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| **Application Scenario**  RANGERover tipped over (Land) | May 4,2020 | **AS10** | Page 1 |
| **Description of the partial development task AS10:**  When the RANGERover is tipped over, there must be a mechanism in place for it to get back up. So, it should be smart enough to understand the physical impact that disrupted its movement and based on that it must be able to suggest a sequential actuation of mechanics in place to get it back on its feet. Since time is critical in these situations, there should be a standard time threshold set within which it must move on from any disruptive scenario. This standard time threshold must be discussed and agreed on with us in advance. Consider a scenario where its not able to get back up, in this deadlock situation the behaviour of the RANGERover should have been predicted in advance and an alternate RANGERover must be deployed in its place. At any point in time, the battery levels must be taken in to account on whether it will be sufficient enough to scout the area and carry out certain other rescue operation without any hinderance. | | | |
| **Principle solution for AS10:**  Just like in mobile phones where the screen rotation is identified using sensor and the display orientation is also adapted accordingly. We will use a similar sensor(accelerometer) to identify the orientation of the RANGERover at all times. Relative to ground the accelerometer helps us to detect small changes in the positioning of the RANGERover. Based on this data, we must be able to keep the robot upright at all times to enable its movements. Whenever there is a physical impact as a result of which the positioning of the RANGERover is incorrect and hence cannot carry out it orders anymore we call it a disruption. During disruption our only focus would be to use the surrounding environment information from the camera along with the sensor data processing to bring RANGERover back to its normal position. Since the RANGERover is self-aware, based on the analysis result it carries out the mechanical actuations of the legs to bring itself back to its stable position.    **Fig 12.1:** Normal Position of RANGERover    **Fig 12.2:** Identification of RANGERover position based on accelerometer information | | | |