Developer Guide

System overview:

This device is a mobile device with three wheels, a battery and an enclosure with electrical components attached to it. It is able to connect wirelessly, enabling receiving and sending data to and from the TekMow, and location mapping via communication with the GPS module. A python script will be used to send commands to a microcontroller and a joystick will then be used to move the device in whatever direction. A Vesc will be used to control the speed due to the motors, and also return some information regarding the TekMow(temperature, RPM, current draw, etc).

Power budget:

Module	Voltage (V)	Max Current (mA)			Motors
Nrf- Tx	3.3	11.3	max current		x2 Hoverboard Motor
Nrf- Rx	3.3	13.5	216.15		DC Cutter Motor
GPS	5.5	26			
Mega	5	150			
Accelerometer	3.6	0.35			
HC-SRO4	5	15			

Dimensions:

item	length(mm)	width(mm)	height(mm)	screw holes	item	diameter	height
Battery	365	90	110		switch	31.8	45.1
Gps	32	26	1.6	none			
Accelerometer	4	4	1.45	none			
NRF	4	4		none			

Vesc	67	39	18.3	none			
Wheel	158.75	114.3	190.5	2			
Relay	58	45	32	2			
Mega 2560	101.5	53.3		6			
Acrylic	250						
Totals:	1040.25						

Risk Assessment:

Frequency	Severity	Solution
High	Medium/Low	Have there be a guard around the blades, so that they won't hit anything themselves. Additionally, include a bump stop, so that if the TekMow hits anything hard enough to restrict motion, it will stop instead.
Low	High	Have a label/ some notification system that tells the user what range of temperature the TekMow is usable in, and which range is considered a hazard. Have systems shut off if they overheat.
Medium	Medium/High	Enclose many key components(ex: battery) in some sort of hard enclosure to ensure protection in case of collision.
Low	Medium/High	Use a BMS on the battery.
Medium	Low	Set a watchdog timer to shut off of movement.
Medium	Medium/Low	Set a temperature/current cutoff on the motor for the blades.
high	Medium/Low	Low battery warning notification + blades shutoff after a certain level of battery is hit.
Medium	High	Indicator lights + noise when started.
Medium/High	Medium	Spring loaded wheels that turn off the blades when wheels are not compressed.
Medium/High	Medium/Low	Kill switch on Tekmow and kill command on controls
Medium	Medium/low	Have a checksum in place

Schematics:

