Signoff Request - May 5th - Mechanical Movem Subsystem

Thursday, May 5, 20   2:31 PM

The Mechanical Movement Subsys

The mechanical movement subsystem in the Autonomous Crawl Space Inspectio the operation of the machine. This subsystem equips the robot with hardware th move about its environment. The hardware consists of an Arduino Nano Every N L298N Motor Drive, and a Shock Absorption Robotic Tank Chassis Kit (the kit con motors).

The Arduino Nano Every will receive input from the Raspberry Pi 4 in the Naviga That Raspberry Pi will house all the software for the decision making process wl needs to decide which direction to move in. That information will be transferrec communication to the Arduino Nano every, which will interpret the instructions then deliver those instructions to the L298n Motor Driver. The Arduino is also re setting the speed of the motors through Pulse Width Modulation, and it will rec

The L298N Motor Drive is responsible for amplifying the signal from the Arduino to the motors. The L298N is a dual H Bridge, so it can singlehandedly drive both r motors require an input Voltage and Current that is greater than what the Arduir provide, so a motor driver is essential to this design.

The Tank Chassis kit serves as the mechanical aspect of the movement system. the Drive Motors come from.

TS300 Tank Chassis Kit

The TS300 Shock Absorption Robotic Tank Chassis Kit from the manufacturer SZE kit that contains tracks, driving wheels, bearing wheels, a metal frame, 2 DC geal incorporated encoders, and the necessary hardware for building. This kit is availa amazon.com

The motors in this kit can each supply a torque of 3000gNaN according to the Prc from amazon. Also, the image of the chassis below is mislabeled in the picture, b parameters below the image are correct. Additionally, the image of the motor sh two GM connections and no V-power for the motor. The red wire is mislabeled a be the power input.

The main platform on the chassis has the space necessary to accommodate the L298N, and if necessary an additional platform can be added on top of the inclu using nuts and bolts to support the components from other subsystems like the Raspberry Pi 4. A crude drawing of the additional platform concept can be seen

- Name: T300 intelligent tank chassis
- Oxidation: Yes
- Track: plastic or metal
- Weight: 1.6kg

- Material: aluminum alloy
- Color: gold or silver
- Size: about 290 * 270 * 100r
- Load: 5kg

GM : GND for Motor

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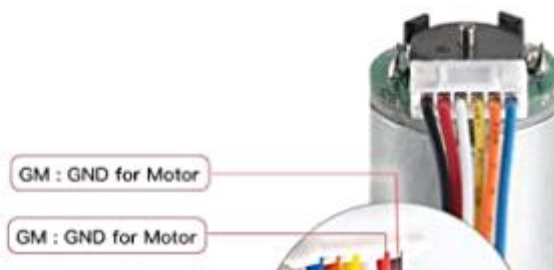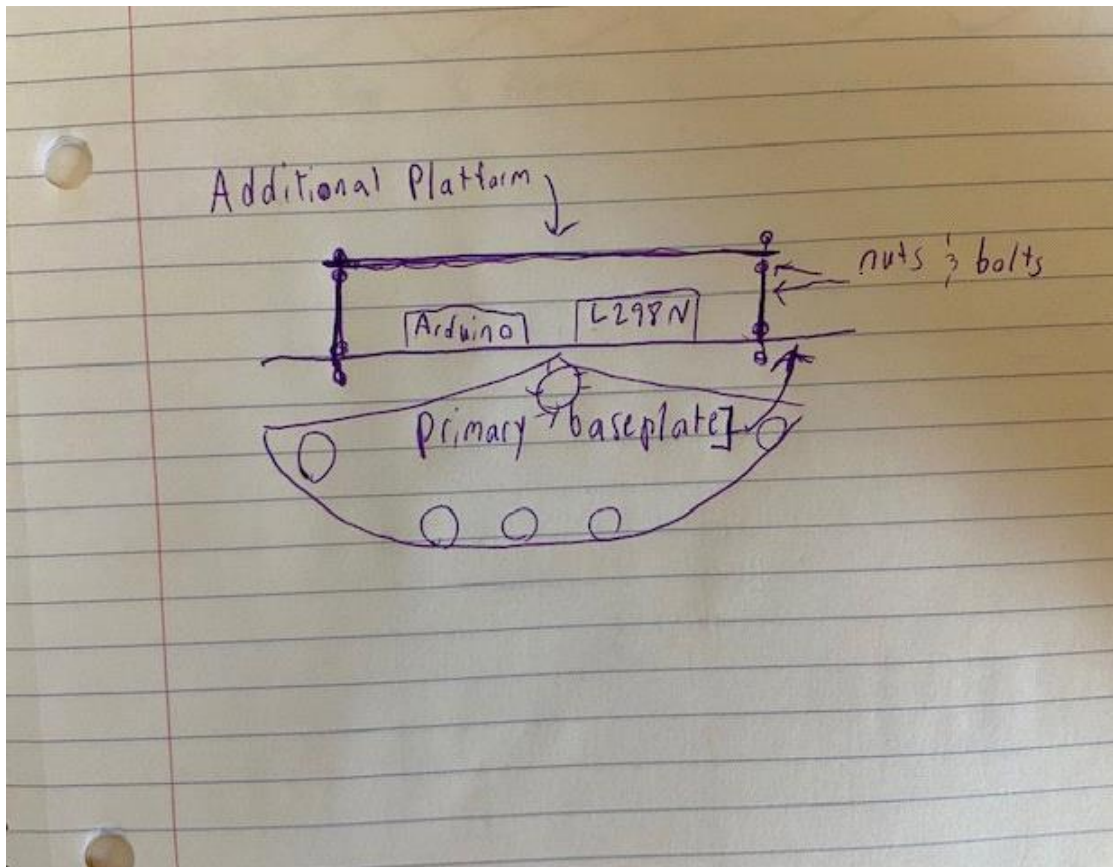
L298N Motor Driver

