<?xml version="1.0" encoding="UTF-8"?>

<AVCL version="3.0" vehicleName="RescueDrone" vehicleType="UAV" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="../../schemas/AVCL.3.0.xsd">

<!-- vehicleType="USV" is also possible -->

<head>

<meta name="title" content="PiratesSeizingMerchantDefense.xml"/>

<meta name="description" content="AVCL mission to overtake pirate small-boat gang attempting to capture threatened merchant ship,

provide warning and counterattack if escalation of hostilities is warranted."/>

<meta name="created" content="27 December 2019"/>

<meta name="modified" content="16 February 2020"/>

<meta name="creator" content="Don Brutzman"/>

<meta name="reference" content="https://wiki.nps.edu/display/NOW/Ethical+Control+of+Unmanned+Systems"/>

<meta name="reference" content="https://gitlab.nps.edu/Savage/EthicalControl/raw/master/missions/PiratesSeizingMerchantDefense.png"/>

<meta name="generator" content="Altova XMLSpy, https://www.altova.com"/>

<meta name="generator" content="Apache NetBeans, https://netbeans.apache.org"/>

<meta name="generator" content="NPS Autonomous Unmanned Vehicle (AUV) Workbench, https://savage.nps.edu/AuvWorkbench"/>

<meta name="identifier"

content="https://gitlab.nps.edu/Savage/EthicalControl/tree/master/missions/avcl/PiratesSeizingMerchantDefense.xml"/>

<meta name="license" content="../license.html"/>

</head>

<body>

<MissionPreparation>

<UnitsOfMeasure distance="meters" angle="degrees" mass="kilograms" time="seconds"/>

<AgendaMission>

<LaunchPosition id="LaunchPosition" description="Ship position when robot is launched">

<LatitudeLongitude latitude="0" longitude="0"/>

</LaunchPosition>

<RecoveryPosition id="RecoveryPosition" description="Ship position when ready to recover robot">

<LatitudeLongitude latitude="0" longitude="0"/>

</RecoveryPosition>

<**GoalList**>

<!--\*Initiation Phase\* to commence operations-->

<**Goal** id="PSMD11.0" title="Deploy, Launch" description="Commit to robot support" phase="Launch" nextOnSuccess="PSMD12.0"

nextOnFailure="PSMD99.0" nextOnException="PSMD99.0">

<Rendezvous description="">

<TargetVehicleID value="100" description="Launching ship"/>

<TargetVehicleID value="101" description="This robot"/>

<!--

<TargetVehicleID value="102" description="Recovery Ship"/>

<TargetVehicleID value="103" description="Merchant Ship"/>

-->

</Rendezvous>

<OperatingArea id="AssignedOpArea">

<Point>

<LatitudeLongitude latitude="36.62" longitude="121.506"/>

<!--36°36′11″N 121°53′37″W-->

</Point>

</OperatingArea>

<Duration value="300"/>

<ReportingCriteria value="onCommence"/>

<ReportingCriteria value="periodic"/>

<ReportingCriteria value="statusChanged"/>

<ReportingCriteria value="onComplete"/>

</**Goal**>

<!--\*Approach Phase\* to overtake pirate small-boat gang attempting to capture threatened merchant ship-->

<**Goal** id="PSMD12.0" title="Transit to hostile area" description="Proceed to estimated position" phase="Transit"

nextOnSuccess="PSMD13.0" nextOnFailure="PSMD99.0" nextOnException="PSMD99.0">

<Search datumType="point" requiredPD="0.5">

<Target name="Merchant Ship" id="MerchantShip" description="Fleeing or stationary"/>

</Search>

<OperatingArea refid="AssignedOpArea"/>

<Duration value="6000"/>

</**Goal**>

<!-- Group 13 Locate Merchant has common objective, exception -->

<**Goal** id="PSMD13.0" title="Locate Merchant" description="Use best search pattern, then follow moving ship and boats"

phase="Transit" nextOnSuccess="PSMD13.1" nextOnFailure="PSMD21.0" nextOnException="PSMD99.0">

