1 page summary of project

Fun: The rack & pinion is the most interesting/ challenging part.
Name of robot is Ruby Mach, it was choosed by Alamezie Victory. Ruby stands for Rubochi , Mach means Machine
Fun story about our robot (url) is that initially when we started building the most challenging part of the robot (rack & pinion). We find it difficult to achieve because of its complexity and lack of LEGO bricks. We became frustrated and got confused. Sometimes it works; sometimes it fails so it was full of mixed reactions. Then all students told the teachers (coach) that the robot design/built is not good and should be completely changed. But the teacher told us that we should be patient and work more on the robot and the attachment (rack &pinion), that if it doesn't work after working on it for the next few days, then he accepts the decision of the whole team to change the design of the robot.
After few days of practice, modification, and thinking out of the box we were able to perfect the robot programming/design and the attachment (rack & pinion).
What is interesting; is that the very moment we perfected it we were all happy and jumped up and down in expression of our feeling then one of us shouted that remember I told you to believe in the coach (teacher) when he told us not to discard the design and make it work he then make a gesture with his hand touching his head (meaning that the teacher is very brave). We all busted into laugh as he was making that gesture and emphasizing that, even the teacher saw him and was laughing. Ever since then we always believe in ourselves and listen to the instruction of the coach.

STRATEGY: (a).The team strategy is to have a robot that perform mission with high accuracy and allow attachment that are permanent on the robot or performs more than one task

(b) We Wrote programs that enable the robot to perform more than one tasks before coming back to the home to avoid multiple number of touching the robot and replacing attachment which will consume time because of man made errors.

(c) Another interesting strategy is that we did not use too many attachments.
(d) We always start our missions with the task that has highest scores among the task that we want to do the round (2.5min), also we start a mission with the closest task.
Success of mission completion: our robot is very successful in completing the chosen mission. Success rate is 90% per mission.
Favourite missions: Favourite mission includes: basketball, slide and bench. Reasons: The basketball is a difficult mission to complete. Not very many competing teams can completely performs the missions. (In fact no school (team) completed the mission in the north zone during the zonal competition) except our robot. And it's accuracy of performing the mission is 100%. It has program and mechanism that always correct errors if there is any when performing the mission. The robot can place a cube in the basket also raise the basket up to the highest point.
The robot always removes the human from the slide and bring them home; success rate is 100%.

BENCH: This mission is of the mission that has the highest possible point. Ruby machine has a success rate of 85%.
Design process: when we started designing the robot, we were following existing designs that we could find (outline and in the spike building guidelines). But due to lack of expansion kits, we were limited in achieving those designs. We had to stop following existing designs and focus on making the robot design in our own way to suit the mission we want to perform. We continue modifying the robot as we practice and fix errors that arises.

DIFFERENT TEAM MEMBERS:
Mechanical design: our robot design is a very high robot. So we make sure there are parts at the base of the robot that gives support, this ensure that despite the height of the robot it remains stable and never fall off. It is very easy to remove or add attachment to the robot because all attachment where on the rack & pinion. Which provide extension for the attachments for easy addition / removal.

Movement (drive train): the robot uses the big tire to move which make it cover more ground in less time compared to small tire.
Attachments: our robot (ruby machine) has three attachment and five gears systems (mechanism) to operate or complete mission.
1. The rack & pinion has a removable / detachable level that carries cube and in the basket and also uses the carrier (lever) to raise the basket/cube to the peak of the basketball stand. The lever has a mechanism that drops cube and ensure that the cube is accurately placed inside the basket without falling off. Another mechanism with the carrier is what we call the connecting/correcting rode; this ensures that as the robot approaches the basket; if the connecting Lever is about to miss the target (basket), the connecting rode/correcting rode correct the error and forces it to be placed accurately with the basket.
These mechanisms ensure that the robot produces 99.9% result whenever the mission is attempted.
Drive train; talking about how our robot moves; our robot move in a manner that prevent errors or move in a certain direction to correct or ensure a mission is completed accurately. Examples of our error correction movement (drive train) can be seen during our bench mission. The robot will move twice if the cubes are not yet in the bench or if the bench is not fell down. We call this movement(drive train) *error correction*..

Programming: The robot is programmed using the prime spike software. To ensure consistent results movement from one point to the other, the program has an

algorithm which is written to correct errors or avoid errors while the robot is moving along the mission field. For instance; if the robot is moving from point A to point B it's programmed to move straight no matter what happens; this was possible by configuring the inbuilt gyro sensor and using the right algorithm. The turning of the robot at any point on the mission field; there is an algorithm we have written that correct accumulated errors during movement to ensure it will turn to the desired angle at all time.
Our robot has an algorithm that makes sure the robot returns back to home if for instance it attempted a mission and failed while performing the mission.
***SENSOR*;** the robot (ruby machine) uses sensor such as ultrasonic to identify its position on the mission field. The sensor as a component,t in our robot is so important and effective i.e. it allows the algorithm (program) to function properly.

Innovation: the features in our robot that are special and cleverly different are ;
the rack and pinion
the lever carrier
cube-dropper rack

I. the rack and pinion attachment; this attachment is unique and different from others you can find anywhere nationally and internationally. Because (1) it controls about 4 gears and can accommodate other attachment such as the cube dropper for the boucci mission and the lever carrier for lifting the basket ball. (2) It's highly fortified, complex and strong. It has never break down or had any issue since it was built over six months ago with despite running it's gear at maximum speed and power at every practice, it requires no adjustment whatsoever.

ii. The lever carrier: this is the attachment attached to the pinion to drop and carry the basket ball to the peak of the basket ball stand.

This very attachment has a feature at its front that ensure that the cube doesn't fall off at any point while moving no matter the speed of the robot and also ensure that the cube never misses the basket or drop off away from the basket while dropping the cube.

Also, there is what we call the connecting rode or correcting rode; this rode ensure that the robot places the carrier rack approximately in the basket by correcting errors or prevent errors that has accumulated during the angular turning and high speed movement close to the basket mission.

These unique features are what you can't find in any other robot that uses this type of attachment.

lii. CUBE-DROPPER RACK; this attachment is used for the bench mission. It has a feature that we also call *correcting rode*; this rode is shaped in a 60^0 angle . It ensures that the rack is properly placed in the right position to the bench by correcting errors that have accumulated while the robot was moving it towards the bench.