A motor driver is essential for this project because the raspberry pi and arduino brains of the operation are unable to produce a signal strong enough to drive th L298N is a popular driver in the community because it can drive a wide variety c form 5-35 volts, and can simultaneously drive two DC motors with direction and The team believes that the L298N will be effective because of its versatility, com

The L298N Motor Driver module consists of an L298 Motor Driver IC, 78M05 Volt resistors, capacitor, Power LED, and a 5V jumper in an integrated circuit. The L29 bridge. The 78M05 Voltage regulator will be enabled only when the jumper is pla power supply is less than or equal to 12V, then the internal circuitry will be powe voltage regulator and the 5V pin can be used as an output pin to power the micro inputs to the module. The jumper should not be placed when the power supply 12V, and thus a separate 5V should be given through the 5V terminal to power tl circuitry. **The team expects to have a voltage of 12V to run the motors, so an ad**

The L298N can be purchased online for about $7 from amazon and walmart. It c for under $3 at Aliexpress.com, but the delivery from this site takes 2 months ra that is the amazon prime standard.

The 4 input pins and the enables are connected to the arduino that will be interp raspberry pi's navigation protocol. The inputs determine the direction and the er that are used to set the motor speed. Ouputs 1 and 2 connect to motor A and ou connect to motor B. The 12V pin in the image below can accept a motor driving v from 5-35V, but 12 is quite common. The 5V pin powers the logic inside the IC. G