<Rendezvous description="">

<TargetVehicleID value="101" description="This robot"/>

<TargetVehicleID value="102" description="Lifeboat"/>

</Rendezvous>

<OperatingArea refid="AssignedOpArea"/>

</**Goal**>

<Goal id="PSMD13.1" title="Report position" description="Alerts updated" phase="Transit" nextOnSuccess="PSMD13.2"

nextOnFailure="PSMD13.2" nextOnException="PSMD99.0">

<MonitorTransmissions title="Send initial position report"/>

<OperatingArea refid="AssignedOpArea"/>

</**Goal**>

<**Goal** id="PSMD13.2" title="Mark with Beacon" description="Monitor wind effects and ocean current" phase="Transit"

nextOnSuccess="PSMD14.0" nextOnFailure="PSMD21.0" nextOnException="PSMD99.0">

<MarkTarget description="TODO ensure beacon/pinger in water">

<Marker type="dyeMarker"/>

<Target name="Merchant Ship Contact" id="MerchantShipContact"/>

</MarkTarget>

<OperatingArea refid="AssignedOpArea"/>

</**Goal**>

<!-- Group 14 Track Merchant has common objective and exception, includes loops-->

<**Goal** id="PSMD14.0" title="Track Merchant" description="Monitor and communicate" phase="Track" nextOnSuccess="PSMD14.1"

nextOnFailure="PSMD14.1" nextOnException="PSMD99.0">

<Search datumType="point" requiredPD="0.5" description="Track Merchant"/>

<OperatingArea refid="AssignedOpArea"/>

<Duration value="6000"/>

</**Goal**>

<**Goal** id="PSMD14.1" title="Maintain proximity" description="Beyond range of small arms" phase="Track"

nextOnSuccess="PSMD14.2" nextOnException="PSMD99.0">

<Rendezvous description="Safe standoff distance">

<TargetVehicleID value="101" description="This robot"/>

<TargetVehicleID value="102" description="Lifeboat"/>

</Rendezvous>

<OperatingArea refid="AssignedOpArea"/>

<Duration value="6000"/>

</**Goal**>

<**Goal** id="PSMD14.2" title="Periodic reports" description="Situation reports, changing status" phase="Track"

nextOnSuccess="PSMD14.3" nextOnException="PSMD99.0">

<MonitorTransmissions xsi:type="monitorTransmissionsElementType" description="Track sailor in water"/>

<OperatingArea refid="AssignedOpArea"/>

<Duration value="6000"/>

</**Goal**>

<**Goal** id="PSMD14.3" title="Continue until further orders" description="Repeat until conditions change" phase="Track"

nextOnSuccess="PSMD14.9" nextOnFailure="PSMD21.0" nextOnException="PSMD99.0">

<Patrol description="Perform any periodic requirements">

<!--TODO should be agendaGoalType allowing OperatingArea-->

</Patrol>

</**Goal**>

<**Goal** id="PSMD14.9" title="Check posture changed?" description="Task update received?" phase="Track"

nextOnSuccess="PSMD30.0" **nextOnFailure="PSMD14.0"** nextOnException="PSMD99.0">

<MonitorTransmissions xsi:type="monitorTransmissionsElementType" description="Track sailor in water"/>

<!--Branch point: note possible human override checked prior to looping.-->

<OperatingArea refid="AssignedOpArea"/>

<Duration value="6000"/>

</**Goal**>

<!-- Group 21 Request Guidance? and Group 22 Low Fuel have common objective, exception-->

<**Goal** id="PSMD21.0" title="Request Guidance?" description="Need updated position" phase="Transit" **nextOnSuccess="PSMD12.0"**

nextOnFailure="PSMD99.0" nextOnException="PSMD99.0">

<MonitorTransmissions title="Request Guidance" description="Active transmission allowed, subject to EMCON"/>

