

# SDMAY23-32: Smart Saw

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# Overview

- Upgrading client's "Branch Saw" into a "Smart Saw"
- Hydraulic jaws clamp to a branch
- Motor rotates electric chainsaw to cut branch
- Controlled wirelessly
- Main objectives:
  - Virtually monitor every component
  - Automate user experience



# Client Goals

- Saw runs wirelessly from controller
- Parts from reputable suppliers
- Materials sourced with intent to mass produce
- Ease of use while wearing gloves.
- Optimization of battery life
- Intuitive controls





# Milestones

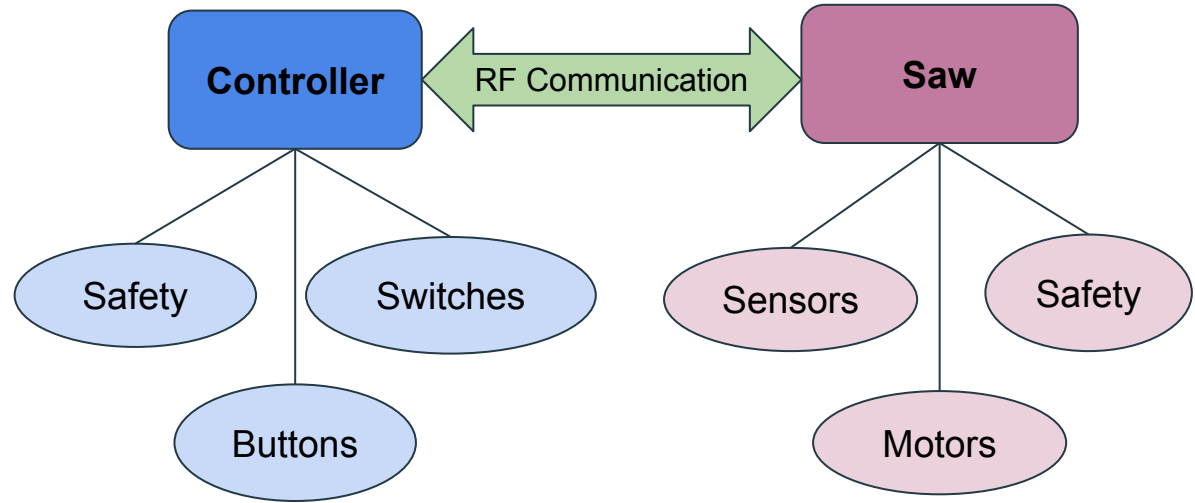
- Add and access sensors of Smart Saw (encoders, gyroscope)
- Enable wireless communication between saw and controllers
- Implement physical and wireless killswitch
- Controller assembly
- Creation of instruction manual

# Benefits of Product

- Cheaper than typical arborist
  - Tree Trimming Service: \$475 Avg per Job up to \$1300.
- Safer
  - Keeps people and equipment from being under the tree
  - Keeps people out of the tree
  - Lowers risk of blade accidents

# Design Plan

- Main Modules
  - Controller
  - Saw
- Wireless communication
- Software In Saw For Cutting