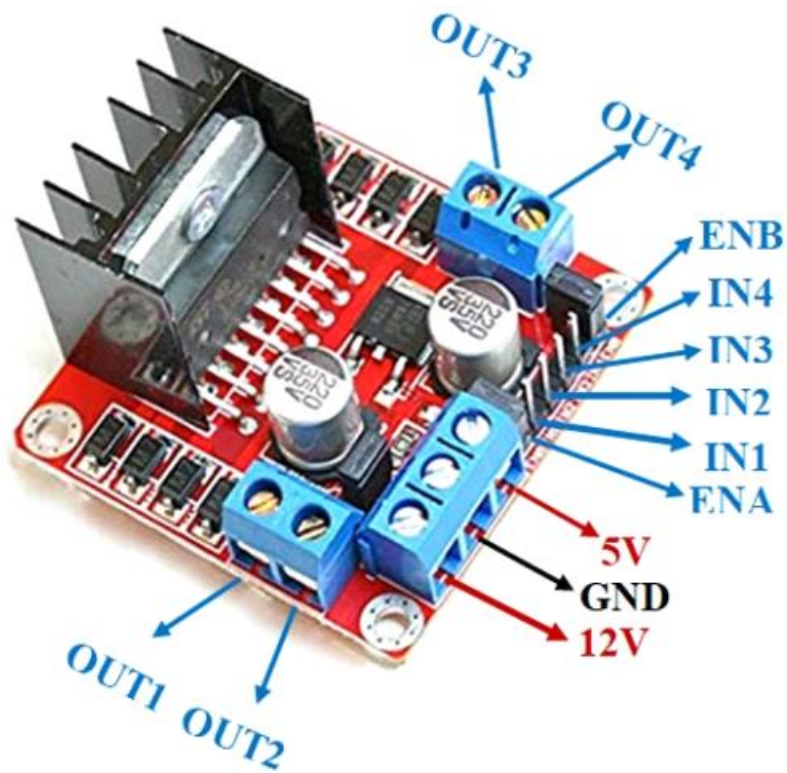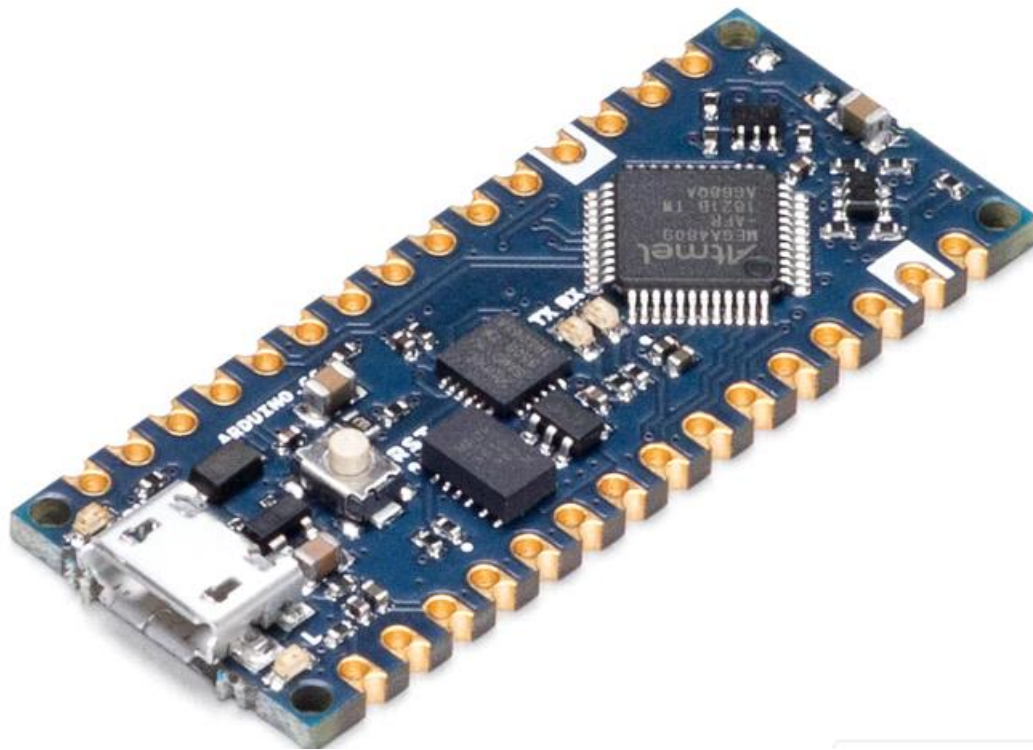
Arduino Nano Every

The Arduino Nano Every is a small (45x18mm) programmable board by Arduino. In th of the Arduino Nano Every is to interpret the signals delivered by the Raspberry Pi, to of the motors through PWM, and to detect faults in the Powertrain. Pictured below a specificaitons for the Arduino Nano Every:

MICROCONTROLLER	ATMega4809 (datasheet)
OPERATING VOLTAGE	5V
VIN MIN-MAX	7-21V
DC CURRENT PER I/O PIN	20 mA
DC CURRENT FOR 3.3V PIN	50 mA
CLOCK SPEED	20MHz
CPU FLASH MEMORY	48KB (ATMega4809)
SRAM	6KB (ATMega4809)
EEPROM	256byte (ATMega4809)
PWM PINS	5 (D3, D5, D6, D9, D10)
UART	1
SPI	1
I2C	1
ANALOG INPUT PINS	8 (ADC 10 bit)
ANALOG OUTPUT PINS	Only through PWM (no DAC)
EXTERNAL INTERRUPTS	all digital pins
LED_BUILTIN	13
USB	Uses the ATSAMD11D14A (datasheet)

The Nano has enough GPIO pins to interface with the L298N Motor Driver, and then h
be used for other tasks. 6 GPIO pins will be used for the Motor Driver, and serial comr
will be used to communicate with the Raspberry Pi from the Navigation System. It is p
communication between the Nano and the Pi without USB connection, but that would
the RX and TX pins on each device as well as 3.3/5 V level changer to prevent burning

The Arduino Nano Every will be powered by the 12V bus as shown in the design sche
Chapter 6 of the datasheet shows the Connector Pinouts.