<OperatingArea refid="AssignedOpArea"/>

<Duration value="6000"/>

</**Goal**>

<**Goal** id="PSMD22.0" title="Low Fuel" description="Make best effort possible" phase="Mission Finish"

nextOnSuccess="PSMD22.1" nextOnException="PSMD99.0">

<Reposition title="Prepare to finish"/>

<OperatingArea refid="AssignedOpArea"/>

<Duration value="6000"/>

</**Goal**>

<**Goal** id="PSMD22.1" title="Remain with Merchant?" description="Choices: land on boat, attach to boat, or adrift nearby"

phase="Mission Finish" nextOnSuccess="PSMD22.2" nextOnException="PSMD99.0">

<Rendezvous title="Attach, Land or Adrift" description="as close as advisable">

<TargetVehicleID value="101" description="This robot"/>

<TargetVehicleID value="102" description="Lifeboat"/>

</Rendezvous>

<OperatingArea refid="AssignedOpArea"/>

<Duration value="6000"/>

</**Goal**>

<**Goal** id="PSMD22.2" title="Beacon?" description="While power remains" phase="Mission Finish" nextOnSuccess="PSMD99.0"

nextOnFailure="PSMD99.0" nextOnException="PSMD99.0">

<MarkTarget description="TODO ensure beacon/pinger in water">

<Marker type="dyeMarker"/>

<Target name="Lifeboat last known location" id="LifeboatLastKnownLocation"/>

</MarkTarget>

<OperatingArea refid="AssignedOpArea"/>

<Duration value="6000"/>

</**Goal**>

<!-- \*Warning Phase\* to warn pirate small-boat gang to stand down and move away, otherwise lethal force imminent-->

<**Goal** id="PSMD30.0" title="Warning Phase" description="Close interaction with pirates, merchant ship" phase="Warning"

nextOnSuccess="PSMD31.0" nextOnException="PSMD99.0"/>

<**Goal** id="PSMD31.0" title="Confirm Mission Authorities" description="Check constraints and defensive responses"

phase="Warning" nextOnSuccess="PSMD32.0" nextOnException="PSMD99.0">

<MonitorTransmissions description="Contact operational commander"/>

</**Goal**>

<!-- Group 32 IFFNU has common objective, exception-->

<**Goal** id="PSMD32.0" title="IFFNU" description="Identify Friend Foe Neutral Unknown" phase="Classify"

nextOnSuccess="PSMD32.1" nextOnFailure="PSMD32.1" nextOnException="PSMD99.0">

<SampleEnvironment description="Check local conditions and all entities in operational area"/>

</**Goal**>

<**Goal** id="PSMD32.1" title="Photograph all close contacts" description="Pass within range of small arms" phase="Classify"

nextOnSuccess="PSMD32.2" nextOnException="PSMD99.0">

<MarkTarget description="Record EM signals, take photos for classification">

<Marker type="photograph"/>

<Marker type="emScan"/>

<Target name="Pirate Boat 1" id="PirateBoat1"/>

<Target name="Pirate Boat 2" id="PirateBoat2"/>

<Target name="Pirate Boat 3" id="PirateBoat3"/>

<!-- possibly more pirates -->

<Target name="Merchant Ship" refid="MerchantShip"/>

<!-- possibly merchant ship life raft(s) -->

</MarkTarget>

</**Goal**>

<**Goal** id="PSMD32.2" title="Classify, send contact reports" description="Based on target behavior or signal/image match"

phase="Classify" nextOnSuccess="PSMD32.3" nextOnException="PSMD99.0">

<!--Does Classify computation require a separate standoff task?-->

<MonitorTransmissions description="Contact operational commander"/>

</**Goal**>

<**Goal** id="PSMD32.3" title="Confirm IFFNU classifications" description="Requires approval by human commander before

proceeding further" phase="Classify" nextOnSuccess="PSMD33.0" **nextOnFailure="PSMD14.0"** nextOnException="PSMD99.0">

<MonitorTransmissions description="Contact operational commander"/>

</**Goal**>

<!-- Group 33 Commence Warnings? decision tree has common objective, exception-->

