in high risk infants.
Sounding by a down-looking radar from a high-altitude aircraft or an orbiting spacecraft measures reflectivity as a function of penetration into a medium such as ice sheets or dry soil. Sounding radars need to be designed to take advantage of the different polarization characteristics of "signal" and "clutter". The fundamental property to be exploited is that backscatter from (layers at) depth is single-bounce, whereas off-nadir clutter is usually dominated by double-bounce reflections.

APL’s polarimetric methods significantly reduce cross-track clutter level relative to sounding signals from depth. These methods utilize a hybrid-polarity method and architecture that provides a circularly-polarized transmitted field and a coherent dual-polarized receiver.
Threats to human life and property are often harkened by combustion, for example, wildfires, missiles, gunfire. During the daylight hours, the visible spectrum is deluged by daylight, which masks the visible light from combustion. Conventional magneto-optical filters (MOF) are capable of filtering out light, however they have a limited field-of-view, are bulky, require continuous calibration and/or have limited usefulness for monitoring large sections of earth or sky.

APL has developed wide-field of view MOFs. These MOFs are low cost, small size and low weight, with a field of view of more than 9 degrees about a central optical axis.
The automation of the control of complex, connection-based systems (for example, engineering plants aboard naval vessels) have emphasized the infrastructure and diagnostic aspects of plant management, while interpretation of and response to the data remain largely manual tasks.

APL has developed an open control agent communication infrastructure which includes loosely coupled subsystem management control agents and a declarative model-based reasoning. Qualitative model-based reasoning provides the unique potential for performing real-time detection, identification, and diagnosis of unanticipated fault conditions.
Aerosols of biological origin represent a potential threat of infection by pathogens. This threat is particularly daunting in the context of closed spaces, such as buildings.

APL has developed a method and apparatus utilizing luminescence spectroscopy to detect potentially pathogenic bio-materials contained in a bioaerosol sample.
In both the commercial and military domains, systems are becoming increasingly networked. The power of networking is apparent through the potential for increased quantity and quality of information available for decision-makers and more efficient use of resources. The increased complexity of networked approaches has led to the need for robust systems to internal faults and to attacks from outside the network, as well as analysis to understand the impact of the system's degradation to its overall mission effectiveness.

APL has developed a deployable network defense system that monitors both network and operational activities and predicts the mission impact of alterations and disruptions of networked resources.