iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** VI **Month of publication:** June 2024

DOI: https://doi.org/10.22214/ijraset.2024.63146

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue VI June 2024- Available at www.ijraset.com

Smart Lawn Bluetooth Mower with Sprinkler and Time Tracker

Supriya Telsang[1], Sumit Pujari[2], Prutha Sawale[3], Vaibhav Pujari[4], Aryan Pungale[5], Rahi Dubewar[6], Rahul Shendre[7]
Department of Engineering, Sciences and Humanities Vishwakarma Institute of Technology, Pune, India

Abstract: ***This abstract outlines the development of a multifunctional lawn care device that amalgamates a traditional lawn mower with an integrated water sprinkler, hence revolutionizing lawn care. It not only cuts down on manual labor in one but many ways. This lawn mower simultaneously supports the irrigation of lawns, enhancing convenience. What comes to more ease is the control of the machine via Bluetooth module, which can be operated with a smartphone through an application. It also shows the estimated mowing time and brushes off the residue to make the mowing activity more organized. Using ESP32 for Bluetooth control, it manages to move in the right direction and start and stop when required. This device merges the conventional task of mowing with an innovative sprinkler system in order to irrigate the lawn as and when required. The built in time tracker allows users to schedule and automate lawn care routines optimizing maintenance efforts and promoting healthier greener laws while saving both time and resources. This integration of lawn care functionalities aims to enhance convenience and effectiveness in maintaining outdoor spaces, manage to cut down on labour and cost and give a user-friendly experience.***
Keywords: Lawnmower, Water sprinkler, Bluetooth, Time tracker, ESP32 Microcontroller, Smart

I. INTRODUCTION

In today's technological advancements, lawn care is a topic to modernize on. Those were the days where young to old aged people would hire workers or used physical labour to either trim their garden lawn or any grassy areas, irrigate it, or those who would otherwise need the use of manual tools like shears, scythes or hand-held trimmers. Lawnmowers provide a solution to this tedious task. A Lawnmower greatly reduces physical strain and effort this is especially important for older individuals or those with physical limitations. Lawn mowers serve the need for all these problems/limitations by offering a convenient and efficient way to trim grass using a machine which would otherwise be extremely time consuming and a physically demanding task. The need for a lawnmower primarily arises from the necessity to efficiently maintain lawns and grassy areas and to cut down labour work.

This research paper focuses on the development of a smart lawn mower that enables the user to trim the grass efficiently, keeping in mind that it is cost effective, environment friendly, save times and labour. The control entirely lies on Bluetooth making it user friendly. It also provides an integrated water sprinkler that optimizes the function of the machine and therefore there is no need for a separate one.

Then comes an additional highlighting feature that estimates the mowing time for the lawn mower. It ends the task by brushing off the residue and making it more organized. The efficiency of lawnmowers allows individuals to devote time to other activities enhancing productivity and freeing up leisure time that would otherwise be spent on manual lawn care. Ultimately lawnmower significantly elevates the physical burden, saves time and ensure effective maintenance making them crucial to both personal and professional lawn care. The striking quality of the lawnmower is its ability to display the estimated mowing time, which can be very beneficial for the user.

The Bluetooth Controlled Lawn Mower with Sprinkler and Time Tracker is an integrate model. This model can perform various task at the same time such as trimming the lawn, irrigating the lawn, cleaning the residue and measuring time for the whole. Our project aims at saving the time, saving expenses and greasing the wheels for the gardener/lawn keeper as it can do multitasking. Generally, conventional lawn mowers costs more than Rupees 10,000. But the total cost of our project is less than that , around Rupees 5,000-6,000. The most captivating factor is its low cost and its ability to perform multiple tasks. This Lawn Mower can revolutionize the lawn care market by entering into it. Conventional lawn mowers cause pollution due to harmful emissions. And as our project is eco-friendly it has the capability to capture the market.

Therefore, this lawnmower offers a much quicker and efficient way to trim grass compared to manual methods and allows individuals to maintain larger areas of grass without exhausting manual labour.

II. LITERATURE REVIEW

[1] Dutta P.P , Baruah A , Konwar A ,Kumar.V "A Technical Review of Lawn Mower Technology", this paper looks into various types of lawn mowers like reel and rotary mowers, each powered by gasoline, electricity, or manually. It goes through advancements like solar-powered models, robotic mowers using sensors and solar energy, and automated mowers employing GPS and AI for precise navigation and action. It also studies gas-powered mower emissions and proposes a low-cost, manually operated or electric mower design.

