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| Requirement List | | |
| No | Requirement Description | D/W |
| 1 | Shape, Dimensions & Weight |  |
| 1.0 | Body |  |
| 1.0.1 | The RANGERover is shaped like dog with a conical head, which is to improve the aerodynamic design. The overall dimension of the RANGERover is about 2ft tall and weighs around 10KG. | D |
| 1.0.2 | The body comprises of a box compartment which could hold battery along with rescue items like oxygen, water ...etc based on the corresponding variant information coded. | D |
| 1.0.3 | The conical head acts as fire extinguisher at times to save a person in distress. It holds two cannisters that are pressurized with nitrogen or carbon dioxide (CO2) to propel a stream of fire-squelching agent to the fire. The tip of the head has a nozzle that sprays the pressurized fluid on to the fire.  There is also a Camera that also supports infrared mounded on the head. |  |
| 1.0.4 | The legs are of height 20cm, and are capable of making a full 360-degree rotation. These are used as paddles to help the RANGERover Swim in case of a water rescue mission. They can withstand weight up to 20KG. | D |
| 1.0.5 | The spiral tail is useful to tie itself to a sturdy object in case of trembling caused by earthquakes, hurricanes… etc. Also, this comes in handy and can be used as a propeller in water rescue operations. | D |
| 2 | Kinematics |  |
| 2.0 | Leg |  |
| 2.0.1 | The leg is a complex system of mechanics, which helps the RANGERover to traverse through rubble. The leg is capable of rotating a full 360-degree which acts as paddles during water rescue operations. Used to achieve the **AS10.** | D |
| 2.0.2 | The elbow that is part of the leg, gives that extra spring tension needed to jump long distances. | D |
| 2.0.3 | The leg often acts as a robot arm in scenarios that need precision. For example, in case where a certain obstacle is to moved from its path this comes in handy. | D |
| 2.1 | Tail |  |
| 2.1.0 | The tail is made of a highly tempered high-carbon steel and nano particles which would help us to reform their shape accordingly. | D |
| 2.1.1 | The spiral shape of the tail is used in water rescue operations as a propeller to move the RANGERover forward and the legs are used as paddles to move in a specific direction. | D |
| 3 | Functional Requirement |  |
| 3.0 | Hardware Functional Requirements |  |
| 3.0.1 | The Central controller that monitors and carries out all operations are **ARM Cortex-A72** processor based on 64-bit ARM v8-A design. This processor handles all the camera, sensors, robotic arm,battery and tail functionalities along with its diagnostics. | D |
| 3.0.2 | The accelerometer is helpful in identifying the orientation of the RANGERover and also its sensor data feedback along with Camera mounted on the head (Refer **1.0.3**) can be used for to stabilize the RANGERover during rescue operations. (Refer **AS10**) | D |
| 3.0.3 | The Robotic ARM/Leg is controlled via a Robotic controller, which is capable of actuating them based on the situation.  For example: In case of RANGERover tipped over on its back by an impact, the Robotic controller rotates all the 4Legs by 180 degree to get back up. (Refer section **2.0** & **AS10**) | D |
| 3.0.4 | Battery that is placed in the compartment will be charged already before deployment. To carry out longer mission, instead of prolongating battery capacity we have an additional solar panel charging capability which is placed on top of the body (Refer **1.0.2**). |  |
| 3.1 | Software Functional Requirements |  |
| 3.1.1 | The Central controller uses the image processing algorithm (YOLO) which in turn uses the camera output in real time to differentiate between objects and living species and also to make decisions during navigation. Also, the real time camera data is being streamed by HLS(HTTP Live Streaming) to a nearby station via which an operator supervises the RANGERover. (Refer **AS10 & 3.0.1**) | D |
| 3.1.2 | The RANGERover contains an AI that is self-aware and always learning and evolving. This AI makes decision in Real time during rescue operations which is again monitored by personals. | D |
| 3.1.3 | The AI in the central controller uses the accelerometer (Refer **3.0.2**) output to know the RANGERover orientation at all times. In case of **AS10**, the AI would be able to make its own decision and actuate the Robotic ARMs/Legs accordingly to get RANGERover back to its Normal Position. | D |
| 3.1.4 | As mentioned in **AS10** , the standard time threshold set is 5sec, before which the RANGERover is unable to move on or the battery capacity isn’t sufficient enough to carry out the mission(Refer **3.0.4**) we consider the system as compromised and request the nearby station for a replacement to be deployed. | D |
| 3.1.5 | Battery status is always checked by the Central controller and analysed by the AI to see if it’s enough to see the mission through. (Disclaimer: More obstacles result in battery drainage |  |