

Pakech -

Making your Robot - Understanding and Assembling the Electronics & your Chassis

Assign3

What is the purpose of your robot? What task or challenge can it complete? It must be able to drive/maneuver around have a secondary ability try to think of how you will design this using servos that can rotate (only 2 servos - CHALLENGE 2-axis)

Ideas for function/task robot can complete - think of 3 unique and choose one.

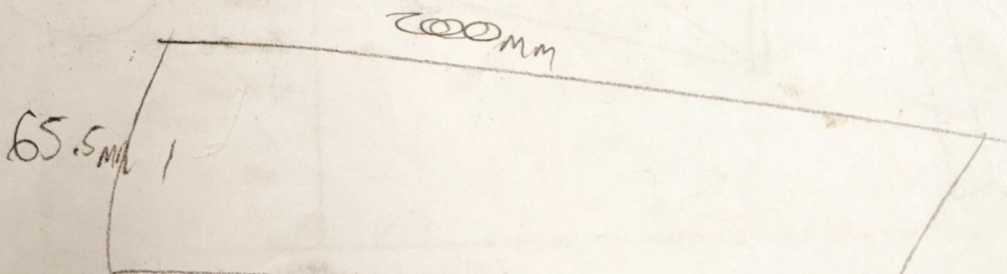
1. Snow removal bot. I can design a shovel in front of the bot to remove snow & I can make a salt dispenser for assignment #4.
2. Field cleaner. I can make a bot that can pickup garbage from outdoors.
- 3.

Ways to design the robot body (chassis) to accommodate:

- 1) the chosen task
- 2) movement
- 3) design (think shape, size, attachment, uniqueness etc.)

