INTELLIGENT GROUND VEHICLE

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Goals and Objectives

Design an autonomous ground vehicle that can compete in the Auto-Nav challenge of the IGV competition

Objective:
- Demonstrate functionality by reading average velocity of 1-5 mph
- Obstacle avoidance with the use of IR sensors and cameras for line tracking
- Capable of carrying a 20 lb. payload

Requirements

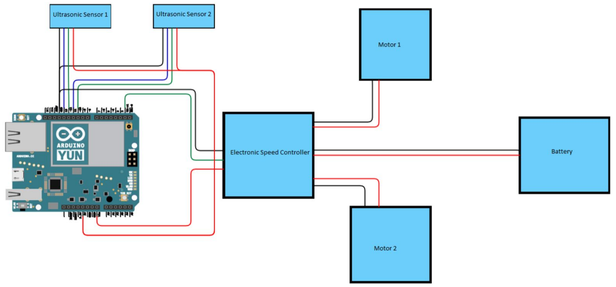
- Must be a ground vehicle
- Between 3 and 7 feet long
- Between 2 and 4 feet wide
- Less than 6 feet tall
- Vehicle must propel itself with no remote fuel storage
- Must maintain an average speed of 1 mph for 44 ft.
- Must be hardware governed to have a max speed of 5 mph
- Mechanical E-stop, that shutdowns the hardware of the robot.
- Must have a wireless E-stop, effective from 100 ft away.
- Must have a easily seen indicator light to show when it's powered on.
- Must be capable of carrying a 20 pound payload

Timeline

IGV Fall Gant chart

	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10
Raspberry Pi tutorials and go through rules	■								
Raspberry Pi tutorials and think about how to navigate course	■	■							
Start psuedo code and finish raspberry pi tutorial	■	■	■						
Make list of components we have (and need) and test components individually	■	■	■	■					
Demonstration of functional code and components	■	■	■	■	■	■			
Begin circuit design	■	■	■	■	■	■	■		
Test initial circuit designs with components and code	■	■	■	■	■	■	■	■	
Test circuits and codes	■	■	■	■	■	■	■	■	■
Get robot to move forward AS IS	■	■	■	■	■	■	■	■	■

Wiring Diagram



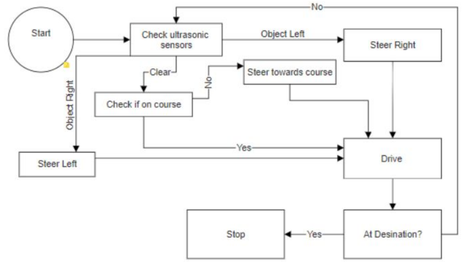
Progress and challenges

- Due to the size of the team, a collective effort was taken to design or redesign every system of the ground vehicle.
- Began by completing Python tutorials. Tested individual components from last year's team.
- Chassis, control arms and wheel hubs were redesigned using 1" x 1" 6061 Aluminum square tubing. Keeping the expenses under budget.
- Ready to test motors to demonstrate movement capability and functional code.

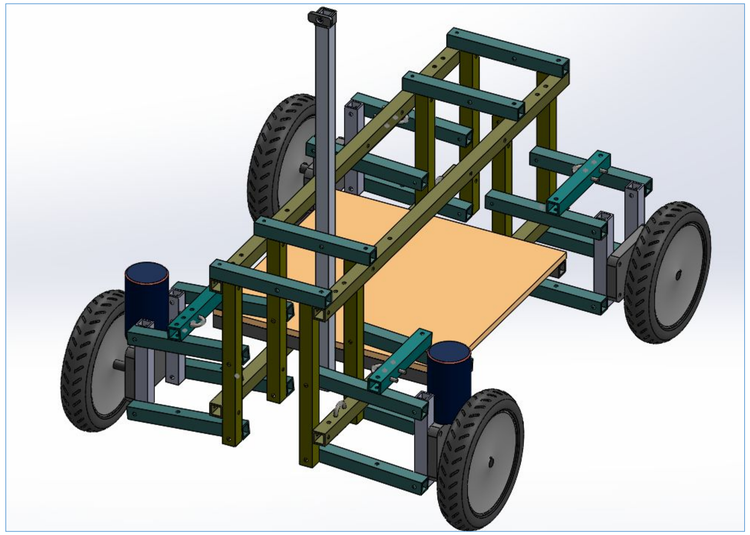
Future works

- Register for competition and prepare required reports
- Implement all design changes and manufacture redesigned components
- Connect camera to Jetson Nano to begin route tracking
- Add video recognition software to detect lines
- Establish electronic componentry location and mounting
- Integrate ESC and ultrasonic sensors into one control system and begin testing IGV

Pseudo code



CAD Assembly



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