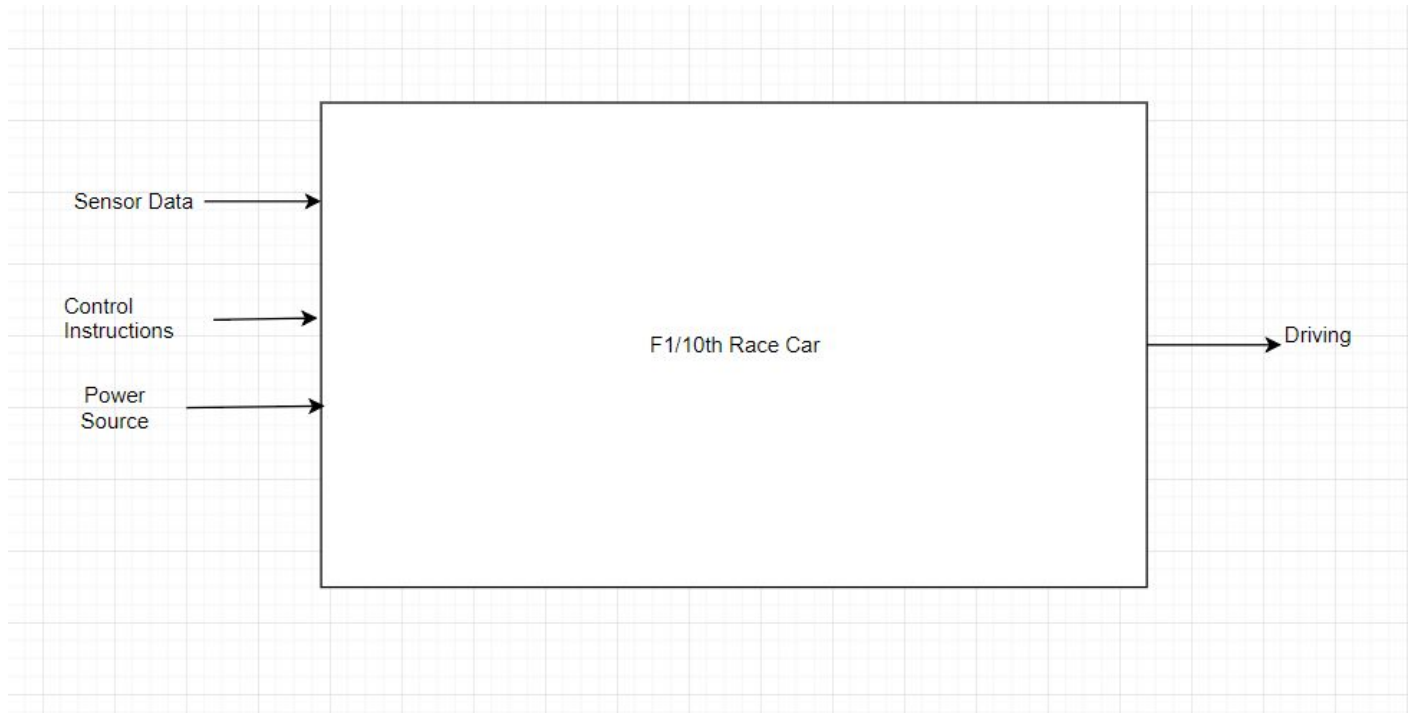**Functional Decomposition**
Team 303
1/10th Scale Autonomous vehicle
(Cody Vanderpool, Michael Calisi, Steven Roy, Nicholas Stiles, Derek Swenson)

Level 0:

| Module	F1/10th Race Car
Inputs	Sensor Data: Image processing, Lidar, etc. Control Instructions: Remote controller Power Source: 7.2V
Outputs	Driving
Functionality	Process signals and sensor data to produce driving. The F1/10 car should have the ability to switch between autonomous driving and user controlled driving at the press of a button.

