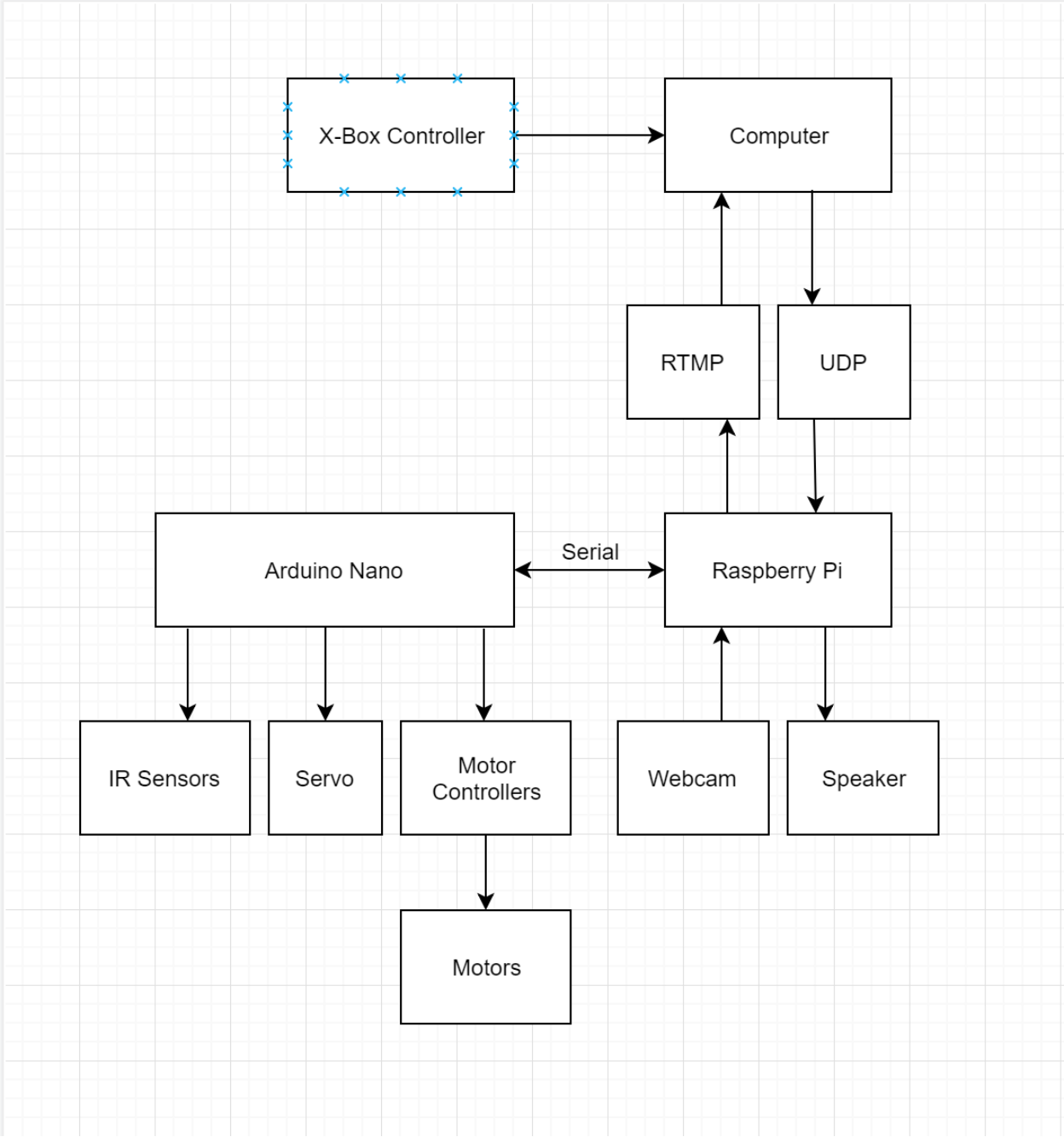
The University of Oklahoma Mercury Team 2018-2019 Technical Document

Written By: Sarah Brown, Samuel Faegre, Tyler Julian, Dalton Newport, Kevin Robb, Noah Zemlin

Captains: Tyler Julian, Kevin Robb

Table Of Contents

Block Diagram



Communication Systems

A. Networking
    a. The system connects the two clients (the Nano and the Pi) by a server using UDP packets. The server exists to act as a proxy to make it easier for the Nano and the Pi to connect to each other, the server does no computation but only acts as a passthrough.
    b. UDP was chosen because we value low latency over packet integrity. We don't envision there being considerable amounts of packet loss.

Controller Systems

A. Raspberry Pi
    a. The Raspberry Pi is the entire brain of the robot. It handles all networking and video capture. It communicates with the Arduino Nano (B) over serial.
B. Arduino Nano
    a. The Arduino Nano is solely in charge of receiving commands from the Pi to move the motors and servos. It communicates with the Raspberry Pi (A) over serial.

Video Feedback Systems

A. Webcam
    a. The Webcam is plugged into the Pi

Driver Interface

We are utilizing a webcam with a fish-eye lens and LIDAR to send visual data of the robot and its surroundings to our driver via an assortment of selfmade servers. The webcam is mounted on the front of the robot to give a view of the forward area around the robot. At the same time, we are using the undermounted LIDAR to generate an artificial image of where walls are in relation to the center of the robot.

Our driver will be able to see both the video feed from the front and the live generated LIDAR image on a computer monitor. The driver will then send driving instructions to the robot via an xbox 360 controller in their hands.

Drive Configuration

We've chosen to utilize sprocket driven tank treads as our robot-to-floor contact apparatus. Both sides of the Screaming Schooner have independent treads that are each driven by one motor driven sprocket and tensioned with an idle mounted sprocket on the opposite end. This system allows for an easily drivable, high traction, low balanced, zero-turn system. Above the motors we are utilizing 2 motor controllers to support the 2 motors.

Sensors and Other Intelligent Systems

The webcam and LIDAR send data through the nano and pi back to the computer so the driver can get an idea of where the robot is on the track in terms of both position and direction.

Power Subsystems