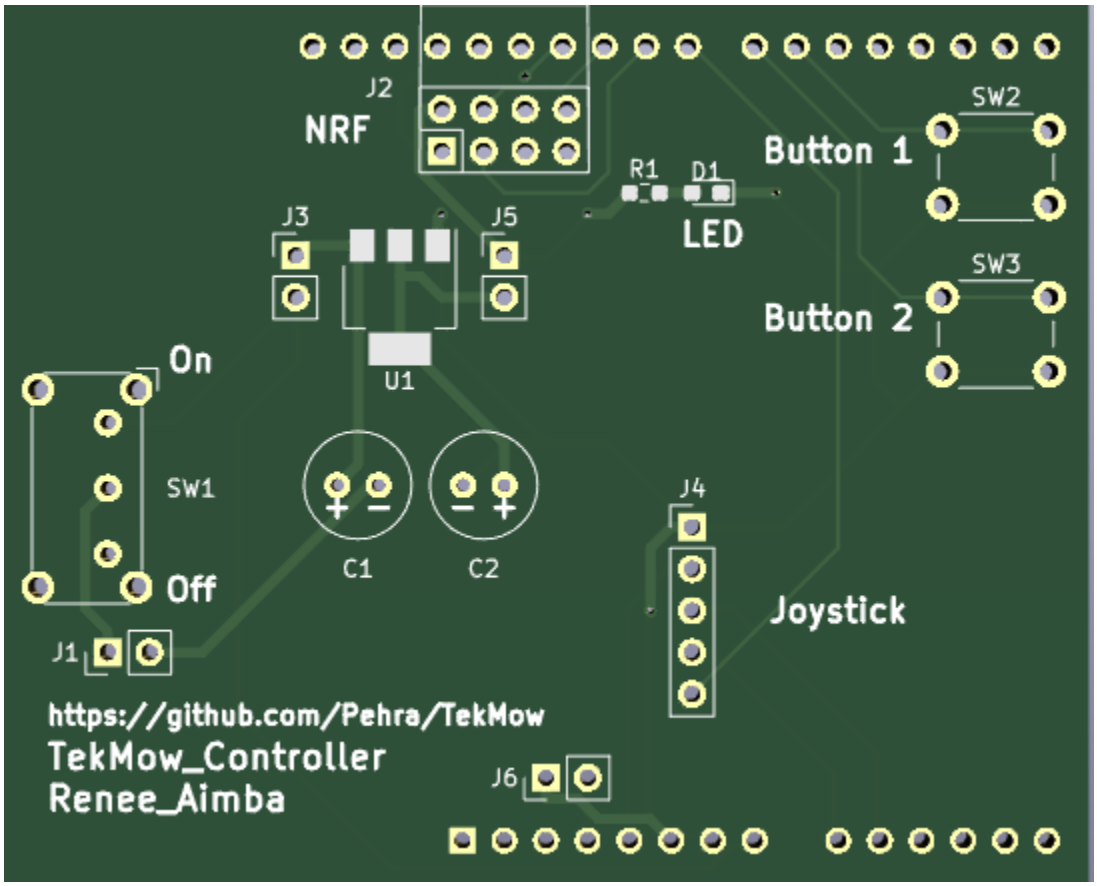

Figure 1: TekMow Controller PCB

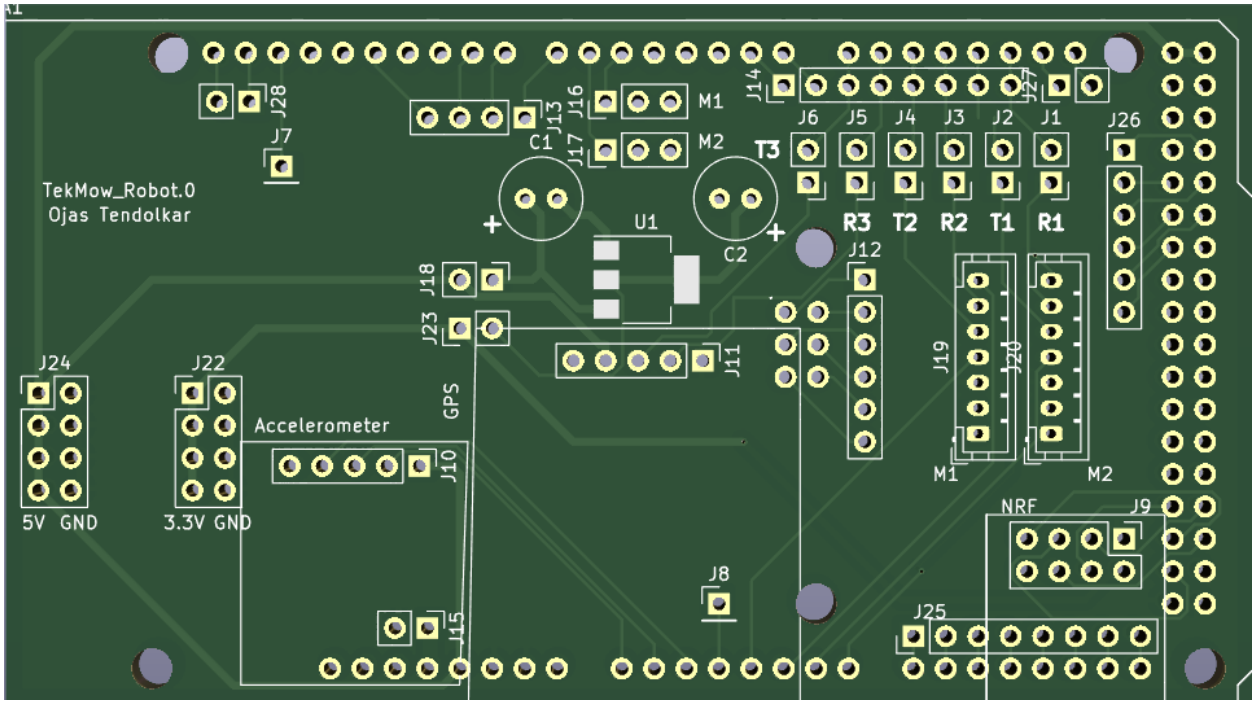

Figure 2: TekMow Robot PCB