Selecting

option # 1



Concept drawing version 1

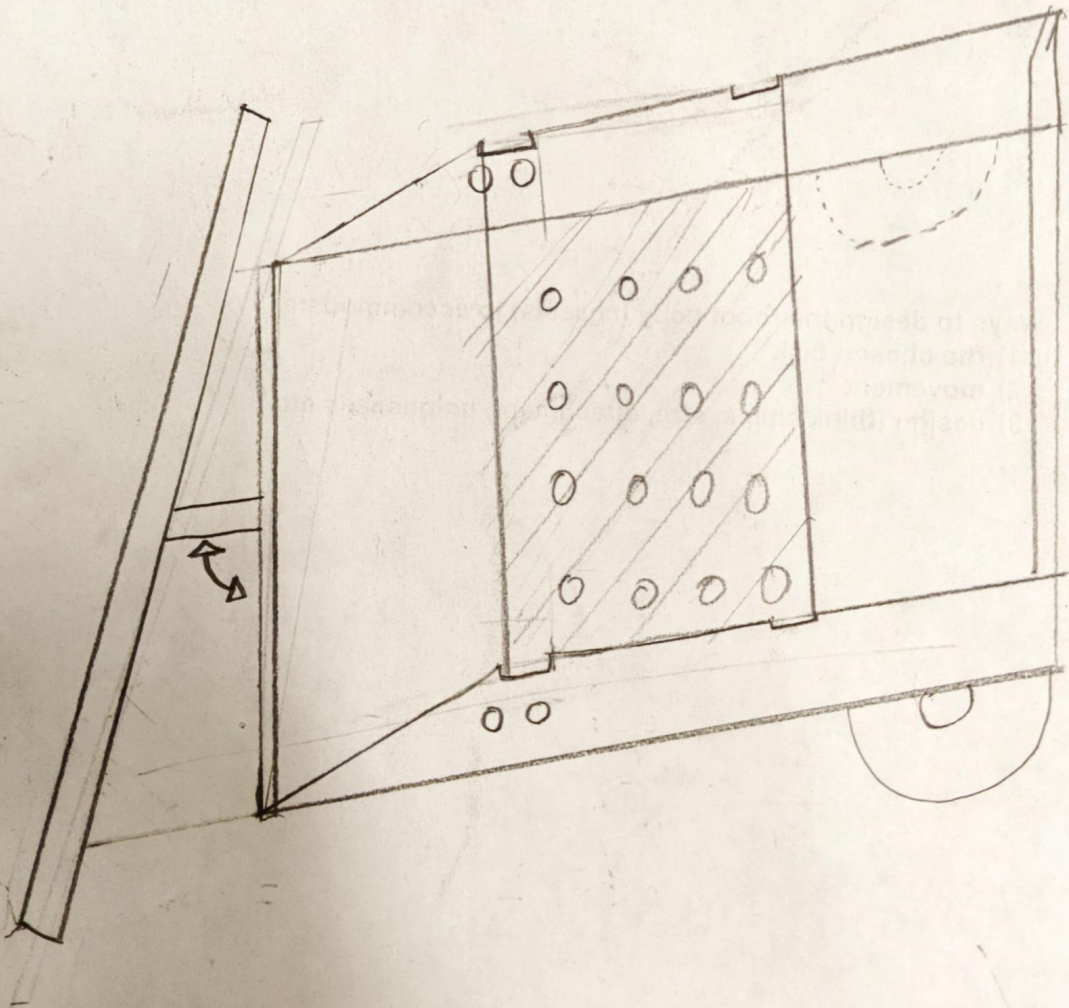
Important dimensions

plow length: 25 cm

Vehicle width: 20 cm

vehicle length (before plow) 30 cm

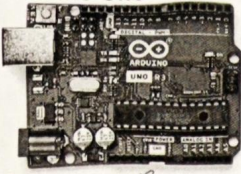
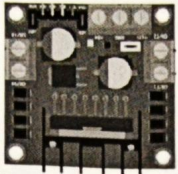
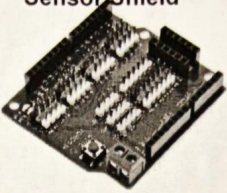
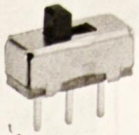
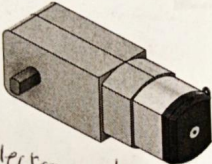

