

# Design and Fabrication of Wireless Remote Controlled Lawn Mower

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**Abstract** - This paper summarizes and reviews different technological developments for making efficient and cost effective lawn mowers. A lawn mower is a device which is used to mow/ cut i.e. cut the grass of a lawn to an even height. It can be operated manually or by some energy conversions such as solar power battery power etc. Generally these are powered by electric motor or internal combustion engine and dc motors. In this paper, effort has been made to modify the old mower to improve its usability. The overall geometry is made smaller and lighter. Adjustable cutting motor height is introduced for better mowing of grass at intricate locations.

**Key Words:** lawn mower, electric motor, wireless, cutting motor height

## 1.INTRODUCTION

Lawn mower is a machine that is used to cut grass. The blades of the lawn mower are powered by pushing the mower forward. The blades may also be rotated by an electric motor or an Internal Combustion engine. Lawn mowers are classified based on different criteria. For example, according to the axis of rotation of blades we may have reel lawn mowers in which the axis is horizontal and rotary lawn mowers in which the axis is vertical. The reel (cylindrical) lawn mower is found to be better. Made of blades on a revolving cylinder, they achieve clean cut by scissors action. As the mower moves forward, the rotating blades come in contact with a stationary bar called the bed knife and placed parallel to the ground. The mower is adjusted to various cutting heights. Rotary mowers are often powered either by an internal combustion engines or an electric motor and are generally mowed manually, with the engine only spinning the cutting blades. Rotary mowers are generally have opening by the side of the housing through which cut grasses are expelled. Several types of mowers exist, each suited for to a particular purpose. From 2012 onwards, there is shifting trend, about 15 times from traditional hand guided or ride-on mowers to automatic electric mowers. Since 1830, there have been various lawn mower designs that have been created. These designs include push lawn mowers, which are suitable for smaller lawns, and the ride-on mowers, which are capable to cut grass in larger lawns [1]. Other more recent models of the lawn mower contain corded and cordless electric power. Cordless electric powered lawn mowers are powered by 12 volt rechargeable batteries. Cordless mowers have the maneuverability of a gasoline powered mower and the environmental friendliness of a corded electric lawn mower

[2]. The lawn mower considered for study in this paper was quite large, heavy, is AC powered and is hand propelled. There is a need felt to make it smaller, lighter and DC powered for better handling and endurance. An effort has been made in this paper to implement the same.

## 2. METHODOLOGY/FLOWCHART

The steps followed for the design of lawn mower is represented in the form of a flowchart as depicted in the figure below.

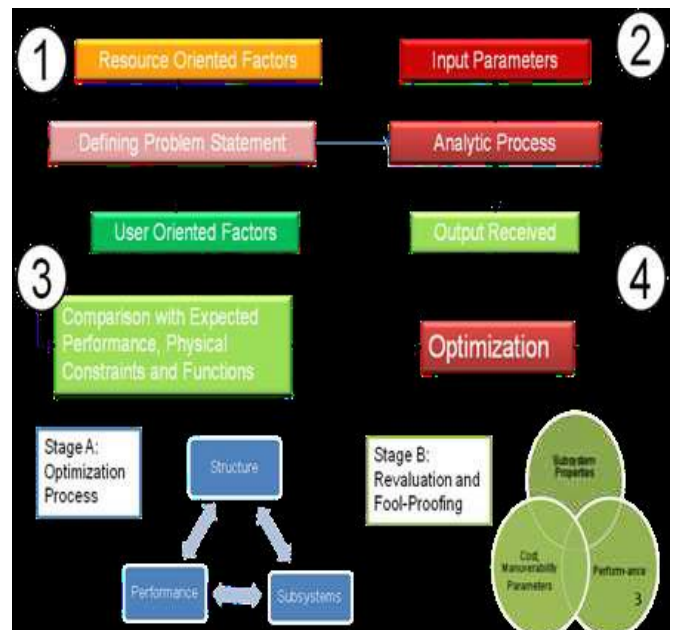


Chart 1- flowchart for the design of lawn mower.

