

EXTENDS *Integers, TLC*

VARIABLES

currentTime, *timeUntilMissionEnds*, *MissionEndTime*, *MinTimeInterval*, *MaxTimeInterval*,
droneattack, *sensorbreak*, *operatorerror*, *whethermisestimation*, *exhaustion*,
poorworkspaceeffeciency, *TransmitterAntennafailure*, *ElectricLoss*,
recieveranteenafailure, *decodingfailure*, *impropersyncro*, *nosoftwareupdatation*,
OSPproblem, *unmanagedrisk*, *virusAttack*, *onboardcomputerloss*, *actuator*, *servomotorDefault*,
cabledisrution, *sensor*, *controller*, *powercoolingfailure*, *carburetorfailure*, *adsymalreaction*,
insufficienttraining, *poorstrategy*, *assemblydefault*, *obstacles*, *suddenpropellerhalt*, *camerafailure*,
arealmapiinaccuracy, *satellitesignalloss*, *GPShardwaredefault*

Init \triangleq

\wedge *currentTime* = 0
 \wedge *MissionEndTime* = 30
 \wedge *MinTimeInterval* = 20
 \wedge *MaxTimeInterval* = 50
 \wedge *timeUntilMissionEnds* = *MissionEndTime*
 \wedge *droneattack* = "False"
 \wedge *sensorbreak* = "False"
 \wedge *operatorerror* = "False"
 \wedge *whethermisestimation* = "False"
 \wedge *exhaustion* = "False"
 \wedge *poorworkspaceeffeciency* = "False"
 \wedge *TransmitterAntennafailure* = "False"
 \wedge *ElectricLoss* = "False"
 \wedge *recieveranteenafailure* = "False"
 \wedge *decodingfailure* = "False"
 \wedge *impropersyncro* = "False"
 \wedge *nosoftwareupdatation* = "False"
 \wedge *OSPproblem* = "False"
 \wedge *unmanagedrisk* = "False"
 \wedge *virusAttack* = "False"
 \wedge *onboardcomputerloss* = "False"
 \wedge *actuator* = "False"
 \wedge *servomotorDefault* = "False"
 \wedge *cabledisrution* = "False"
 \wedge *sensor* = "False"
 \wedge *controller* = "False"
 \wedge *powercoolingfailure* = "False"
 \wedge *carburetorfailure* = "False"
 \wedge *adsymalreaction* = "False"
 \wedge *insufficienttraining* = "False"
 \wedge *poorstrategy* = "False"

$\wedge \text{assemblydefault} = \text{"False"}$
 $\wedge \text{obstacles} = \text{"False"}$
 $\wedge \text{suddenpropellerhalt} = \text{"False"}$
 $\wedge \text{camerafailure} = \text{"False"}$
 $\wedge \text{arealmapinaccuracy} = \text{"False"}$
 $\wedge \text{satellitesignalloss} = \text{"False"}$
 $\wedge \text{GPShardwaredefault} = \text{"False"}$

$\text{collision} \triangleq$
 $\wedge \text{droneattack} \in \{\text{"True"}, \text{"False"}\}$
 $\wedge \text{sensorbreak} \in \{\text{"True"}, \text{"False"}\}$
 $\wedge \text{operatorerror} \in \{\text{"True"}, \text{"False"}\}$

$\text{communicationfailure} \triangleq$
 $\wedge \text{whethermisestimation} \in \{\text{"True"}, \text{"False"}\}$
 $\wedge \text{exhaustion} \in \{\text{"True"}, \text{"False"}\}$
 $\wedge \text{poorworkspaceefficiency} \in \{\text{"True"}, \text{"False"}\}$

$\text{connectionfailure} \triangleq$
 $\wedge \text{TransmitterAntennafailure} \in \{\text{"True"}, \text{"False"}\}$
 $\wedge \text{ElectricLoss} \in \{\text{"True"}, \text{"False"}\}$

$\text{recievefailure} \triangleq$
 $\wedge \text{recieveranteenafailure} \in \{\text{"True"}, \text{"False"}\}$
 $\wedge \text{decodingfailure} \in \{\text{"True"}, \text{"False"}\}$
 $\wedge \text{impropersyncro} \in \{\text{"True"}, \text{"False"}\}$

$\text{sensorfailure} \triangleq$
 $\wedge \text{communicationfailure}$
 $\wedge \text{connectionfailure}$
 $\wedge \text{recievefailure}$

$\text{softwarefailure} \triangleq$
 $\wedge \text{nosoftwareupdatation} \in \{\text{"True"}, \text{"False"}\}$
 $\wedge \text{OSPproblem} \in \{\text{"True"}, \text{"False"}\}$
 $\wedge \text{unmanagedrisk} \in \{\text{"True"}, \text{"False"}\}$
 $\wedge \text{virusAttack} \in \{\text{"True"}, \text{"False"}\}$

$\text{hardwarefailure} \triangleq$
 $\wedge \text{onboardcomputerloss} \in \{\text{"True"}, \text{"False"}\}$
 $\wedge \text{actuator} \in \{\text{"True"}, \text{"False"}\}$
 $\wedge \text{servomotorDefault} \in \{\text{"True"}, \text{"False"}\}$
 $\wedge \text{cabledisruption} \in \{\text{"True"}, \text{"False"}\}$
 $\wedge \text{sensor} \in \{\text{"True"}, \text{"False"}\}$
 $\wedge \text{controller} \in \{\text{"True"}, \text{"False"}\}$