[2] Kartik R. Khodke, Himanshu Kukreja, Sumit Kotekar, Nital kukade, C. J. Shende "Literature Review of Grass Cutter Machine", this study reviews the development of grass cutter machines that are cost effective and efficient. It explores historical perspectives on mowing, from manual methods to reel-type and gasoline-powered mowers. The literature survey covers various aspects, including device design, environmental considerations, and noise pollution. The proposed model includes grass cutter types and their characteristics. It highlights the improved efficiency of contemporary grass cutter machines, reducing manual effort in maintaining lawns.

[3] Neha Bhateja, Nishu Sethi, Shefali Jain, Yash Mishra "Lawn Mower – An Automated Machine", this research focuses on improving automated lawn mowers using sensors and electric parts to cut grass without manual labour.it reviews various designs, including solar-powered models with sensors for boundary detection and obstacle avoidance. These systems, using components like Arduino and microcontrollers, are efficient and ecofriendly. But it faces challenges like its reliance on sunlight, lack of boundary detection wires, and struggles with dense grass. To overcome these, the study aims to create an Arduino-based lawn mower, ensuring safety and adaptability for homes, institutions, and industries.

[4] Tayyab Tahir, Adnan Khalid, Jehangir Arshad, Aun Haider, Iftikhar Rasheed, Ateeq Ur Rehman, Seada Hussen "Implementation of an IoT-Based Solar-Powered Smart Lawn Mower", This research focuses on improving conventional lawn mowers by incorporating automation and solar photovoltaic energy. Automation, including the use of robotics, has been implemented in industries and daily life tasks to increase efficiency. It talks about how solar energy has become an important source of power generation due to its pollution-free nature. The conversion of solar energy into electrical energy is done using PV cells.

[5] Baihaqi Siregar, Boi Manggala Hutagaol, Opim Salim Sitompul "Smartphone-Controllable Lawn Mower Robot", this research paper focuses on the development of a Smartphone-Controlled Lawn Mower Robot, for efficient lawn mowing. Previous research on autonomous lawnmowers is reviewed, leading to the introduction of a robot having manual and autonomous control features. It has Bluetooth communication, ultrasonic sensors, and an ATmega8 microcontroller. There are challenges like uneven terrain and obstacle detection limitations. The paper concludes that the smartphone-controlled lawn mower effectively performs its functions, suggesting future improvements such as enhanced trimmer head design, improved performance on hilly terrain, autonomous navigation based on maps, and additional features like a camera and IoT integration.

[6] Noli Mark A. Paala, Nikko Marc M. Garcia, Rojimar A. Supetran, Ma. Erica Lyn B. Fontamillas "Android Controlled Lawn Mower Using Bluetooth and WIFI Connection", this paper introduces an Android-controlled lawn mower project designed to enhance school field maintenance. The researchers proposed a model featuring an Arduino Uno microcontroller, Bluetooth, and WIFI connections. The ENIRO app enables remote control via Android phones. The model includes Bluetooth range of 58 meters, WIFI range of 152 meters, and a two-hour continuous usage covering a 30x20 meters mowed grass area. Results indicate successful Bluetooth and WIFI connections and a significant mowed grass coverage.

[7] Savita Patil, Bharati Vidyapeeth College of Engineering, Navi Mumbai, Ms. Nilam P. Gawade, S Ankita "Smart Solar Grass Cutter with Sprinkler", this research paper introduces a Smart Solar Grass Cutter with a built-in sprinkler system. The solar-powered automatic cutter operates within a defined area, avoiding obstacles in a 'zigzag' pattern. The objective is to provide an eco-friendly and noise-free alternative to gas-powered cutters, utilizing solar energy and Arduino technology. Components used are a solar panel, Arduino microcontroller, ultrasonic sensor etc. The cutter's working principle involves a rotary blade and roller, with automatic obstacle detection and control facilitated by Arduino The project has advantages such as fuel cost reduction and automatic sprinkling of water after cutting.

