

Sponsor Provided Mission Matrix

PODBot Phase II Team #25018

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Organization: Raytheon

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1.0 Mission Matrix

At the beginning of this project, the sponsors provided a document titled *Mission Matrix*. This matrix defined the various types of missions that the POBBot system could be deployed to. To manage the scope of this project and make it feasible for the time allotted for this project, the sponsors allowed the team to pick their two favorite missions and then added a third mission of their choice. Below are the various First Responder (FR), SWAT, and Border Patrol (BP) missions the team was allowed to choose from. The sponsors added Tandem Mission 1 (TD-1) as their mission of choice for the team. The team chose First Responder Mission 2 (FR-2) and Border Patrol Mission 3 (BP-3) as the missions the team wanted to complete.

Sponsor Provided Mission Matrix Revision 2.0 - 9/20/2024				
Mission ID	Mission Description	Mission Purpose	Mission Special Attributes	Comments
FR-1	Recon Collapsed Building	Safety inspection and finding survivors of earthquakes	High definition (HD) video, possibly infrared (IR)	This could be either air or ground, both would be useful, ground would be tracked
FR-2	Small Med-pack Delivery	To deliver medical supplies to trapped victims in collapsed buildings or trapped in the open on a cliff or etc, stay on station to observe/monitor victim	Low definition (LD) video, easy access payload bay, two-way radio	This could be both air and or ground bot
FR-3	Forward Radio Relay-Indoor	To provide forward radio links in compromised environments such as collapsed buildings and subterranean environments like mines	LD video for navigation in confined spaces, payload is ultra high frequency (UHF) relay on self-contained battery	Expected to be ground bot, an antenna will need to be stowed and then deployed, *payload should have its own power for mission support
SWAT-1	Recon Hostage Situation	To provide on-site but covert/low observable imaging and possibly com link	HD Video, audio, and or 2-way radio communication	This could be air or ground, covert or overt. Note the mission duration may just be in observation mode not flight mode for the full duration
SWAT-2	Covert Short Term Surveillance	To provide high def. video and audio for recon of large-scale infrastructure environment searching for hostiles in a crowd	HD video, audio, local signal processing for facial recognition filtering, low observable features, 240-minute	This would most likely be a quad bot with a disguise and a low audible signature, needs to broadcast video and telemetry for 3 hours of non-flight

			transmit time	
SWAT-3	Ammo Re-Supply	To provide ammunition to entrenched SWAT in an armed standoff	HD video, Audio, large payload carrying capacity of 20 pounds (lbs)	Most likely a ground bot, tracked or fat wheel, needs to have a large payload volume, low center of gravity
BP-1	Recon Wide Area Desert	To provide high-definition reconnaissance of open desert in daytime missions OR long wave infrared (LWIR) for Night Time missions	HD Vid, or Long Wave Infrared(LWIR) for nighttime missions, maybe gimbaled	This is an airborne platform with a significant surveillance mission duration of 12 hours
BP-2	Deliver Unattended Sensors	To provide the delivery and local monitoring of covert seismic, audio, or video sensors on trails or choke points to monitor illegal activities	HD video, releasable payload capability, 2 lbs payload capacity, and onboard transmit/receive capability to monitor sensors and transmit data	This is an airborne platform with the unique attribute of being able to dispense 4 unattended sensors separately in different locations. The Quad will then stay near the area to be the sensor data relay point
BP-3	Tunnel Recon	To provide makeshift tunnel reconnaissance to detect human presence and to provide threat assessment before BP entry	HD Video, Audio, low light, or LWIR capable, consider covert disguise to avoid detection and provide extended monitoring of tunnel	This could be either air or ground, both would be useful, ground would be equipped with Tracks or fat wheels, covert or overt, capable of long-term sensor monitor and transmission in covert mode
BP-4	Covert Long Term Surveillance	To provide long-term video surveillance of a desert area where several ingress choke points are visible like hilltops, This is a fly-in and park mission	HD video and or LWIR, gimbaled, global positioning system (GPS), long mission broadcast duration, or sense and respond broadcast	This will be a quadcopter type of bot with a fairly significant power supply for video uplink but could be a "trail cam" type sense and respond to limit radioactivity
TD-1	Tunnel Recon with a small med-pack delivery	To provide real-time video and audio reconnaissance in confined spaces for situational awareness, enabling ground units to secure tunnels and deliver rapid medical aid via aerial support, ensuring all personnel remain informed through a unified Graphical User Interface (GUI).	All of the sensors from FR-2 and BP-3	Both drones stream video and "talk" back to a single GUI. Confined spaces, object awareness, obstacle avoidance, vertical descent into border patrol tunnel.

Table 1.0.1 - Mission Matrix Description: The above table is a mission matrix provided by the sponsors.

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Mission ID	Mission Duration for Nav (Minutes)	Mission Duration for Effectors (minutes)	Effective Mission Distance (meter)	Max Mission Altitude (meter)	Day/Night?
FR-1	30	90	100	100	Both
FR-2	30	120	200	500	Both
FR-3	60	360	200	NA	Both
SWAT-1	30	240	200	100	Both
SWAT-2	30	240	300	100	Day
SWAT-3	30	30	200	50	Both
BP-1	30	720	500	1000	Both
BP-2	30	720	1000	500	Day
BP-3	60	720	1000	100	Both
BP-4	60	720	1000	1000	Both
TD-1	60	720	1000	100	Both

Table 1.0.2 - Mission Matrix Specifications: The above table is the continuation of the mission matrix provided by the sponsors. In this table, it displays the numerical specifications of each mission.