Top Level

- **F1** Transform electrical energy to mechanical energy
  - **C1a** DC motor
    - **Sub-Functions (C1a)**
      - **sF1** Transfer energy from motor to wheels
        - **sC1a** Direct drive
        - **sC1b** Gear box
        - **sC1c** Belt drive
        - **sC1d** Chain drive
        - **sC1e** Friction drive
        - **sC1f** Fan or propellor
  - **C1b** Explosives
    - **Sub-Functions (C1b)**
      - **sF1** Move explosives behind center of mass
        - **sC1a** Chute of gunpowder with a servo
        - **sC1b** Gravity fed tube
        - **sC1c** Small fan
      - **sF2** Set Off Explosives
        - **sC2a** Lighter
        - **sC2b** Primer with pins
        - **sC2c** Arcing electricity
  - **C1c** Jet Engine
    - **Sub-Functions (C1c)**
      - **sF1** Hold Fuel
        - **sC1a** Internal gas tank
        - **sC1b** External gas tank
      - **sF2** Move fuel to engine
        - **sC2a** Gravity
        - **sC2b** Injection
        - **sC2c** Difference in air pressure
      - **sF3** Expel fuel
        - **sC3a** Fan or propellor
        - **sC3b** Air compressor
      - **sF4** Light fuel
        - **sC4a** Pilot light
        - **sC4b** Arcing electricity
- **F2** Detect turns
  - **C2a** Potentiometer
    - **Sub-Functions (C2a)**
      - **sF1** Detect resistance changes
        - **sC1a** Arduino
  - **C2b** Accelerometer/gyrometer
    - **Sub-Functions (C2b)**
      - **sF1** Detect changes in acceleration/gyration
        - **sC1a** Arduino
  - **C2c** Light sensor
    - **Sub-Functions (C2c)**
      - **sF1** Detect differences in light reflected from track
        - **sC1a** Arduino
  - **C2d** Preset time intervals
    - **Sub-Functions (C2d)**
      - **sF1** Wait for preset time interval
        - **sC1a** Arduino
  - **C2e** None
    - **Sub-Functions (C2e)**
      - **sF1** Go slow enough to not need turn detection
- **F3** Turn relative to ground
  - **C3a** Conical wheels
    - **Sub-Functions (C3a)**
      - **sF1** Adjust speed for each wheel to account for difference in distance travelled
        - **sC1a** Geometry will account
  - **C3b** Flat wheels
    - **Sub-Functions (C3b)**
      - **sF1** Allow for slip
        - **sC1a** Use material with low coefficient of friction
  - **C3c** Slip differential
- **F4** Move up steep inclines
  - **C4a** High momentum
    - **Sub-Functions (C4a)**
      - **sF1** Quickly accelerate
        - **sC1a** Lightweight chassis
        - **sC1b** Gear ratio
  - **C4b** High torque
    - **Sub-Functions (C4b)**
      - **sF1** Increased amounts of friction
        - **sC1a** Rubberized wheels
        - **sC1b** Adhesive
      - **sF2** Sustain torque
        - **sC2a** Gear ratio
        - **sC2b** Multiple motors
  - **C4c** Sticky arms
    - **Sub-Functions (C4c)**
      - **sF1** Move along its length
        - **sC1a** Ratchet
        - **sC1b** Pulley and motor powered
      - **sF2** Launch arms forward
        - **sC2a** Crossbow
        - **sC2b** Pneumatics
        - **sC2c** Explosives
        - **sC2d** Slingshot
        - **sC2e** Catapult
- **F5** Control speed
  - **C5a** Drum brake
    - **Sub-Functions (C5a)**
      - **sF1** Apply pressure to wheels
        - **sC1a** Servo
        - **sC1b** Hydraulics
        - **sC1c** Pneumatics
  - **C5b** Spike
    - **Sub-Functions (C5b)**
      - **sF1** Force spike into ground
        - **sC1a** Servo motor
        - **sC1b** Heavy spike with release latch
        - **sC1c** Shoot spike into ground
        - **sC1d** Hydraulics
        - **sC1e** Pneumatics
  - **C5c** Disk brakes
    - **Sub-Functions (C5c)**
      - **sF1** Apply pressure to wheels
        - **sC1a** Servo
        - **sC1b** Hydraulics
        - **sC1c** Pneumatics
        - **sC1d** Electromagnets
  - **C5d** Drag based brakes
    - **Sub-Functions (C5d)**
      - **sF1** Increase drag coefficient
        - **sC1a** Flip panels outward
        - **sC1b** Parachute
  - **C5e** Electric brake system
    - **Sub-Functions (C5e)**
      - **sF1** Transform kinetic energy of motor to electrical/heat energy
        - **sC1a** Connect motor to storage battery/capacitor (regen braking)
        - **sC1b** Connect motor to resistor (dynamic braking)
        - **sC1c** Connect motor to power source in reverse (plug braking)
- **F6** Stay aligned with rails
  - **C6a** Conical wheels
  - **C6b** Wheels with o-rings and flanges
  - **C6c** Tank treads
- **F7** Contain components
  - **C7a** Sit in box
  - **C7b** Drill to plate
  - **C7c** Adhere to plate
  - **C7d** Potting
  - **C7e** Welding
- **F8** Connect to cargo carts
  - **C8a** Screws
  - **C8b** Rope/wire
  - **C8c** Links
  - **C8d** Pins
  - **C8e** Glue