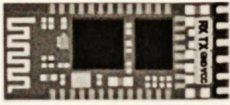


vehicle body height: 6 cm



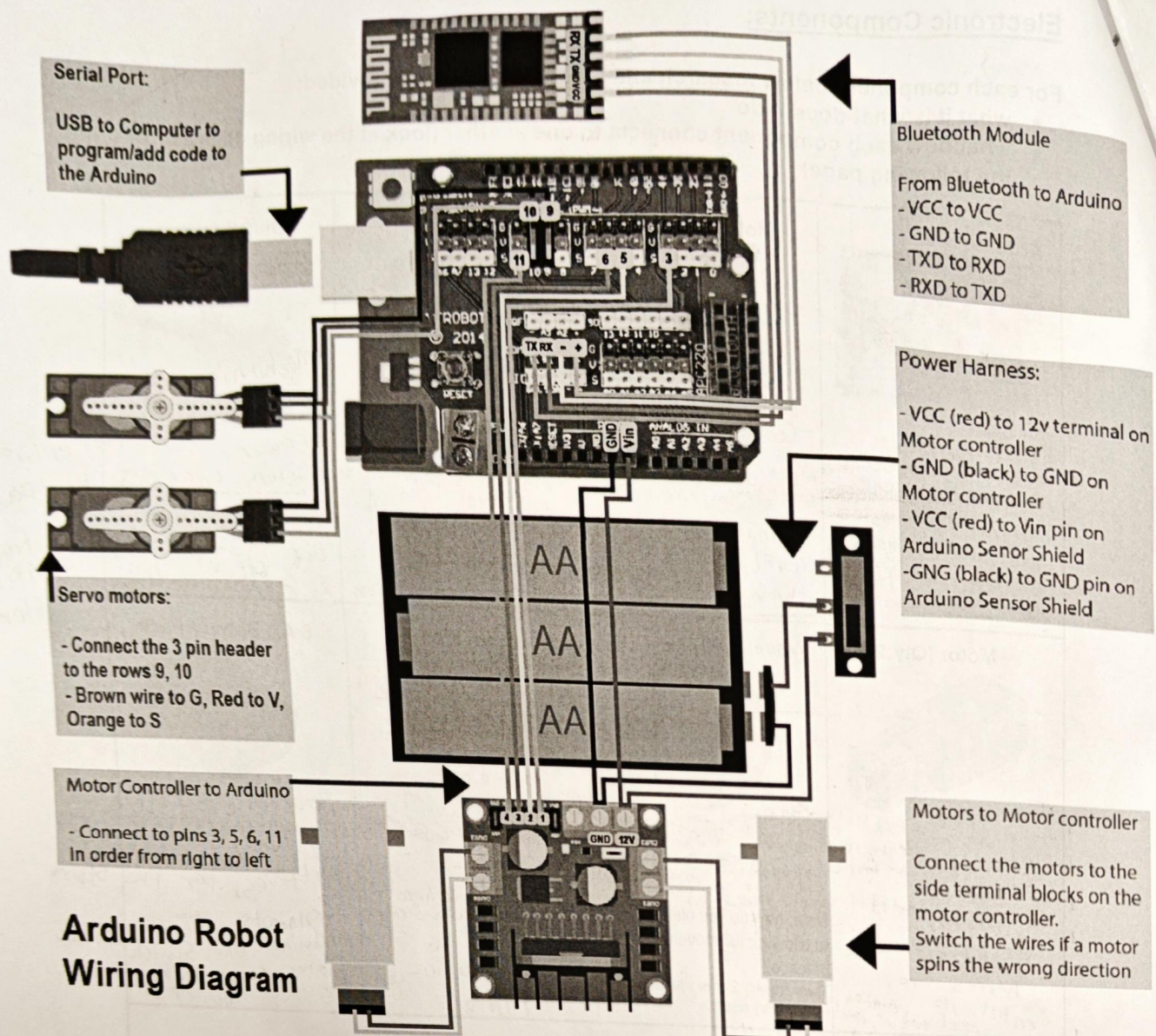
Electronic Components:

For each component below research and record in the space provided:

- what it is/what does it do
- what/how each component connects to one another (look at the wiring diagram on the following page)

<p>Arduino Uno</p>  <p>- Microcontroller board. Brain of the system, controls components & executes programmed tasks. - Nearly all components connect to this, parts, wires, connectors, etc.</p>	<p>Motor Controller</p>  <p>- Controls the performance of the electric motor, controlling speed, torque, direction. - Connects to Arduino Uno through pins (digital or analog).</p>	<p>Sensor Shield</p>  <p>- Expansion board which simplifies connecting input devices to the Arduino Uno. - Plug & play using header pins.</p>	<p>On/Off Switch</p>  <p>- Mechanical device which controls power for the entire system. Connects to power source & when turned off, circuit not complete flow.</p>
<p>Motor (Qty: 2)</p>  <p>- Electromechanical device which converts electrical energy into kinetic energy. Connects to motor controller using wires to control its rotation speed, torque, etc.</p>	<p>Wheel (Qty: 2)</p>  <p>- Connects to motor. I will allow for steady movement by implementing steady rolling wheels at the bottom of the snow pit. It will steady the snow pit. Note: how do you plan to allow for full movement/balance? There are only 2 drive wheels but that won't be very steady.</p>	<p>Bluetooth Module</p>  <p>- Communicates wirelessly using bluetooth. Allows for bluetooth connectivity between device & robot. - Connects to Arduino Uno using pins.</p>	<p>6 AA Battery Pack</p>  <p>- power pack which holds the AA batteries for the system. - Connects to Arduino Uno, Switch, motor controller using wires.</p>
<p>Micro Servo</p>  <p>- Motorized device to control the angle/position of an objection component. Connects to Arduino Uno via</p>	<p> $f' = \frac{2 - \ln x^2}{x^2}$ $f'' = \frac{(-\frac{2}{x^2})(x^2) - (2 - \ln x^2)(-2x^{-3})}{x^4}$ $= \frac{-2 + 2\ln x^2 + 4 - 4\ln x^2}{x^4}$ $= \frac{2 - 2\ln x^2}{x^4} = \frac{2(1 - \ln x^2)}{x^4}$ $= \frac{2(1 - \ln x^2)}{x^4} \cdot \frac{x^3}{x^3} = \frac{2(1 - \ln x^2)}{x}$ </p> <p> $f'' = \frac{2(1 - \ln x^2)}{x}$ </p> <p> $f'' = 0$ </p>		