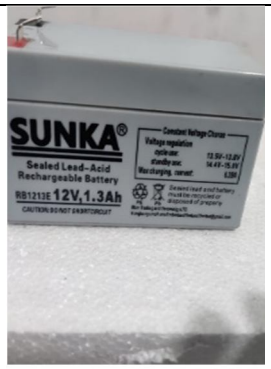
[8] Himanshu Arora , Jane Alam Sagor, Varun Panwar, Puneet Sharma , S. K. Mishra , P. G. Arora , P. K. Singh "Design and Fabrication of Autonomous Lawn Mower with Water Sprinkler", a smart lawn mower has been developed that uses an Arduino system, Bluetooth, and various modules to work autonomously, cutting grass efficiently and even watering the lawn simultaneously. The mower design focuses on factors like blade speed, turf quality, and battery life. It's built with a high torque DC motor and water sprinkler, controlled via Bluetooth from a smartphone. The machine's cost-effective design makes it portable and user-friendly.

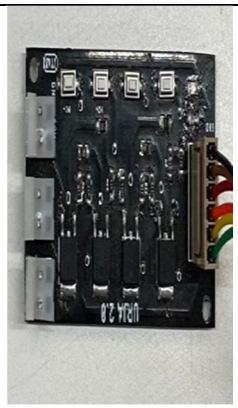
[9]S.Ramakoteswararao, N.Giridhar, M.Ramakrishna, K.Dharani, G.Nandhitha "AUTONOMOUS LAWN MOWER ROBOTIC CONTROLLER DESIGN AND IMPLEMENTATION", this project aims to make a robot that can cut grass by itself. It uses a clever way of acting based on what it senses in the environment. The robot has different behaviors, like finding grass and avoiding obstacles using sensors like sonar and cameras. It knows where it is using GPS and other tools. The robot's actions are coordinated using a smart design, and tests are done in a simulator to see how well it works. The robot learns to find grass, avoid obstacles, and cut the grass neatly. There's still room to make it even better, especially in making different patterns while cutting grass using smarter techniques.

[10] Ashin Saji ,Geon G Bastian , Muhammad Jaseel KA , Sanu Sajeevan "Design and Implementation of Intelligent Lawn Mower Robot", this research highlights a robotic lawn mower using advanced technology like AVR microcontrollers and accelerometers. It solves challenges of uneven terrain, ensuring energy efficiency and user-friendly control. Key components include remote-controlled movability, automated height adjustment, and sensor fusion for real-time data. The hardware implements low RPM and has servo motors for precise cutting tool adjustments. It emphasizes controller fine-tuning, better user interfaces, and ease between mechanical design and software control.

III.METHODOLOGY

A. Materials

Component Name	Image	Description
BO Motors		Voltage:3V-12V DC RPM: Approx. 150 RPM Output Torque: 3.5
Lead-Acid Rechargeable battery		Feature: Rechargeable Operating Voltage: 12V Capacity:1.3Ah Material: ABS Battery Type-VRLA
Gear Motors		Operating Voltage:12V RPM: 100 RPM

ESP32 Microcontroller board		Operating Voltage: 3.3V Feature: Can be connected by a USB cable used for power supply or a 9v external battery can be used.
L298N Motor Driver		Feature: H-bridge based Voltage: 5-35V
Water Sprinkler Nozzle		Material Used: PVC Pipe Colour: Black Spraying diameter: 0.9-1.1 m
Pump		Operating Voltage: 12V
Rotating Blade		Material: Metal

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue VI June 2024- Available at www.ijraset.com

B. Algorithm

1) Initialization

- Initialize Bluetooth communication.
- Create three motor objects (m1, m2 and m3) using the Urja library, specifying the pins connected to the motors.

2) Setup

- Initialize serial communication.
- Begin Bluetooth communication with a specific device name.

3) Main Loop

- Check if there is any data available from the Bluetooth connection.

4) Check Function

- If data is available:
- Read a character from Bluetooth.
- Call the `check` function with the received character.

5) Motor Control Functions

- `forward () `:
- Set PWM values to move the robot forward.
- `backward () `:
- Set PWM values to move the robot backward.
- `left () `:
- Set PWM values to turn the robot left.
- `right () `:
- Set PWM values to turn the robot right.
- `stop Motor () `:
- Stop the motors by setting PWM values to 0.

-start cutting ():
-Set PWM values to start cutting blades motor
-stop cutting ():
-Set PWM values to stop cutting blades motor

6) Check Function Logic

- Switch based on the received character:
- F': Call `backward () `.
- 'L': Call `left () `.
- 'R': Call `right () `.
- 'B': Call `forward () `.
- 'S': Call `stop Motor () `.
- Default: Call `stop Motor () `.
- ‘M’: Call ‘start cutting’.
- ‘N’: Call ‘Stop cutting’.

