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Robotic Pool Cleaning Machine Using Arduino

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Abstract: ***Plastic, thermocol and metal usage contributing to water plugging, which is causing problems and promoting diseases like typhoid and intestinal illness. Manually cleaning the wastes would not be sufficient because it frequently entails a large amount of work and effort and there is a chance that the irresistible germs present in the sewage could cause various illnesses. This study includes a suggested design for a garbage collection system that is practical and efficient for cleaning up trash from rivers, channels, and lakes. The system for collecting trash is specifically designed to work with applications for picking up a variety of material, including gliding litter, trash bags, discarded tyres, and others. IoT technology which has the ability to track and control the entire process, is utilized as part of the integrated system. The watercraft was developed in response to the need for cleaning contaminants in the rivers territory and to meet the requirement of working in locations other than the seaward zone, providing more options for the use of cleaning trash and waste from the aquatic environment.***

Keywords: Arduino Uno, Servo motor, blue tooth, Driver IC, Wheels etc.

I. INTRODUCTION

The most objective of this project is to develop a system to clean the thrash from surface of water bodies using Arduino uno to ease the method for cleaning and also result in saving of time and work requirement. Status of robot is controlled by Bluetooth from a certain distance. Thus, it also reduces pollution due to garbage in water bodies. The pool surface cleaner using robotic machine can be designed by making use of Hardware such as Arduino, Beagle Bone Black boards etc. Which can connect with Bluetooth. Here we are focusing on less power consumption and more performance device. So, we are using Arduino uno which is more suitable with our requirement.



Fig.1:The floating wastes in oceans, coastal areas



Fig.2: cleaning water surfaces manually

The objective of this work is to, instead of hiring someone to clean your pool or using a more labor-intensive machine, a pool cleaner is the best option for the budget conscious pool owner. It is a one-time investment meaning it will be beneficial in the long run period of time. This means that it lets you save on energy, right after finishing. It also requires minimal maintenance. Most automated cleaners in the market have a built-in function that automatically turns off after its job. Consistent cleaning helps maintain the proper alkalinity, pH levels and calcium hardness. Some corner sand pool walls mostcare, and pool cleaners can provide you the service.

II. OBJECTIVE

The objective of this project is to give emphasis on decreasing the consumption of time and the man power. Most importantly to have clean water bodies. To provide with the resource so that the pollutants can be removed from the water bodies. To provide with performance which is fast and very reliable during the river cleaning operation. To improve the quality of a water bodies. Work for society for cleaning up the section of a water bodies. To provide with solutions for a improved environment for aquatic life and humans.

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III. EXISTING SYSTEM

Traditional method for collecting water surface floating waste is manual basis, by means of boat trash skimmer. The above methods are costly risky and large time consuming. To eliminate the drawbacks of the above-mentioned methods the remote-controlled water cleaning machine was designed which helps in cleaning the water surface efficiently and eco-friendly.

IV. PROBLEM STATEMENT

The statement of the project is "Robotic Pool Cleaning Machine Using Arduino" to remove the waste debris, plastic waste garbage from Rivers and pools. This causes harm to acoustic human life. To achieve clean water body for reduction of river pollution to achieve the beauty of water bodies by cleaning water bodies. To achieve that we require prior knowledge of either desired position or angle of each joint, where using the angels is called forward kinematic while using the position is called inverse kinematic.
This is done using many types of controllers. The controller is used to minimize the error between the desired and the actual positions. In doing so, the controller must meet certain specifications. These specifications such as reducing overshoot, minimizing rising time and eliminating steady state error. In addition, reducing the load disturbances, which model on each Position.

