Don't Crash:
Autonomous Motor Response to Getting Too Close

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(Dated: April 30, 2021)

LED and Motor Response to Ultrasonic Sensor Output.

I. ABSTRACT: AUTONOMOUS RESPONSE

A really neat technology that you can find in modern-day vehicles is sensors that measure distances of objects and can create images of the surrounding environments based on the different points sensed. For example, self-driving cars use both Radar and LiDar sensors to create an image of the vehicle's surroundings. To reenact these devices and how they work, I will use infrared sensors to measure the distances of an object and visually communicate that through LEDs (Light Emitting Diodes). I would like to apply this to an operating hovercraft, however, for a tangible goal with the given time period, the object of this project will be to build the circuit for the infrared sensors, LEDs, and brushless motor. I will connect the brushless motor that would serve as the lift fan on the hovercraft, and shut down the motor when a certain distance is measured when the object gets "too close" to the sensor. To complete the concept of the hovercraft operation, I will use three sensors, three corresponding LEDs, and a brushless motor that responds to all three infrared sensors. The basic functions match with that of the Radar and LiDar sensors of automated cars. Something that can be further pursued is to use a LiDar sensor rather than an infrared sensor.

II. MATERIALS

See Table I for complete list of materials.

III. FUNCTION FLOW: HOW IT WORKS via \\

Once all of the pins are connected correctly between all of the components, as shown in Figure 2, the code can be uploaded. The sensors will measure a certain distance. The measured signal will then be sent to the Arduino. The Arduino converts this into the appropriate distance units and based off that value sends a speed value to the electronic speed controller as well as sends out the correct values for each red, green, and blue pin for the RGB LED. The electronic speed controller, which is connected to the battery, shares its power with the motor, and communicates with the anticipated speed from the Arduino to the motor. The result is a visual representation of the condition of the motors surrounding as well as an automatic motor response to that condition. The flow diagram is shown in Figure 1.

IV. TIMELINE

Below is a timeline of the projects progress.

Week 9 - Purchase materials and attain all materials needed

Week 10 - Submit Project Proposal and begin writing code for IR sensors

Week 11 - Set up a circuit and write code for LED response,

Week 12 - Test and proof code for LED, write code for motor shut down

Week 13 - Test and proof code for motor shutdown, make presentation for project

TABLE I. This table is a Bill of Materials consisting of the components used in this project, how many, the function of each component, and the vendor where the piece was acquired from.

Part	*Quantity*	*Function*	*Vendor*
Arduino Uno	1	Main computer board	Arduino Kit
Breadboard	1	For connections and placement of components	Arduino Kit
Jumper Wires	1 Pack	Establish connections between components	Arduino Kit
Ultrasonic Sensor	1	Use to measure the distance to the targeted object	Arduino Kit
RGB (Red Green Blue) Light Emitting Diode	1	Visual Display of Infrared Sensor Output	Arduino Kit
DC Brushless Motor (2400KV)	1	Motor to be shut down in response to the sensor output	Amazon