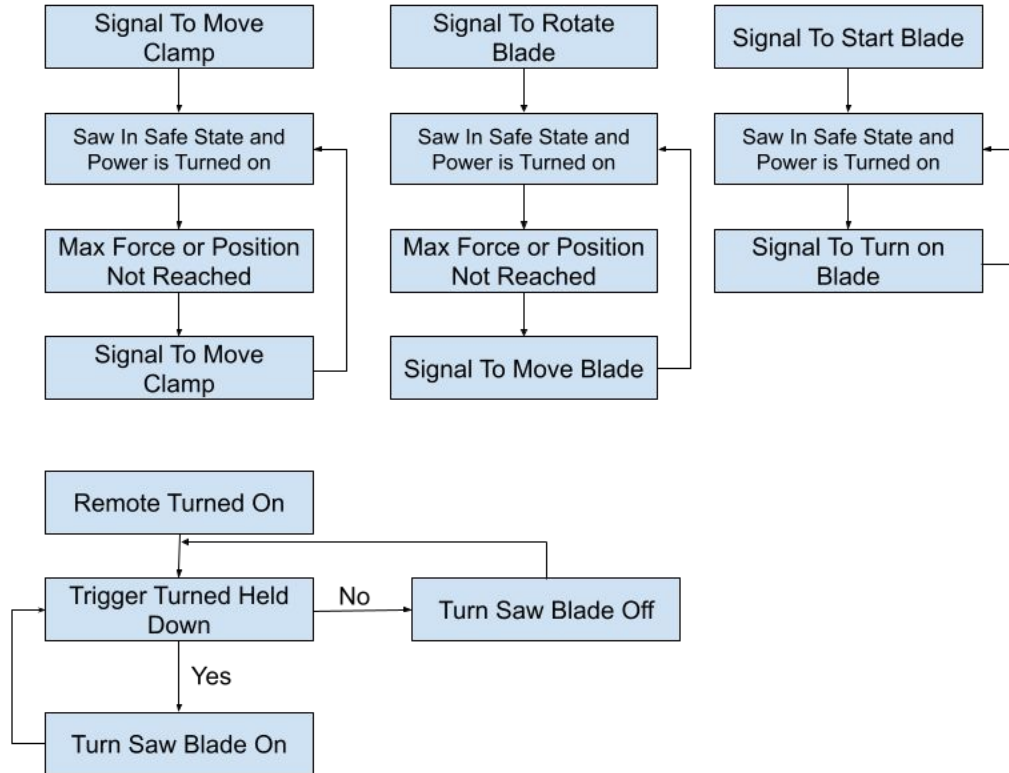
# Saw Interface

- Battery connection
- Safety Kill Switch
- Gyroscope and arduino module
- Servos to operates saw and clamp connected to arduino.