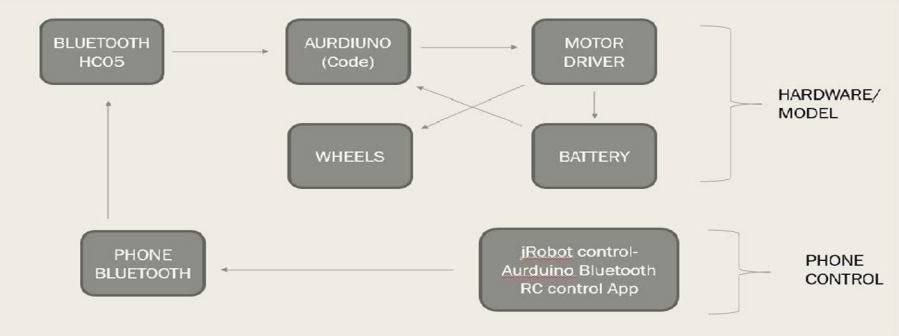


Fig.3: Block Diagram

V. COMPONENTS USED

A. ARDUINO

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc and at first released in 2010. The board is prepared with sets of digital and analog input/output(I/O) pins that will be interfaced to different development boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), by means of a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, in spite of the fact that it accepts voltages between 7 and 20 volts. It is comparative to the Arduino Nano and Leonardo.

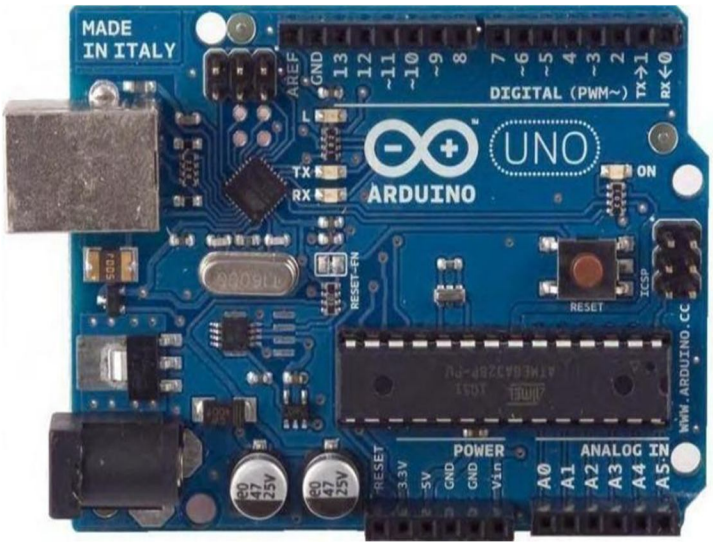


Fig.4: Arduino Uno

B. Servo Motor

A motor type that can rotate very precisely is a servo motor. Typically, this sort of motor has a control circuit that gives feedback on the motor shaft's present position, enabling the servo motors to rotate with extreme precision. A servo motor is used when you wish to spin an object at a specified angle or distance. It only consists of a basic motor that drives a servo mechanism. A motor is referred to as an AC servo motor if it is powered byan AC power source rather than a DC power source. A servo motor often has a gear configuration that enables us to produce a very high torque servo motor in tiny and light designs. These characteristics have led to its employment in a variety of applications, including toy cars, RC helicopters and planes, robotics, etc.



Fig.5: Servomotor

C. Bluetooth Module

HC-05 module is an easy-to-use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication. This serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Bluecore04-External single chip Bluetooth system with CMOS technology and withAFH (Adaptive Frequency Hopping Feature).

The Bluetooth module HC-05 is a MASTER/SLAVE module. By default, the factory setting is SLAVE. The Role of the module (Master or Slave) can be configured only by AT COMMANDS. The slave modules cannot initiate a connection to another Bluetooth device, but can accept connections. Master module can initiate a connection to other devices. The user can use it simply for a serial port replacement to establish connection between MCU and GPS, PC to your embedded project, etc. Just go through the datasheet for more details.