## 3. DESIGN AND FABRICATION OF WIRELWSS LAWN MOWER

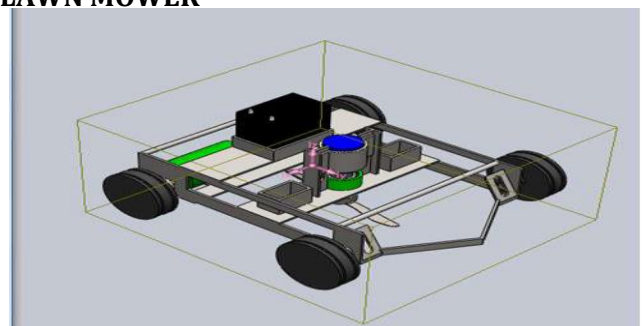
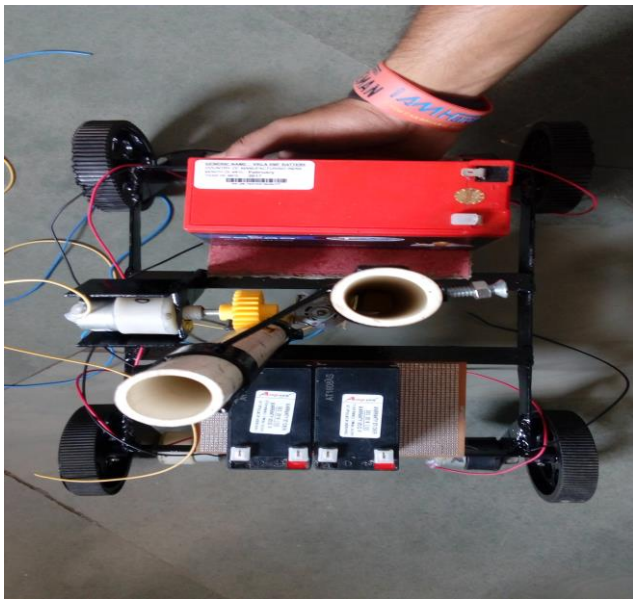


FIGURE 1- CATIA v5 model



**FIGURE 2-** Fabricated model of the wireless lawn mower

Fig. 1 shows the model designed in Catia v5 software and fig. 2 shows the actual fabricated model of the wireless lawn mower.

1. Wireless electric lawn mower releases zero emissions in our lawn.
2. Rechargeable 12V battery and highly efficient motor allow the user to mow up to 100 sq. ft. of a lawn in 10 min.
3. With a highly efficient blade, users can achieve a manicured lawn without the hassles of a gas-powered mower.
4. Removable battery allows users to swap in additional batteries for larger lawns.
5. it goes without frustrating starting issues with direct remote control access.
6. Adjustable height of blade with rack and pinion mechanism.
7. This mower is environmentally friendly; it runs on a 12 v cordless system, which is powerful and emission-free. It is equipped with rack and pinion mechanism which can adjust the cutting height up to 2" inches. It is also light weight, making it lighter than most other battery/cordless mowers.
8. Height of cut = 0.5" - 2".

**4. RESULT**

The design and fabrication of wireless lawn mower has been done as per the specification mentioned above. This model is tested for grass cutting and giving the efficiency of cutting 100 sq. ft. of lawn in 10 minutes using 180 watts of power with 2000 rpm using 12 volt electric motor.

**5. DESIGN CALCULATIONS**

**A] SELECTION OF ELECTRIC CUTTING MOTOR**

- DC motor
- Speed = 2000 rpm
- Voltage = 12 volt
- Power = 180 w

$$T = (P \times 60) / 2 \pi N$$

$$= (180 \times 60) / 2 \pi 2000$$

Hence Torque produced by cutting motor is 0.862 Nm.

**B] SELECTION OF LIFTING MOTOR**

$$FORCE = (Wt. Of motor + rack Wt. + misc.) \times 9.81$$

$$= 0.85 \text{ kg} \times 9.81$$

$$= 8.338 \text{ N}$$

$$T = \text{force} \times \text{radius of lifting pinion}$$

$$= 8.338 \text{ N} \times 0.02 \text{ m}$$

$$= 0.1667 \text{ Nm}$$

$$P = (2 \pi N T) / 60 = (2 \times \pi \times 2000 \times 0.1667) / 60$$

$$= 34.91 \approx 35 \text{ watt}$$

Hence power and torque of the lifting motor is 35 watt and 0.1667Nm.

**6.CONCLUSIONS**

It has been observed that literature pertaining to lawn mower design and development is comparatively lesser. In the present studies, different aspects of solar powered, plug on electric, wireless lawn mower have been presented. With this background, the present studies direct design and development of a low cost manual / electric lawn mower. It has also been observed that the technological variations of

Commercially available lawn mowers are not abundant. Mostly domestic lawn mowers are powered with gasoline engine and operating cost for such lawn mower is around Rs.300-400/- per day excluding labor charges. It is expected that low cost improved manual / electric wireless lawn mower once developed, the operating cost for such system is expected to come down in future.

## 7. REFERENCES

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## BIOGRAPHIES



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