This algorithm assumes that the motor control functions (`forward () `, `backward () `, `left () `, `right () `, `stop Motor () `,’start cutting ()’ and ‘start cutting ()’) are correctly implemented to control the motors based on PWM values. The actual movement and behaviour of the robot will depend on the specifics of your hardware setup and the characteristics of the motors.

IV.FUTURE SCOPE

The lawn mower machine will provide convenience for the user as it can do multiple tasks in a short period of time. It provides easy access to the user as it is controlled via cell phone. Incorporating a sprinkler system provides efficient and effective water flow, supports lawn health and saves water. The time tracking feature provides automation and convenience, allowing users to plan and track lawn care activities. Further research and development in this area may explore additional functionality, integration with smart home systems, and environmental benefits. The continued development of these technologies has the potential to change the way we look after our outdoor spaces and make them more useful, efficient and environmentally friendly. On the whole, the lawn mower with sprinkler system and time tracker represents a well-thought solution for today's lawn care.

V. RESULT

The Lawn mower is working efficiently in the green field. The app developed for it makes it easy to control the mowing robot in any direction. Integrating the IOT system and Bluetooth module enables seamless connectivity and communication between the user and the mowing robot. Through the app the user can easily operate the lawn mower robot, cutting blades, and the sprinkler system. Also, the time can be calculated to do the trimming process. This is done by entering the area to mow in meter square. By clicking on 'calculate time' the result is displayed. The Sprinkler system is made to work both manually and on a controlled basis. The Lawn Mower is completely eco-friendly in contrast with the conventional lawn mowers which causes pollution. Over all the lawn mower project with an integrated sprinkler system proves to be user-friendly and an efficient solution to the problems faced by the user.