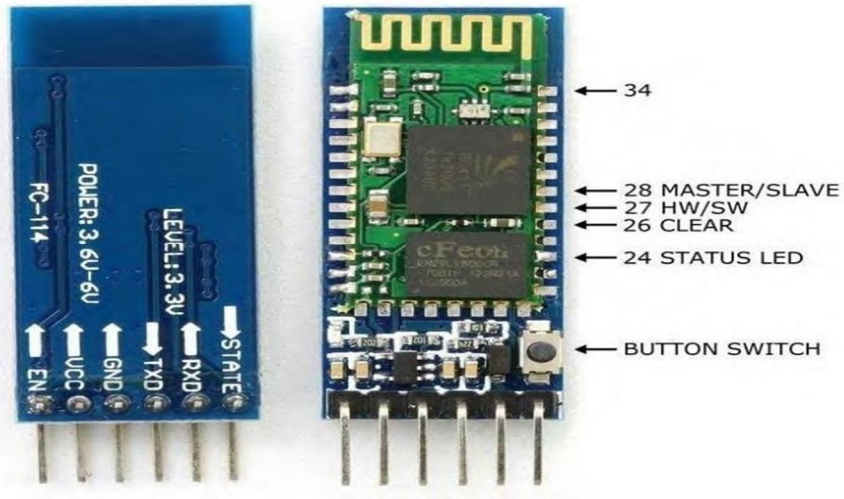


Fig.6: Bluetooth Module

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D. Driver IC

Driver IC is used to split the power that is given to the motors for their successive rotation. A huge amount of supply is given to the Driver IC which is further separated into small amount of supply and given to motors. When the motors are directly given a supply from the power source there is high chance of the circuit being malfunctioned or the end system will become short circuited. As the total system will be left troubled. To find a result for these type of power issues, Driver IC can run both in forward and backward direction which enables the motor to be run in every possible direction that are in need. Here the input voltage is given evenly to two motors. Driver IC has several configurations. Driver IC has Enable which acts as a switch making in On and OFF. The input and output terminals that are used as basic input and output terminals.



Fig.7: Motor Driver IC Module

E. Battery

Selection of battery is based on criteria i.e Maintenance – Free Sealed Lead-acid Battery. In the machine we have used four 1.5V battery . The 6V battery supply is given to the Regulator through Motor.

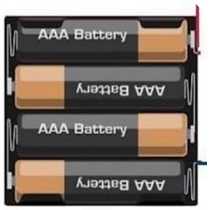


Fig.8: Battery module

F. Conveyor Belt

Conveyor belts are flexible endless strip of fabric or linked plates driven by rollers and used to transport objects. Belt conveyor is one of the basic tools in material handling industry. It is most commonly used in transportation of bulk materials such as grain, salt, coal, ore, sand, etc.

VI. WORKING

In this project the main aim of this machine is to lift the waste debris from the water surface. Here we are fabricating the Bluetooth app operated pool cleaning machine. Separate power supply is given to the 2+2 DC motors. 2 at the front for the belt and2 at the back for the robot to run in the water.

The back 2 motors are connected to the motor driver to control the motors which is further connected to the Arduino dumped with code and Bluetooth module.

Next the further working we observe that is by connecting the Bluetooth to an app called jrobot control where all the controls are available from which we can control the robot.

Finally, when the power is on and manually switching on the belt now the belt starts rotating and by using the app controls, we can move the robot in all directions and the belt collects all the dirt and waste.