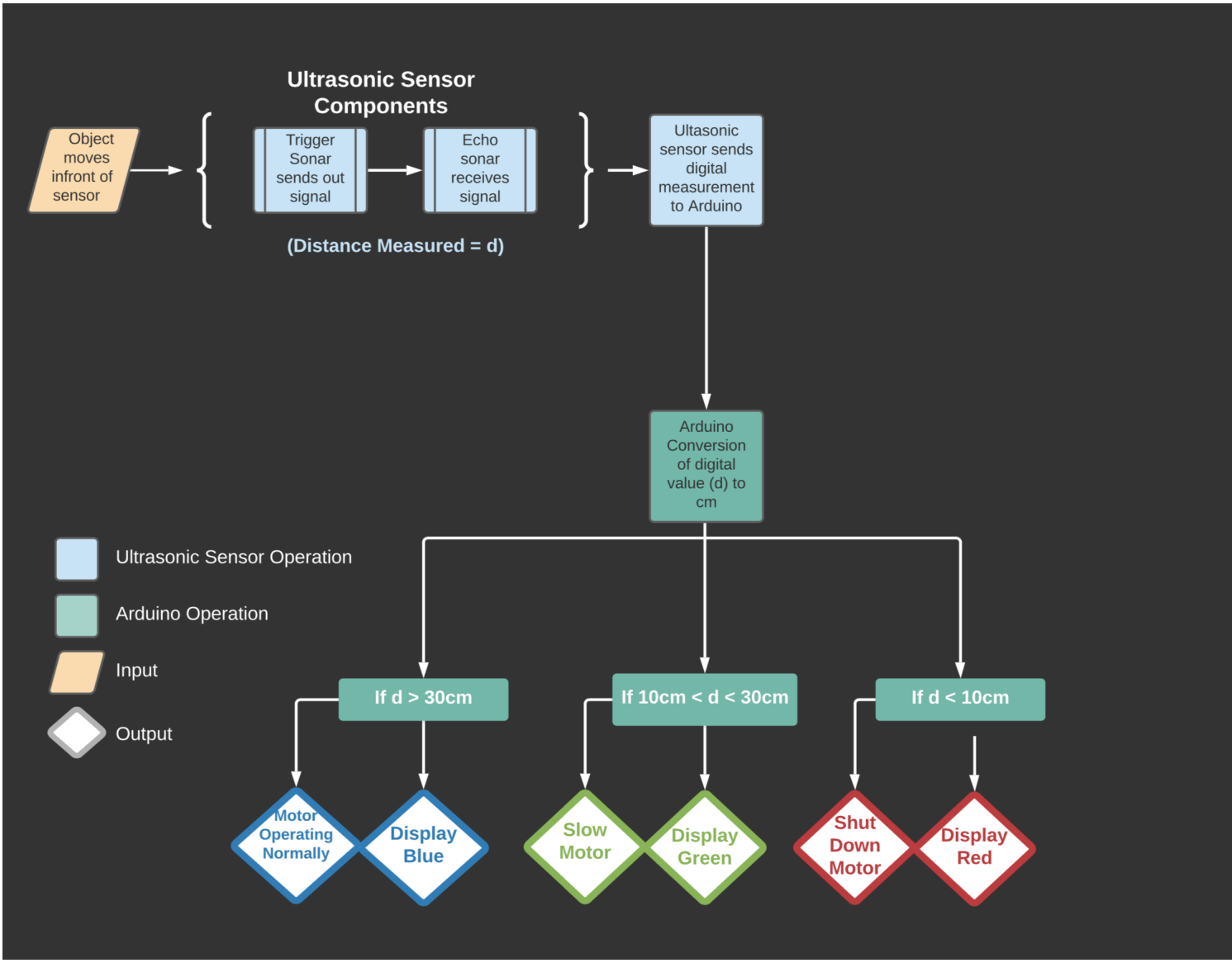

FIG. 1. Flow diagram of the operation of the circuit.

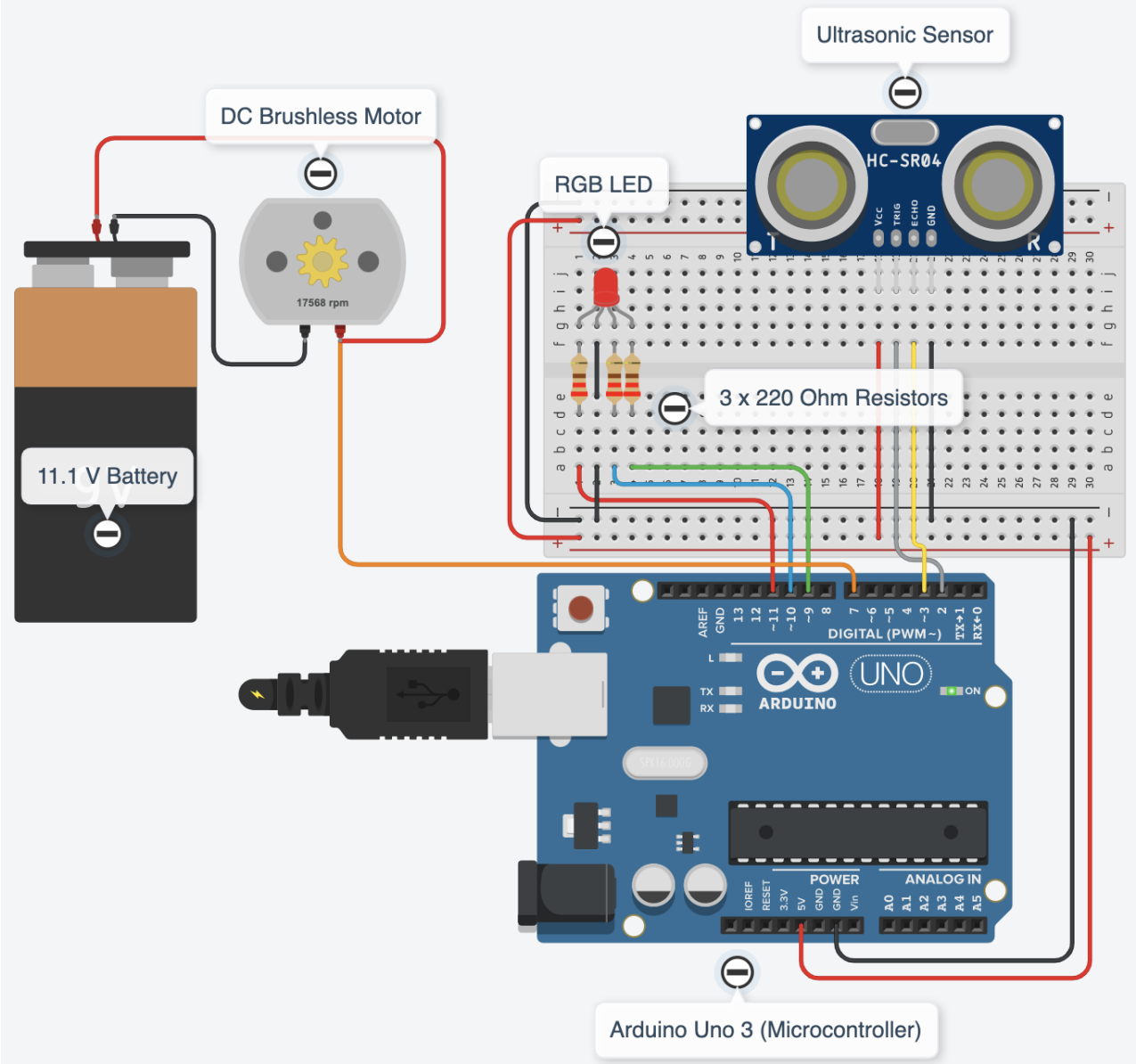

FIG. 2. Circuit schematic of project.