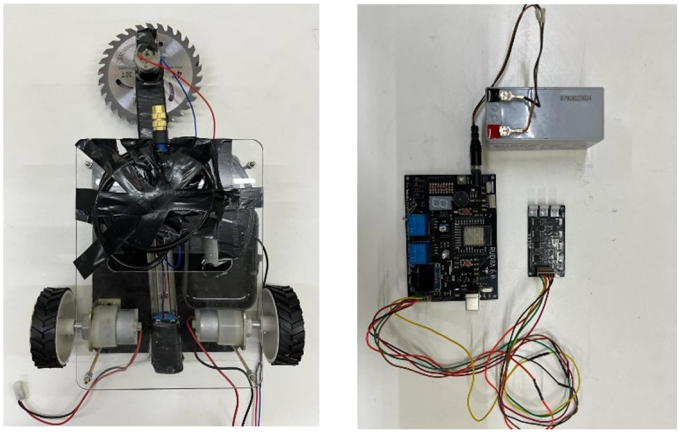


Figure 1.Assembled and integrated components

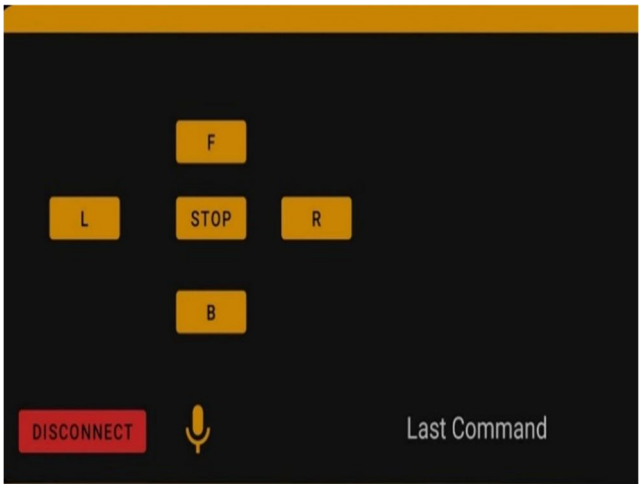


Figure 2. Application to control the mower

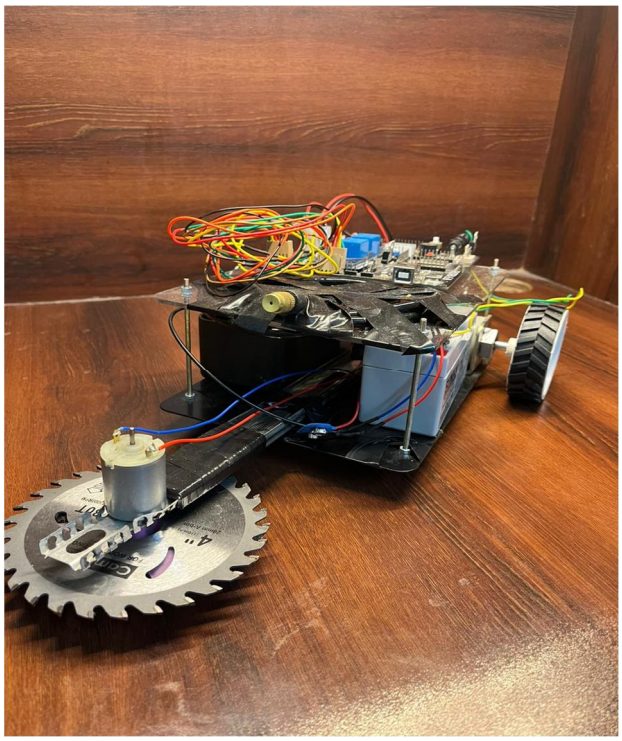


Figure 3. Integrated Lawn Mower

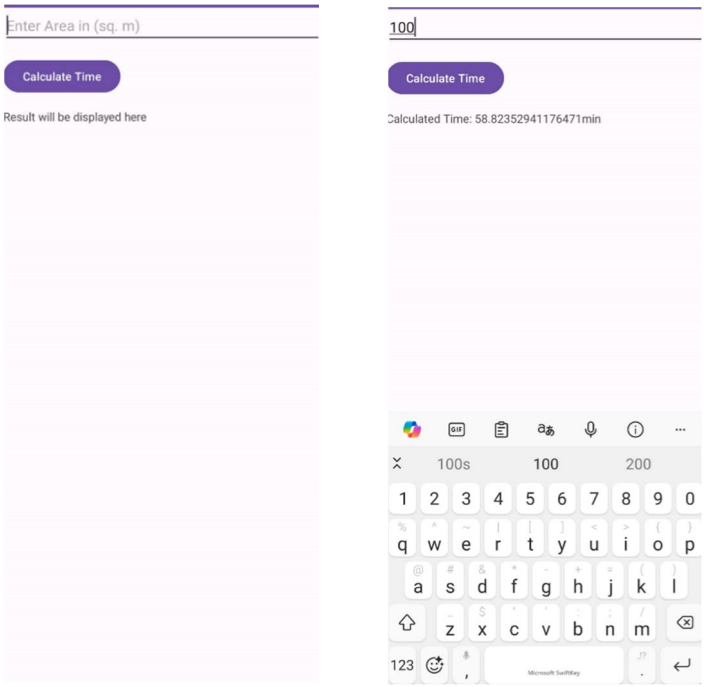


Figure 4. display of calculated time

VI. CONCLUSION

In a nutshell, the lawn mower with a water sprinkler project represents an innovative and practical solution for modern lawn maintenance.

It combines the essential functions of mowing and watering, saving time, water, and effort. It has the potential to evolve with technological advancements to meet the needs of homeowners while contributing to a more sustainable and eco-conscious approach to lawn care.

VII. ACKNOWLEDGEMENT

I would like to express my appreciation and profound gratefulness to everyone who have contributed to the successful completion of the project ‘Smart Lawn: Bluetooth Mower with Sprinkler and Time-tracker’.

Firstly, I extend my sincere thanks to Prof. Supriya Telsang for being our project supervisor and for her guidance and insightful feedback throughout the development process.

I immensely appreciate my teammates for their dedication, hard work, and collaborative spirit. Each team member brought unique skills to the table, contributing to the project's success. Our collective efforts and synergy made this endeavour both enjoyable and rewarding.

Lastly, I extend my thanks to ‘The Robotics Forum VIT Pune’ who have provided valuable insights, assistance and encouragement, all of which played a crucial role in refining the project.

REFERENCES

[1] Kartik R. Khodke ,Himanshu Kukreja, Sumit Kotekar, Nital kukade ,C. J. Shende “Literature Review of Grass Cutter Machine”, International Journal of Emerging Technologies in Engineering Research (IJETER)

[2] Dutta P.P , Baruah A , Konwar A, Kumar.V , “A Technical Review of Lawn Mower Technology”, ADBU-Journal of Engineering Technology.

[3] Adubika Oluwatobi Akinyemi, Hamzat Farouq Ayobami and Adebayo Solomon Damilare,” Design and Fabrication of a Solar Operated Lawnmower”, International Journal of Innovative Science and Research Technology ISSN No:-2456-2165.