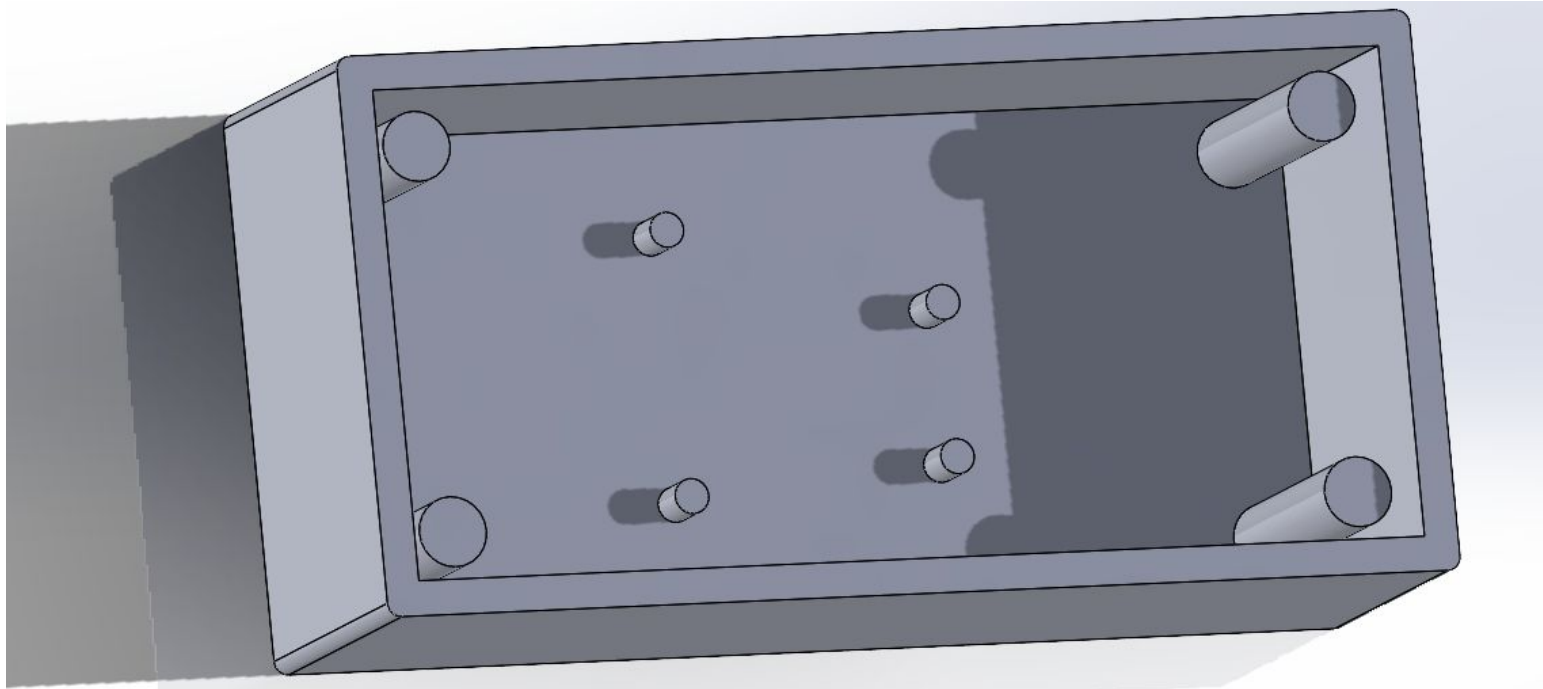
# Controller interface

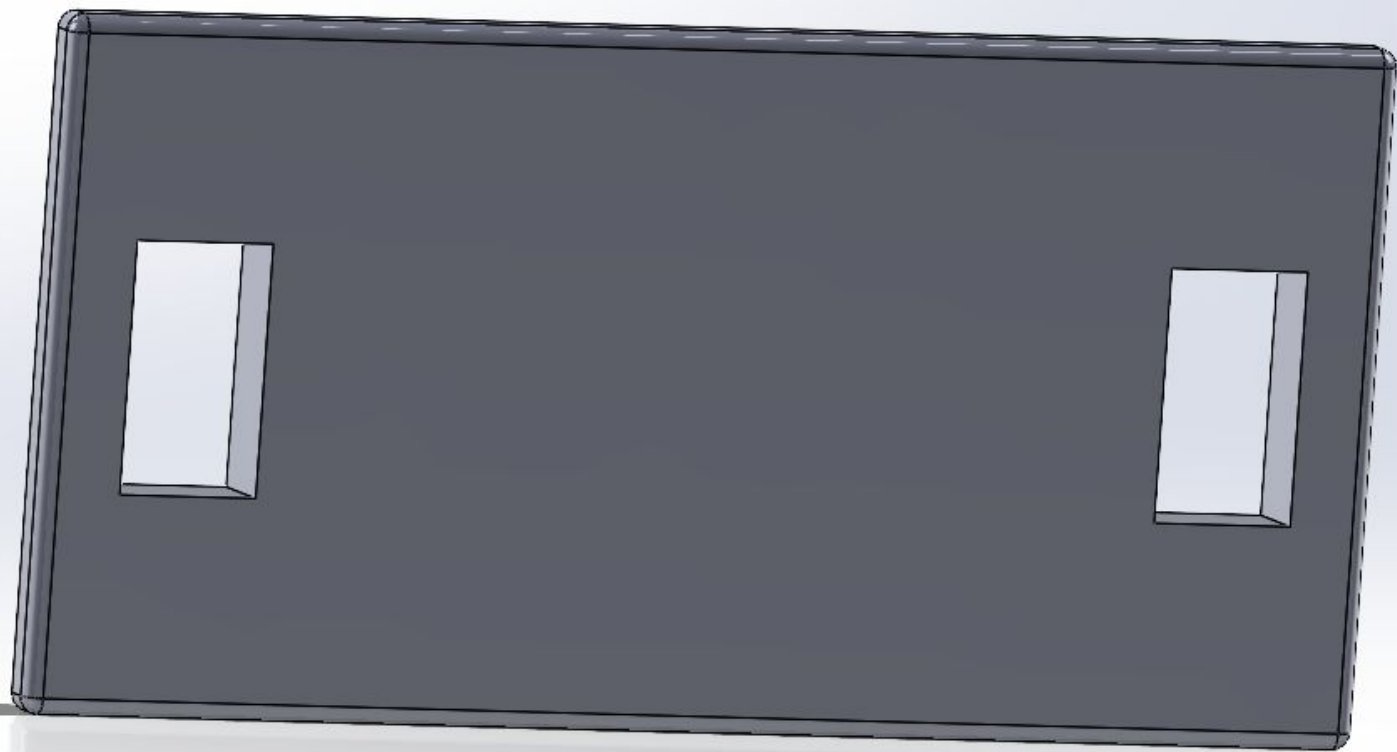
- Two Buttons on Remote for Safe Start and control
- Rocker switch to open and close clamp on saw
- Rocker switch to change saw angle
- LED's to indicate power and connection

# Programming Flowchart



# Controller Design





# Bill Of Materials

Arduino Uno		1
Arduino Mega		1
Gyroscope		1
XBEE shield		1
XBEE 802.15.4 chip		1
Explorer Deck		1
Button		1
Potentiometer / Dial		1
Power Switch		1
Rocker Switch		2
LED		2

# Engineering Standards

- **IEEE 1118.1-1999:** Use of microcontroller to control and communicate with sensors within device
- **IEEE C95.1-2005:** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.
- **IEEE 2030.2.1-2019:** IEEE Guide for Design, Operation, and Maintenance of Battery Energy Storage Systems, both Stationary and Mobile, and Applications Integrated with Electric Power Systems
- **IEEE 2700-2017:** Standard for Sensor Performance Parameter Definitions



Questions?