Level 1:
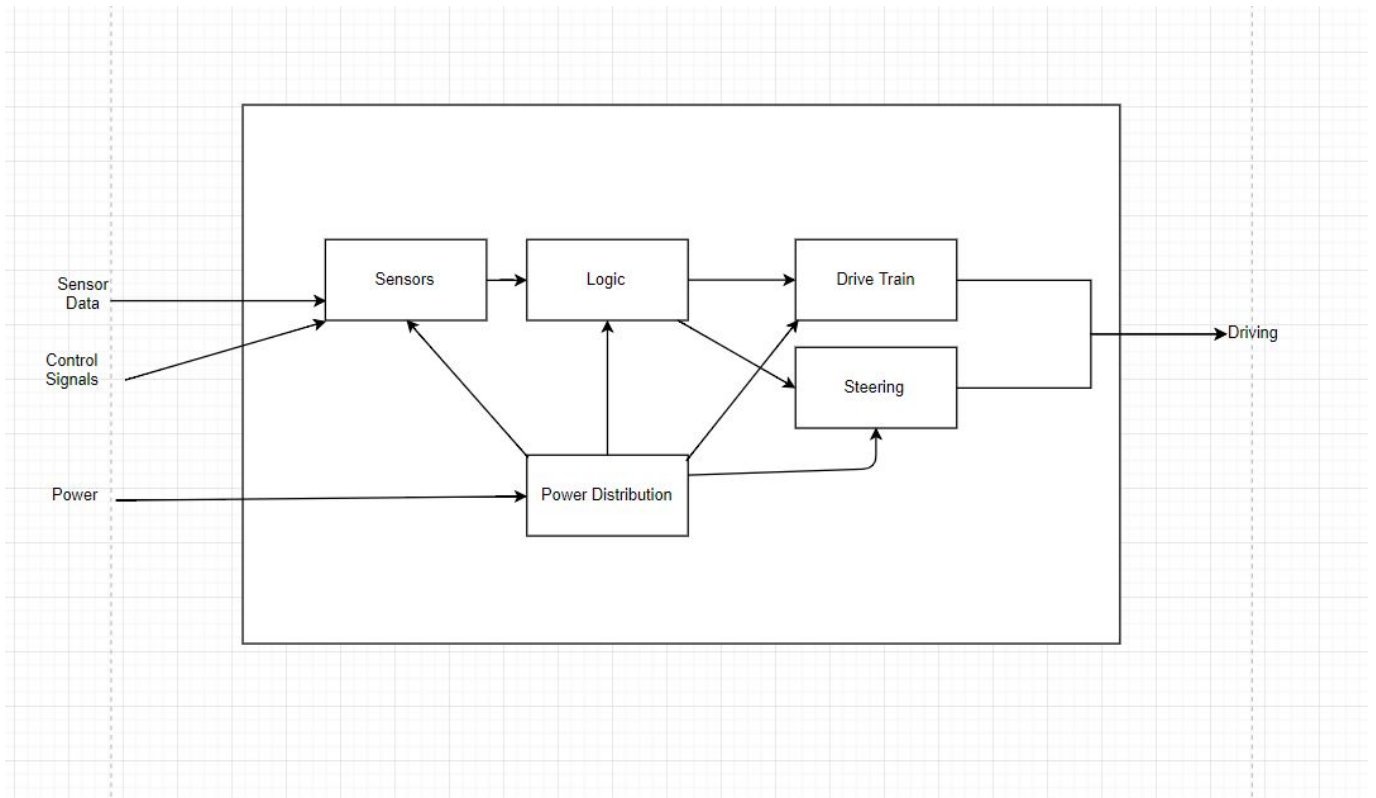
Module	Sensors
Inputs	Data: Images, Lidar (possibly),distance sensor ,controller unite Power: ?V
Outputs	Signals to the Logic Unit
Functionality	Signals being sent to the logic unit allow the vehicle to understand its environment and make decisions based on received inputs.

Module	Logic Unit
Inputs	Data: Signals from sensors. Power: ?V
Outputs	Signals to drivetrain and steering motors.
Functionality	Signals being received are processed and decisions are made about the environment. Appropriate controls will be sent to both the drivetrain and steering motors.

Module	Drivetrain
Inputs	Data: Signals from Logic Unit Power: 5.5V
Outputs	Wheel Rotation
Functionality	The drivetrain will transfer power from a motor to the wheels, propelling the vehicle. Signals sent from the Logic unit will power the motor which will rotate the tires.

Module	Steering
Inputs	Data: Signals from Logic Unit Power: ?V
Outputs	Angle of tires
Functionality	Signals received from the Logic Unit will, through a mechanical system, change the angle of the front wheels and control the direction of the vehicle.