[4] Neha Bhateja, Nishu Sethi, Shefali Jain, Yash Mishra,” Lawn Mower – An Automated Machine” International Journal of Innovative Research in Computer Science & Technology (IJIRCST) ISSN: 2347-5552 Volume- 8, Issue- 6.

[5] Sarath Chandra Damineni Sai Manikanta Munukoti,” Product Usage Data collection and Analysis in Lawn-mowers”, Master of Science in Computer Science October 2020.

[6] Baihaqi Siregar, Boi Manggala Hutagaol, Opim Salim Sitompul “Smartphone-Controllable Lawn Mower Robot”, 2020 International Conference on ICT for Smart Society (ICISS)

[7] Ashin Saji ,Geon G Bastian , Muhammad Jaseel KA , Sanu Sajeevan “Design and Implementation of Intelligent Lawn-Mower Robot”, International Journal of Innovative Science and Research Technology

[8] S. RAMAKOTESWARARAO, N.Girdhar, M.Ramakrishna, K.Dharani, G.Nandhitha “ Autonomous lawnmower robotic controller design and implementation”, International Journal of Creative Research Thoughts(IJCRT).

[9] Himanshu Arora , Jane Alam Sagor, Varun Panwar, Puneet Sharma , S. K. Mishra , P. G. Arora ,P. K. Singh “Design and Fabrication of Autonomous Lawn Mower with Water Sprinkler”, Think India Journal ISSN: 0971-1260 Vol-22-Issue-17-September-2019.

[10] Ramachandran N, Neelesh kumar N , Rajeshwaran S K , Jeyaseelan R, Sree Harrish S “ Design And Fabrication Of Semi-Automated Lawn Mower”, International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075 (Online), Volume-8 Issue-10, August 2019.

[11] R.S.Keote, Prasanna Kale, Chaitanya Raut, Bhaskar Samavedula, Rutuja Khawade, Abhijeet Dumanwar “Solar Based Smart Lawn Mower”, International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958 (Online), Volume-9 Issue-4, April 2020.

[12] Dev Khetan, Komal Rajput, Hritik Mittal “Solar Powered Hybrid Lawn Mower based on Arduino”, International Journal of Scientific and Research Publications, Volume 11, Issue 12, December 2021 ISSN 2250-3153.

[13] Dipin.A, Dr. Chandrasekhar.T.K “Solar Powered Vision Based Robotic Lawn Mower”, International Journal of Engineering Research and Reviews.

[14] Vipul Patel, Tanvi Patil, Pratik Sarvankar, Kashif Shah, “Arduino Controlled Lawn Mower”, IJSRD - International Journal for Scientific Research & Development| Vol. 3, Issue 11, 2016.

[15] Ashish kumar chaudhari, Yuvraj sahu, Pramod kumar sahu, Subhash Chandra verma “Smart Solar Grass Cutter Robot for Grass Trimming” IJARIIE-ISSN(O)-2395-4396.

[16] Christine Marie J. Madrid, Zye Raquel E. Acosta, Juliet F. Macabodbod, Geraldine A. Navasa “AUTONOMOUS SOLAR-POWERED GRASS CUTTER”, International Journal of Engineering and Techniques - Volume 4 Issue 6, Nov-Dec 2018.

[17] Aditi Singh, Durgesh Kumar Pandey, Mohd Saif Sayyed, Pratibha Dubey “SOLAR POWERED AUTOMATIC GRASS CUTTER”, International Research Journal of Modernization in Engineering Technology and Science.