$\text{enginefailure} \triangleq$

$\wedge hardwarefailure$
 $\wedge powercoolingfailure \in \{\text{"True"}, \text{"False"}\}$
 $\wedge carburetorfailure \in \{\text{"True"}, \text{"False"}\}$

 $humanfailure \triangleq$
 $\wedge adsymalreaction \in \{\text{"True"}, \text{"False"}\}$
 $\wedge insufficienttraining \in \{\text{"True"}, \text{"False"}\}$
 $\wedge poorstrategy \in \{\text{"True"}, \text{"False"}\}$

 $propellerfailure \triangleq$
 $\wedge assemblydefault \in \{\text{"True"}, \text{"False"}\}$
 $\wedge obstacles \in \{\text{"True"}, \text{"False"}\}$
 $\wedge suddenpropellerhalt \in \{\text{"True"}, \text{"False"}\}$
 $\wedge camerafailure \in \{\text{"True"}, \text{"False"}\}$

 $lossofpropulsion \triangleq$
 $\wedge enginefailure$
 $\wedge humanfailure$
 $\wedge propellerfailure$

 $GPSfailure \triangleq$
 $\wedge arealmapinaccuracy \in \{\text{"True"}, \text{"False"}\}$
 $\wedge satellitesignalloss \in \{\text{"True"}, \text{"False"}\}$
 $\wedge GPSHardwaredefault \in \{\text{"True"}, \text{"False"}\}$

 $Next \triangleq$
 $\wedge currentTime' = currentTime + 1$
 $\wedge timeUntilMissionEnds' = timeUntilMissionEnds - 1$
 $\wedge MissionEndTime' = MissionEndTime$
 $\wedge MinTimeInterval' = MinTimeInterval$
 $\wedge MaxTimeInterval' = MaxTimeInterval$
 $\wedge droneattack' = \text{"False"}$
 $\wedge sensorbreak' = \text{"False"}$
 $\wedge operatorerror' = \text{"False"}$
 $\wedge whethermisestimation' = \text{"False"}$
 $\wedge exhaustion' = \text{"False"}$
 $\wedge poorworkspaceeffeciency' = \text{"False"}$
 $\wedge TransmitterAntennafailure' = \text{"False"}$
 $\wedge ElectricLoss' = \text{"False"}$
 $\wedge recieveranteenafailure' = \text{"False"}$
 $\wedge decodingfailure' = \text{"False"}$
 $\wedge impropersyncro' = \text{"False"}$
 $\wedge nosoftwareupdatation' = \text{"False"}$
 $\wedge OSPproblem' = \text{"False"}$
 $\wedge unmanagedrisk' = \text{"False"}$
 $\wedge virusAttack' = \text{"False"}$

$\wedge \text{onboardcomputerloss}' = \text{"False"}$
 $\wedge \text{actuator}' = \text{"False"}$
 $\wedge \text{servomotorDefault}' = \text{"False"}$
 $\wedge \text{cabledisruption}' = \text{"False"}$
 $\wedge \text{sensor}' = \text{"False"}$
 $\wedge \text{controller}' = \text{"False"}$
 $\wedge \text{powercoolingfailure}' = \text{"False"}$
 $\wedge \text{carburetorfailure}' = \text{"False"}$
 $\wedge \text{adsymalreaction}' = \text{"False"}$
 $\wedge \text{insufficienttraining}' = \text{"False"}$
 $\wedge \text{poorstrategy}' = \text{"False"}$
 $\wedge \text{assemblydefault}' = \text{"False"}$
 $\wedge \text{obstacles}' = \text{"False"}$
 $\wedge \text{suddenpropellerhalt}' = \text{"False"}$
 $\wedge \text{camerafailure}' = \text{"False"}$
 $\wedge \text{arealmapinaccuracy}' = \text{"False"}$
 $\wedge \text{satellitesignalloss}' = \text{"False"}$
 $\wedge \text{GPShardwaredefault}' = \text{"False"}$
 $\wedge \text{collision}$
 $\wedge \text{softwarefailure}$
 $\wedge \text{sensorfailure}$
 $\wedge \text{enginefailure}$
 $\wedge \text{loss of propulsion}$
 $\wedge \text{GPSfailure}$

$\text{MissionCompleted} \triangleq \text{timeUntilMissionEnds} \leq 0$

$\text{Spec} \triangleq \text{Init} \wedge \Box[\text{Next}](\langle \text{currentTime}, \text{timeUntilMissionEnds}, \text{MissionEndTime}, \text{MinTimeInterval},$
 $\text{MaxTimeInterval}, \text{droneattack}, \text{sensorbreak}, \text{operatorerror}, \text{whethermisestimation}, \text{exhaustion},$
 $\text{poorworkspaceefficiency}, \text{TransmitterAntennafailure}, \text{ElectricLoss},$
 $\text{recieverantennafailure}, \text{decodingfailure}, \text{impropersyncro}, \text{nosoftwareupdataion},$
 $\text{OSPproblem}, \text{unmanagedrisk}, \text{virusAttack}, \text{onboardcomputerloss}, \text{actuator}, \text{servomotorDefault},$
 $\text{cabledisruption}, \text{sensor}, \text{controller}, \text{powercoolingfailure}, \text{carburetorfailure}, \text{adsymalreaction},$
 $\text{insufficienttraining}, \text{poorstrategy}, \text{assemblydefault}, \text{obstacles}, \text{suddenpropellerhalt}, \text{camerafailure},$
 $\text{arealmapinaccuracy}, \text{satellitesignalloss}, \text{GPShardwaredefault} \rangle$