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| **#** | **Design Decisions** | **Related Requirement #** | **Explanation** |
| 1. | Instead of 2 motors,2 wheels and a free wheel model, 4 wheels and 4 motors model is implemented. | 1,3,&5 | At first it may seem that 4 motor model is not a favorable choice in terms of budget. Nevertheless when one thinks about the cost of the equipment in order to convert the two wheels in the front to freely rotating wheels, the price is almost the same. Besides 4 wheel model provides easier movement also on uneven surfaces. |
| 2. | Differential drive is used for the motors. | 1,2,&3 | This choice is made considering the mechanical simpleness of these drives. |
| 3. | IR distance sensor is placed at the front of the robot. | 1 | For the front of the robot more sensitive sensor is needed to follow the robot infront properly. Due to this fact IR sensor is chosen over ultrasonic one for the front of the robot. |
| 4. | To obtain the lateral distance ultrasonic sensors are placed to the sides of the robot. | 2 | Ultrasonic distance sensors are used to keep a minimum lateral distance to prevent crashes while the robot is leaving the convoy. |
| 5. | With image processing, front distance, robot’s direction and detection of the flag to leave the convoy are achieved. | 1&3 | Image Processing not only provides the detection of the leave flag, it also gives accurate distance and direction information of the robot infront. |
| 6. | To understand if the robot is the last one, solar panels are implemented to detect the laser which is the last one flag. | 3 | Solar panels are implemented on the sides of the robot. The purpose of these panels are to detect the laser and according to the measured voltage difference help the robot to understand that its the last one in the convoy. |
| 7. | 38 kHz IR receiver is used to be able to leave the line with the external command. | 2 | A high frequency signal is chosen for the external leave command in order to prevent any interfences with the other sensors of the robot. |
| 8. | Custom chassis from MDF is made. | 4 &5 | A new chassis is designed and implemented according to the standards. Since its made of MDF it is cheap and light which are desirable for the robot. Also new chassis provides more space and neatness for the module implementation on the robot. |