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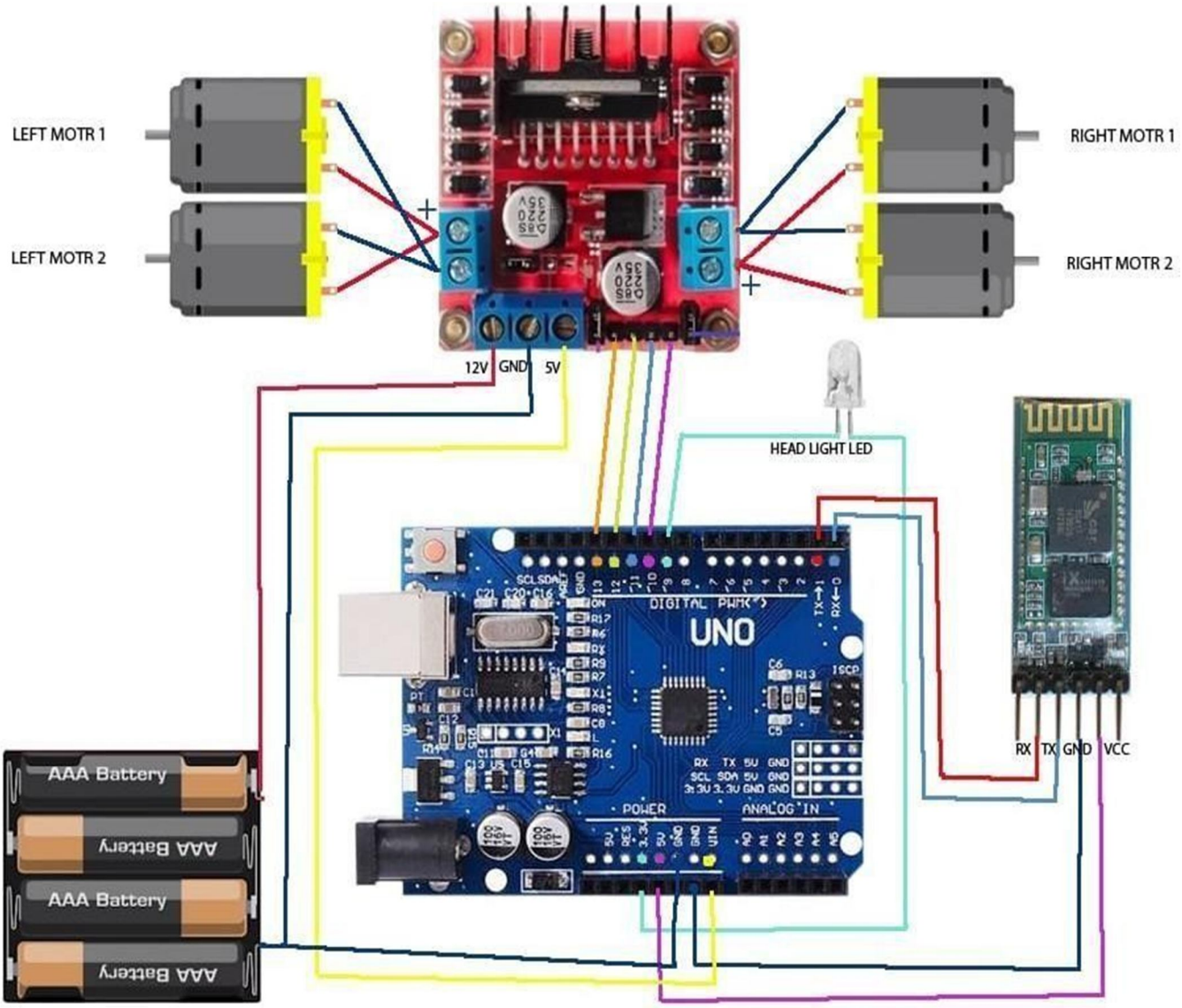


Fig.9: Arduino Connection



Fig.10: Models of final system

VII. VII.COMPARISION

The comparision of different parameters like installation, maintenance and Eco friendly etc. are considered in between the Existing and Proposed systems.

Table 1: comparing the different parameters between the Existing and Proposed systems

S.No.	Parameter	Existing System	Proposed System
1	Initial Investment cost	High	Less
2	Usage	Useful for big sewage bodies	useful for small as well as big sewage streams
3	Maintenance service cost	High	Less
4	Conveyor system	Not applicable	Safer and no need of labour or other machinery to lift the wastage
5	Replacement and installation of various parts.	Difficult	Easy
6	Skill worker requirement to drive a water-propelled system	Required	Not required
7	Environment friendly system	Some machineries use petrol or diesel for the operation it creates the pollution to environment	It is Eco friendly system

VIII. LIMITATIONS

1) The waste collecting capacity of machine is limited at a time.
2) This machine is only able to collect the waste which is floating upon the sewage stream surface.
3) When the flow of water is limited, rate of garbage collection is low.

IX. CONCLUSION

Cleaning of water bodies is always been a huge problem. Due to which the aquatic life of animals is destroying. So, to maintain a good balance between the aquatic life, this automatic water cleaning machine is introduced. This machine is easy in operations and its manufacturing cost is also low. Hence this water cleaning machine is very useful. Water cleaning machine is designed to make system very much economical and helpful to remove water impurities like plastic, trashes and other day to day waste which is floating on the surface of water bodies. This machine provides a new life to the aquatic animals and it also helps in human living.