<**Goal** id="PSMD33.0" title="Commence Warnings" description="May provoke pirate response" phase="Engagement"

nextOnSuccess="PSMD33.1" **nextOnFailure="PSMD14.0"** nextOnException="PSMD99.0">

<MonitorTransmissions description="Contact operational commander"/>

</**Goal**>

<**Goal** id="PSMD33.1" title="Notify Merchant" description="Keep crew informed, even if they cannot transmit"

phase="Engagement" nextOnSuccess="PSMD34.0" **nextOnFailure="PSMD14.0"** nextOnException="PSMD99.0">

<MonitorTransmissions description="Contact operational commander"/>

</**Goal**>

<!-- Group 34 Send Warning Messages has common objective, exception-->

<**Goal** id="PSMD34.0" title="Send Warning Messages" description="Communicate to pirates, all parties" phase="Warning"

nextOnSuccess="PSMD34.1" nextOnFailure="PSMD34.1" nextOnException="PSMD99.0">

<MonitorTransmissions description="Contact pirates"/>

</**Goal**>

<**Goal** id="PSMD34.1" title="Send multiple message paths" description="Loudspeaker, flashing light, siren, drop smoke,

bridge-bridge radio" phase="Warning" nextOnSuccess="PSMD34.2" nextOnException="PSMD99.0">

<MonitorTransmissions description="Contact pirates"/>

</**Goal**>

<**Goal** id="PSMD34.2" title="Maintain proximity" description="Just outside range of small arms" phase="Warning"

nextOnSuccess="PSMD34.3" nextOnException="PSMD99.0">

<Rendezvous description="Safe standoff distance">

<TargetVehicleID value="101" description="This robot"/>

<TargetVehicleID value="102" description="Merchant Ship"/>

</Rendezvous>

<OperatingArea refid="AssignedOpArea"/>

</**Goal**>

<**Goal** id="PSMD34.3" title="Periodic reports" description="Situation reports, changing status" phase="Warning"

nextOnSuccess="PSMD34.4" nextOnException="PSMD99.0">

<MonitorTransmissions xsi:type="monitorTransmissionsElementType" description="Track sailor in water"/>

<Duration value="6000"/>

</**Goal**>

<**Goal** id="PSMD34.4" title="Continue until further orders" description="First repeat for all designated pirates"

phase="Warning" nextOnSuccess="PSMD35.0" **nextOnFailure="PSMD14.0"** nextOnException="PSMD99.0">

<Patrol description="Perform any periodic requirements">

<!--TODO should be agendaGoalType allowing OperatingArea-->

</Patrol>

</**Goal**>

<!-- Group 35 Observe pirate response has common objective, exception-->

<**Goal** id="PSMD35.0" title="Observe pirate response" description="Monitor and report back to own ship" phase="Hostilities

Imminent" nextOnSuccess="PSMD35.1" nextOnFailure="PSMD35.1" nextOnException="PSMD99.0">

<Patrol description="Perform any periodic requirements">

<!--TODO should be agendaGoalType allowing OperatingArea-->

</Patrol>

<OperatingArea refid="AssignedOpArea"/>

</**Goal**>

<Goal id="PSMD35.1" title="Pirates retreat?" description="Stay with merchant, report if response changes"

phase="Hostilities Imminent" **nextOnSuccess="PSMD14.0"** nextOnFailure="PSMD35.2" nextOnException="PSMD99.0">

<MonitorTransmissions description="Contact pirates"/>

</**Goal**>

<**Goal** id="PSMD35.2" title="Pirates attack?" description="Stay with merchant, counterattack if response changes"

phase="Hostilities Imminent" nextOnSuccess="PSMD40.0" nextOnFailure="PSMD35.3" nextOnException="PSMD99.0">

<MonitorTransmissions description="Contact pirates"/>

</**Goal**>

<**Goal** id="PSMD35.3" title="Maintain proximity" description="Just outside range of small arms" phase="Hostilities Imminent"

nextOnSuccess="PSMD35.4" nextOnException="PSMD99.0">

<Rendezvous description="Safe standoff distance">

<TargetVehicleID value="101" description="This robot"/>

<TargetVehicleID value="102" description="Merchant Ship"/>

</Rendezvous>

<OperatingArea refid="AssignedOpArea"/>

</**Goal**>

<**Goal** id="PSMD35.4" title="Periodic reports" description="Situation reports, changing status - note ship may have EMCON

radio silence" phase="Hostilities Imminent" nextOnSuccess="PSMD35.5" nextOnException="PSMD99.0">

<MonitorTransmissions xsi:type="monitorTransmissionsElementType" description="Track sailor in water"/>

<Duration value="6000"/>

</**Goal**>

<**Goal** id="PSMD35.5" title="Continue until further orders" description="Repeat until conditions change" phase="Hostilities

Imminent" nextOnSuccess="PSMD36.0" nextOnException="PSMD99.0">

<Patrol description="Perform any periodic requirements">

<!--TODO should be agendaGoalType allowing OperatingArea-->

</Patrol>

<OperatingArea refid="AssignedOpArea"/>

</**Goal**>

<**Goal** id="PSMD36.0" title="Check posture changed?" description="Task update received" phase="Hostilities Imminent"

nextOnSuccess="PSMD37.0" **nextOnFailure="PSMD35.0" nextOnException="PSMD14.0"**>

<MonitorTransmissions xsi:type="monitorTransmissionsElementType" description="Track sailor in water"/>

<Duration value="6000"/>

</**Goal**>

<**Goal** id="PSMD37.0" title="Fire Warning Shot" description="Warning shots remain an available option for human commanders.

Lethal force is authorized." phase="Hostilities Imminent" **nextOnSuccess="PSMD31.0" nextOnFailure="PSMD31.0"**

nextOnException="PSMD99.0">

<Attack title="Attack pirate boats" description="Use of Lethal Force is authorized"/>

</**Goal**>

<!-- \*Interdiction Phase\* Counterattack to force pirate small-boat gang withdrawal from threatened merchant ship-->

<**Goal** id="PSMD40.0" title="Attack" description="Close interaction with pirates, merchant ship" phase="Counter Attack"

nextOnSuccess="PSMD41.0" nextOnFailure="PSMD41.0" nextOnException="PSMD99.0"/>

<**Goal** id="PSMD41.0" title="Attack Pirate Boats in priority order" description="Rapidly engage, shoot to disable or kill.

Lethal force still authorized." phase="Counter Attack" nextOnSuccess="PSMD41.1" nextOnException="PSMD99.0">

<Attack title="Attack pirate boats" description="Use of Lethal Force is authorized"/>

</**Goal**>

<**Goal** id="PSMD41.1" title="Pirates retreat?" description="Stay with merchant, report if response changes" phase="Counter

Attack" **nextOnSuccess="PSMD14.0"** nextOnFailure="PSMD41.2" nextOnException="PSMD99.0">

<MonitorTransmissions description="Contact pirates"/>

</**Goal**>

<**Goal** id="PSMD41.2" title="Pirates attacking?" description="Stay with merchant, counterattack if response changes"

phase="Counter Attack" nextOnSuccess="PSMD41.3" nextOnException="PSMD42.0">

<MonitorTransmissions description="Contact pirates"/>

</**Goal**>

<**Goal** id="PSMD41.3" title="Maintain proximity" description="Just outside range of small arms" phase="Counter Attack"

nextOnSuccess="PSMD41.4" nextOnException="PSMD99.0">

<Rendezvous description="Safe standoff distance">

<TargetVehicleID value="101" description="This robot"/>

<TargetVehicleID value="102" description="Merchant Ship"/>

</Rendezvous>

<OperatingArea refid="AssignedOpArea"/>

</**Goal**>

<**Goal** id="PSMD41.4" title="Periodic reports" description="Situation reports, changing status - note ship may have EMCON

radio silence" phase="Counter Attack" nextOnSuccess="PSMD41.5" nextOnException="PSMD99.0">