digital or analog pins & receives control signals to adjust its position accordingly.



Arduino Robot Wiring Diagram

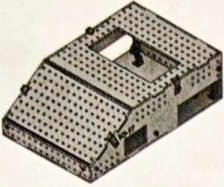
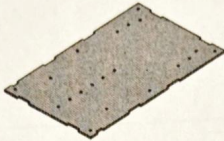

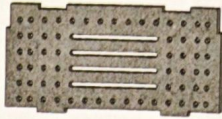

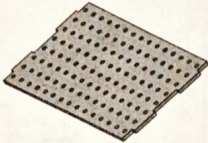
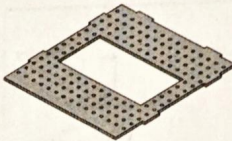
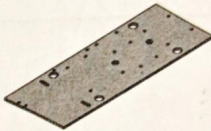
What questions do you have about this diagram?

Write them down and then do some research (at least 3)

Question	Answer
How does the BT module emit signal?	- Generates 2.4 GHz frequency radio waves. Produced by electric circuit in module, converts electrical signal to electromagnetic waves. Allows connection to bluetooth devices.
Why don't we need a sensor shield?	- After research, it seems that this robot could support motor modifications & component additions if it had more space & cost restraints (low requirements for functionality).
What is third pin of the switch?	- One is a normally open terminal, one is a normally closed terminal, one is a common terminal. The third one can be a common terminal, point of connection with switch in its (on/off) state.
Why do VCC & GND wires go to same type, whereas TXD go to RXD & vice versa?	VCC & GND are ground & voltage wires, same like connections due to standardization, safety, & compatibility. RXD & TXD are data communication devices, one is the receiver & the other is the transmitter. Bi-directional communications with this wiring setup is possible.

Laser Cut Parts

Below is an example of a fairly basic chassis you could use to house and carry your robot.

<p>Full Chassis (Qty: 1)</p> 	<p>Base (Qty: 1)</p> 	<p>Front (Qty: 1)</p> 	<p>Back (Qty: 1)</p> 
<p>Sides (Qty: 2)</p> 	<p>Front Slope (Qty: 1)</p> 	<p>Front Slope (Qty: 1)</p> 	<p>Electronics holder (removable)</p> 

How will you make your unique and useful for your design?

-My design will be unique due to the plow I will have to make a special connector for the plow & as the plow will be able to move left/right it will be use ful to actually remove snow or ice, etc.

How will you plan to have a place and sturdy way to attach each component you researched above?