Circuit Schematic
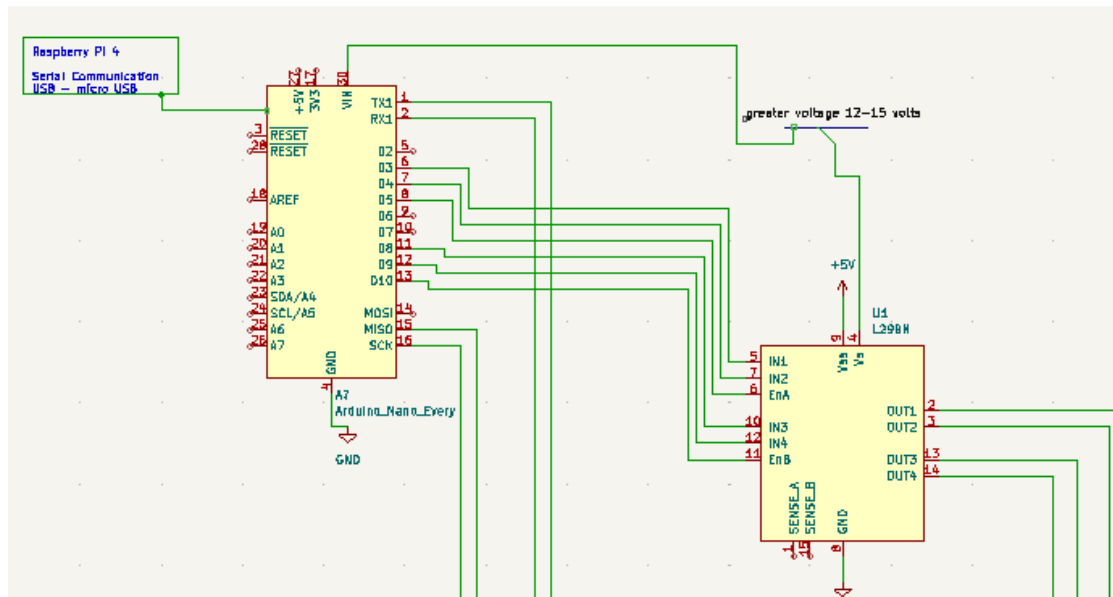
References

- L298N technical data and images: https://components101.com/modules/l293n-module
- L298N Datasheet: https://www.sparkfun.com/datasheets/Robotics/L298_H_B
- Example of someone using the L298N and Arduino: https://create.arduino.cc/projecthub/ryanchan/how-to-use-the-l298n-motor-dr
- Arduino Nano Every Specs and Photos: https://store-usa.arduino.cc/collections/boards/products/arduino-nano-every
- Arduino Nano Every Datasheet: https://docs.arduino.cc/resources/datasheets/A datasheet.pdf?_gl=1*13hza88*_ga*NTI1NjU0MzE5LjE2NTAzMDE5Mzc.*_ga_NF *MTY1MDU1Mzg2My4zLjEuMTY1MDU1NDcwMC4w
- TS300 Robot Tank Chassis: https://www.amazon.com/dp/B09131Z41C/ref=sspa_ pf_rd_p=49ce9e12-f1ff-4df5-8538-a749372f4064 &pd_rd_wg=wseqU&pf_rd_r=ETY58RV6VP923X3D2R45&pd_rd_w=3Fx7Z&pd_rd a9d5-4249-a57d-5aa538d4e6ea&s=toys-and-games&spLa=ZW5jcnlwdGVkUXVhbGlmaWVyPUExNVpDUDJMRjBLSEFWJmVuY3J MjkyMjE4MUkyVzVQUzkzQzU5TiZlbmNyeXB0ZWRBZElkPUEwNjI5Njg5MVpXQkc4 WRnZXROYW1lPXNwX2RldGFpbCZhY3Rpb249Y2xpY2tSZWRpcmVjdCZkb05vdExvz