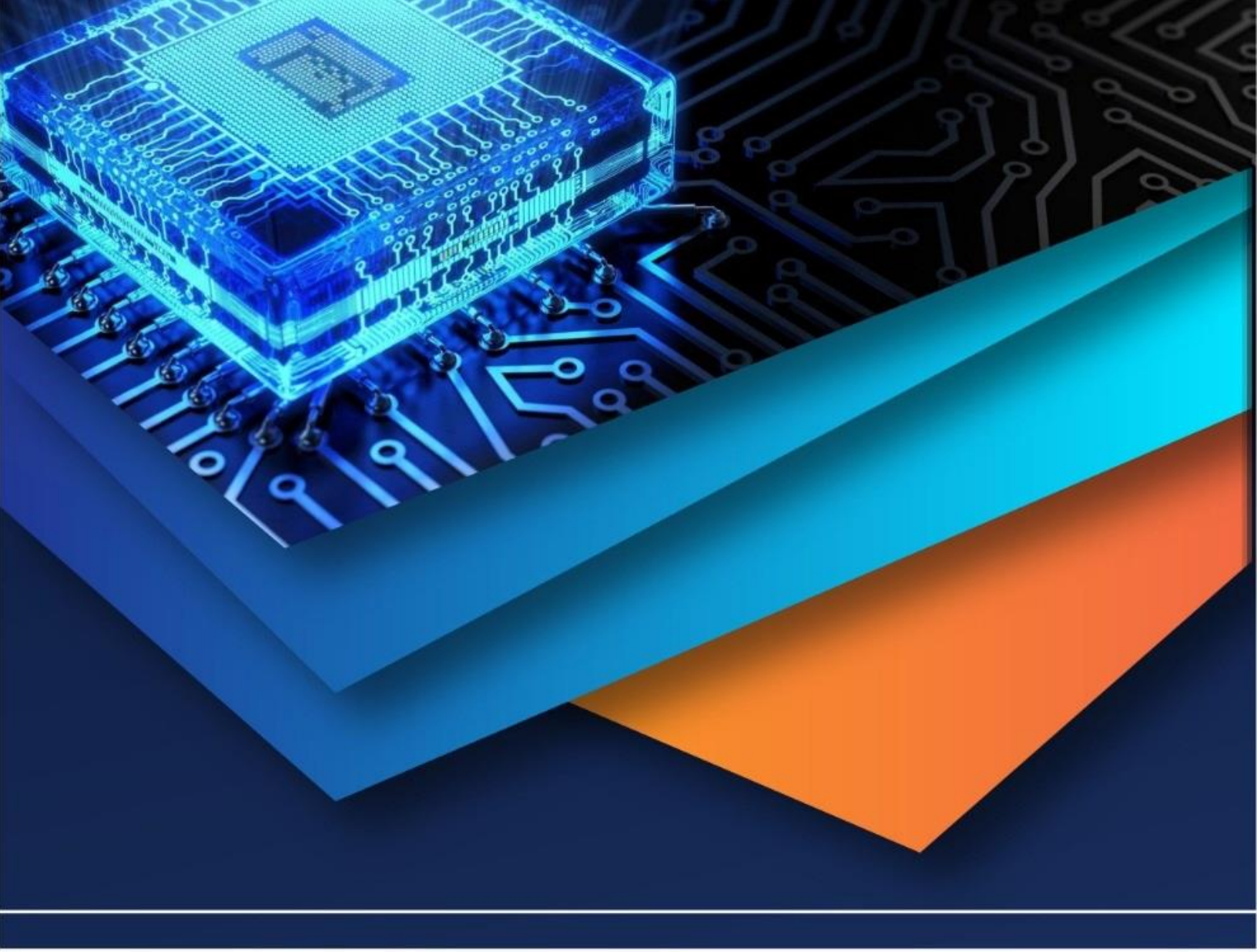
[18] Mrudal Kanhekar, Pranay Pohankar, PrashikDable, SachinWaghmare, Saurabh Munghate “Mobile Operated Solar Grass Cutter”, International Journal of Research Publication and Reviews.

[19] Dr. J. G. Chaudhari , Akash S Ingole , Aakash Z Patel , Kunal R Bhagat , Ashwini S Gaurkhede “Smart Solar Based Grass Cutter”, International Journal of Advanced Research in Science, Communication and Technology (IJARSCT).

[20]) Prof. Kiran Napte, Pooja Yevale, Pranali Raje, Divya Temgire “Bluetooth Controlled Solar Grass Cutter using IOT Application”, Ijraset Journal For Research in Applied Science and Engineering Technology.

[21] Prof. S. V. Patil , Ms.Nilam P. Gawade, Ms.Ankita S. Golam , Ms.Manjiri M. Kajale , Mr.Ganesh R. Yelave "Smart Solar Grass Cutter with Sprinkler", IJSART - Volume 4 Issue 3 – MARCH 2018.

[22] Y.B.N.V.Bhaskar, T.Sabitha, P.Sahithi, T.Ramya, U. Dhanya Sri, P. Praseeda "Fully Automated Solar Grass Cutter using IoT", Volume 8, Issue 4, April 2023 International Journal of Innovative Science and Research Technology ISSN No:-2456-2165.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY