T-shirt bot Design Check list

Mechanical

Base/drive train- We will have everyone do this

- Sheet metal/ WCD hybrid
    - The chassis alone must weigh less than 8lbs
    - The chassis must be easily maintained
        - Wheels must be easily exchanged
        - Chains must easily tensioned
    - The chassis must be strong enough to resist rough game play
        - Use stress analysis
    - The chassis must have mounting points that allow for attachments that results in octagonal shape. Check out 973 modifications to their 2014 chassis. The weight of the attachments is included in the 8lbs.
    - Must have mounting points designed for the super structure
        - Could be accomplished by a pattern of holes
    - The chassis must be able be assembled together with 3/16 rivets or #10 bolts.
    - The belly pan of the chassis will have room for all the electronics and pneumatic controls that the electronics team says that the robot needs
        - Design for room for up to ten motor controllers
        - Include a hole pattern for custom electronics mounts.
        - The belly pan should have mounting holes to accommodate the new electronics as well.
    - Design the chassis, so that a splash guard could be included beneath the belly pan
    - The chains or belts will tensioned by bearing blocks
        - The bearing blocks must be easy to machine, easily adjustable, and better than COTS options
    - The drive train axles will all be made of 7075, hex or keyed does not matter
    - The wheels must be 6 inch wheels
        - The wheels should be non-marking on the school gym floor
        - The wheels must be durable enough for outside driving
        - If the wheels are to be custom, then the wheels must be easily machined and lighter than COTs options. Preferably the wheels could be done with one operation only.
- Gearboxes
    - Must be cheaper to build than COTS gearboxes
    - Must be smaller and lighter than COTS gearboxes
        - Lighten the gears
    - Gear ratios must be optimized for driving places the fastest
    - Gearbox must be compatible with up to three CIM motors
    - Gearboxes must have a shifting components; dog or ball does not matter
    - Aside from the custom plates, everything must be COTS and the shafts must be able to be machined in house.
    - Must have encoder mounts
    - Check out JVN design calculator.
    - Sources of inspiration can include 973, 254 , 971

Upper structure

- Super structure
    - The entire top half of the robot must be easily removable

    - The structure will be attached to the base with rivets or bolts
    - The super structure will have support the two scuba tanks and the shooting components, must be analysis verified.
    - Must allow easy removal of the shooting components.
    - Must have minimum parts and must be easily manufactured.
    - Must have a mount for camera
- Shooting components
    - The block for the shooter must be modular enough to accommodate up to eight barrels of fire power.
    - The barrel is to be designed out of Lexan
    - The expanded block must be able to accommodate a revolving component. Check out 254 for inspiration. There will be no chain or belt driving this motion.
    - Must have mount for inclinometer
- Shooting Angle adjustment
    - Must have sufficient torque to lift the final configuration of the shooter
    - Must be driven by non-CIM motors
    - Must be able to be adjusted within the full range of motion under 1.5 seconds
    - No chains or belts allowed.
    - The same rules for the drive train gear box applies here

Things to teach the people in the mechanical team before the design

- DFMA principles, sheet metal work, torque calculations.

Dividing work

- There will be two groups every week. There will be a group that design gearboxes and a group that does not. They will switch so that everyone gets equal experience.