X. FUTURE SCOPE

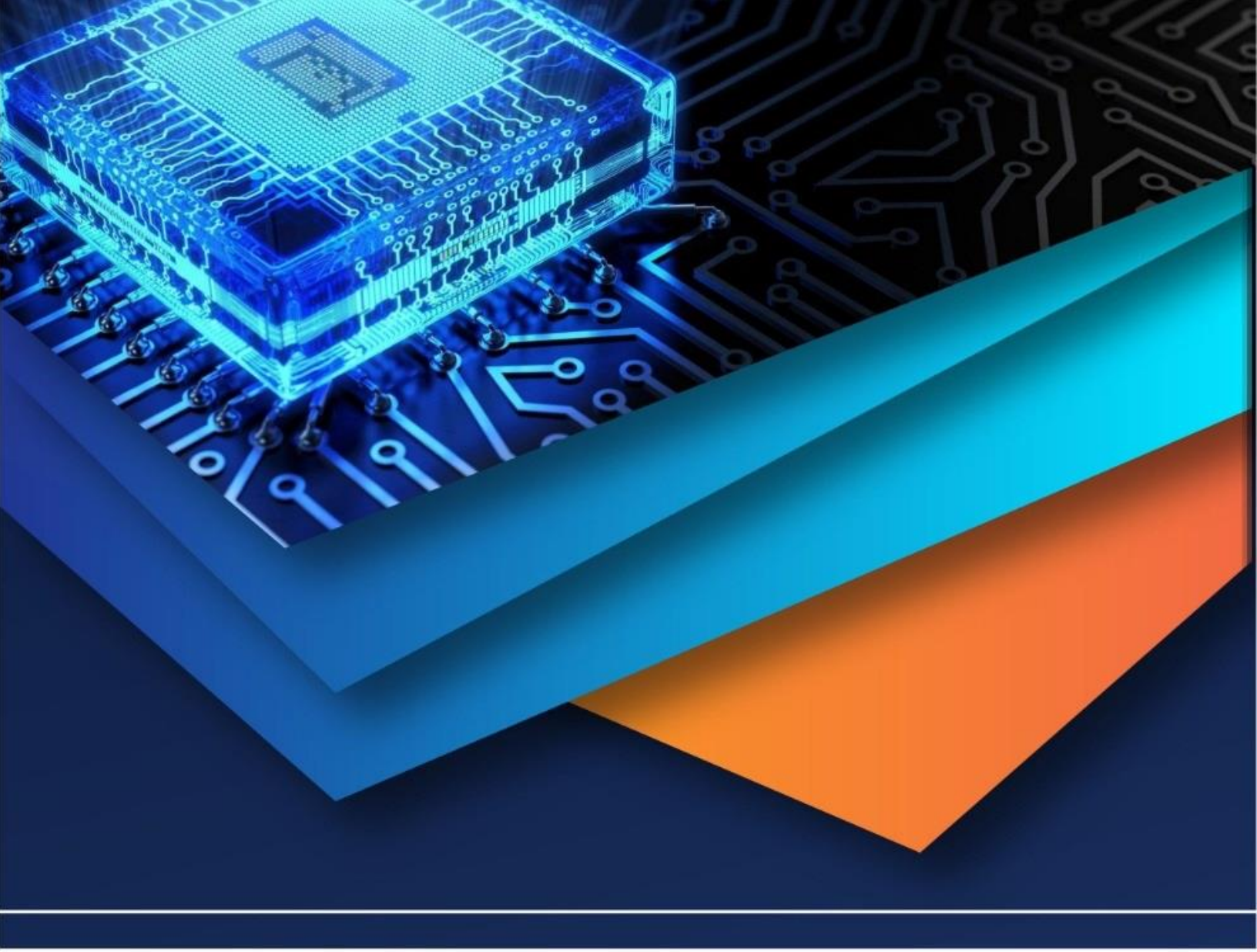
With the advancement of technology and for better functionality of the product, new versions of the device can be introduced. The present system is efficiently working, but still to increase the functionality of the device, various other modules can be added without majorly affecting the present system. Among the various added functionalities, some could be voice detection, camera, screaming alarm, and shock generator.

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