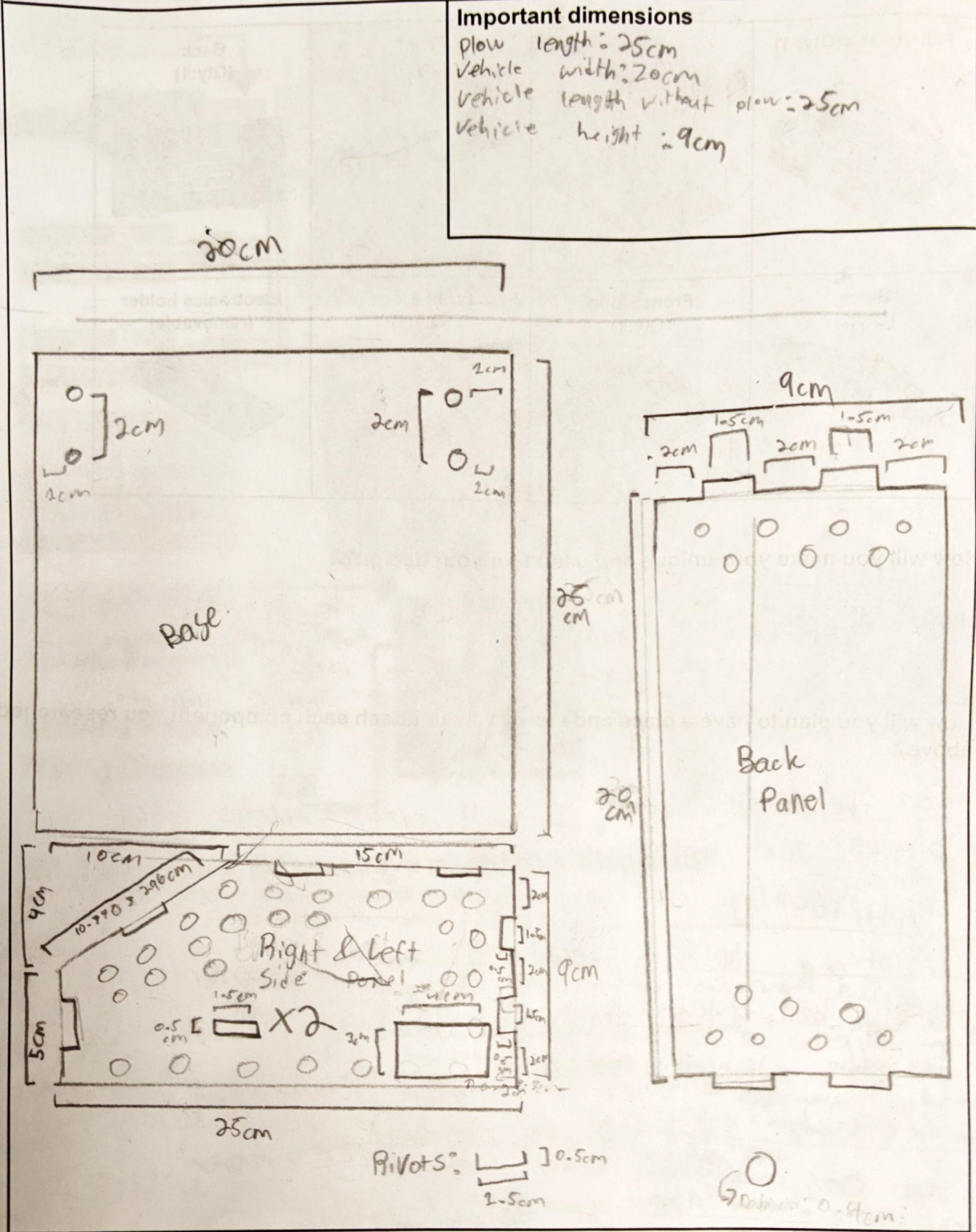
For the wood body, I will create notches that the pieces can interlock using. I will then glue the interlocking sections for a complete & strong hold. In terms of each component, they will be glued down to the base of the body for the pieces which require extra

Strength due to movement (ie motor, servo) I can make a dowel style of joint connecting the component to the base of the bot & additional glue for smooth

Concept drawing version 2

Now that you have a better understanding of the parts needed (at minimum) make a more detailed CHASSIS drawing with all pieces required and measurements.

Important dimensions
 plow length: 25cm
 vehicle width: 20cm
 vehicle length without plow: 25cm
 vehicle height: 9cm



$a^2 + b^2 = c^2$
 $10^2 + 4^2 = c^2$
 $100 + 16 = c^2$
 $116 = c^2 \rightarrow c = \sqrt{116} \rightarrow$ negative extraneous no negative measurements
 $\therefore c = 10.770329$