Level 2:
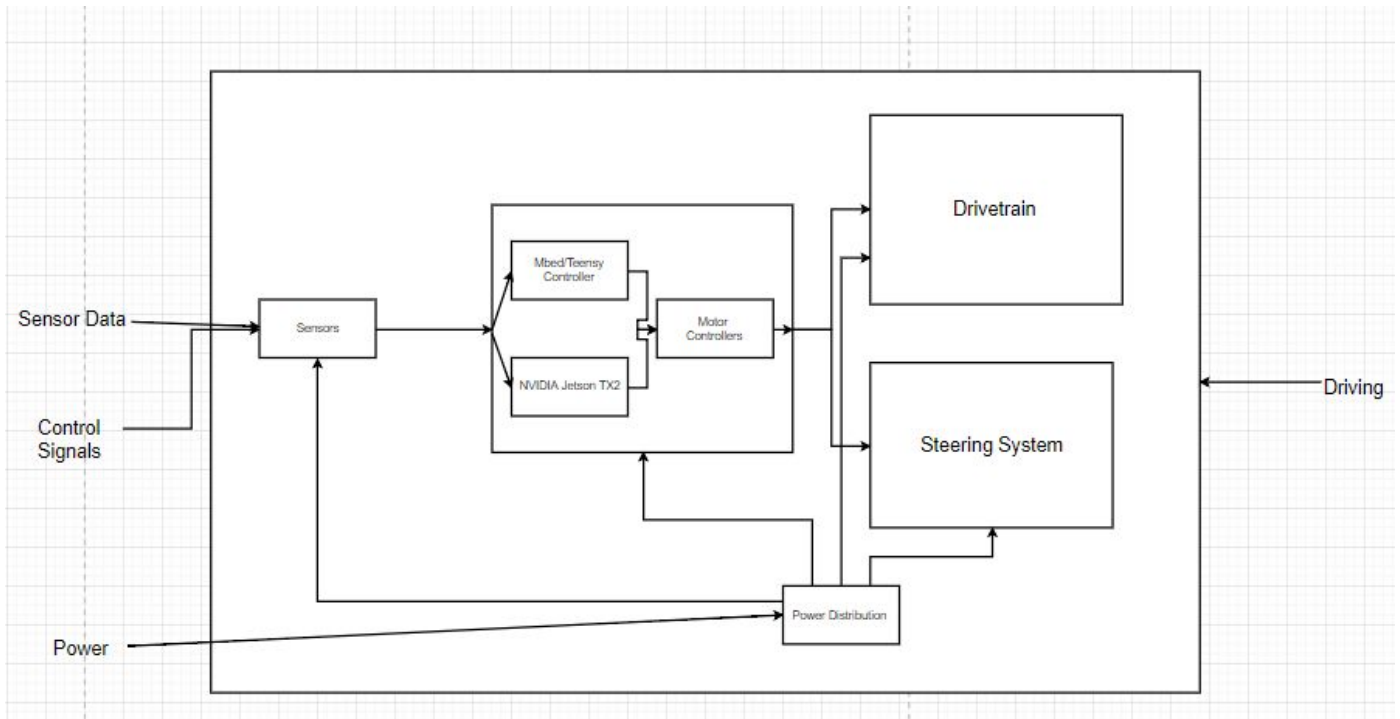
Module	Mbed/Teensy Controller
Inputs	Data: Signals from Remote Controller Power: 5.5V
Outputs	Signals to the Motor Controller
Functionality	Signals being received from a controller device will be processed and outputed to the motor controller.

Module	NVIDIA Jetson TX2
Inputs	Data: Signals from Sensors Power: 7.2V
Outputs	Signals to the Motor controllers
Functionality	Signals being received from the sensors will be processed and the processor will make decisions for signals to be sent to the motor controller. Those signals will power the drivetrain and steering systems.

Module	Motor Controllers
Inputs	Data: Signals from NVIDIA Jetson TX2 or Mbed/Teensy microcontrollers Power: 5V
Outputs	Signals to the drivetrain drive motor or the steering systems' servo motor.
Functionality	Signals received from the microprocessors are interpreted and allow proper rotation of motors.

Module	Drivetrain
Inputs	Data: Signals from Logic Unit Power: 5V
Outputs	Wheel Rotation
Functionality	The drivetrain will transfer power from a motor to the wheels, propelling the vehicle. Signals sent from the Logic unit will power the motor which will rotate the tires.

Module	Steering
Inputs	Data: Signals from Logic Unit Power: 5V
Outputs	Angle of tires
Functionality	Signals received from the Logic Unit will, through a mechanical system, change the angle of the front wheels and control the direction of the vehicle.