<MonitorTransmissions xsi:type="monitorTransmissionsElementType" description="Track sailor in water"/>

<Duration value="6000"/>

</**Goal**>

<**Goal** id="PSMD41.5" title="Continue until further orders" description="Repeat until conditions change" phase="Counter

Attack" **nextOnSuccess="PSMD36.0"** nextOnException="PSMD99.0">

<Patrol description="Perform any periodic requirements">

<!--TODO should be agendaGoalType allowing OperatingArea-->

</Patrol>

<OperatingArea refid="AssignedOpArea"/>

</**Goal**>

<**Goal** id="PSMD42.0" title="Low or no ammunition: need to disengage?" description="Hold ammunition in reseve, or else fight

to the finish" phase="Counter Attack" **nextOnSuccess="PSMD14.0" nextOnFailure="PSMD41.3"** nextOnException="PSMD90.0">

<MonitorTransmissions xsi:type="monitorTransmissionsElementType" description="Track sailor in water"/>

<Duration value="6000"/>

</**Goal**>

<**Goal** id="PSMD43.0" title="Check for guidance, resume tracking or continue attacking?" description="Humans monitoring

attack can interrupt or override" phase="Counter Attack" **nextOnSuccess="PSMD14.0" nextOnFailure="PSMD41.0"**

nextOnException="PSMD90.0">

<MonitorTransmissions xsi:type="monitorTransmissionsElementType" description="Track sailor in water"/>

<Duration value="6000"/>

</**Goal**>

<!-- \*Recovery Phase\*-->

<**Goal** id="PSMD90.0" title="Check relieved by other asset" description="Continue tracking merchant unless further task

update recieved" phase="Mission Finish" **nextOnSuccess="PSMD14.0" nextOnFailure="PSMD14.0"** nextOnException="PSMD99.0">

<MonitorTransmissions xsi:type="monitorTransmissionsElementType" description="Track sailor in water"/>

<Duration value="6000"/>

</**Goal**>

<!--Group 99 has common objective: Global Default Exception and terminal states-->

<**Goal** id="PSMD99.0" title="Proceed to recovery" description="Mission complete, prepare for pickup" phase="Recover Robot"

nextOnSuccess="PSMD99.1" nextOnFailure="PSMD99.2" nextOnException="PSMD99.3">

<Reposition description="Return to ship or other recovery point"/>

<OperatingArea refid="AssignedOpArea"/>

<Duration value="6000"/>

</**Goal**>

<**Goal** id="PSMD99.1" title="Halt and prepare for recovery" description="Operations completed, final success state"

phase="Recover Robot">

<Rendezvous description="Recovery by ship">

<TargetVehicleID value="101" description="This robot"/>

<TargetVehicleID value="102" description="Recovery Ship"/>

</Rendezvous>

<OperatingArea refid="AssignedOpArea"/>

<Duration value="0"/>

</**Goal**>

<**Goal** id="PSMD99.2" title="Halt and deploy recovery beacon" description="Unable to operate, final failure state"

phase="Recover Robot">

<Rendezvous description="Recovery by ship">

<TargetVehicleID value="101" description="This robot"/>

<TargetVehicleID value="102" description="Recovery ship"/>

</Rendezvous>

<OperatingArea refid="AssignedOpArea"/>

<Duration value="0"/>

</**Goal**>

<**Goal** id="PSMD99.3" title="Halt and await further orders" description="Unplanned failure, final exception state"

phase="Recover Robot">

<Rendezvous description="Recovery by ship">

<TargetVehicleID value="101" description="This robot"/>

<TargetVehicleID value="102" description="Recovery ship"/>

</Rendezvous>

<OperatingArea refid="AssignedOpArea"/>

<Duration value="0"/>

</**Goal**>

</**GoalList**>

</AgendaMission>

</MissionPreparation>

</body>

</AVCL>