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Driverless Irrigation Device of Lawn

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Golden Prize of Russian Archimedes Award in Mar. 2021

Background of Invention

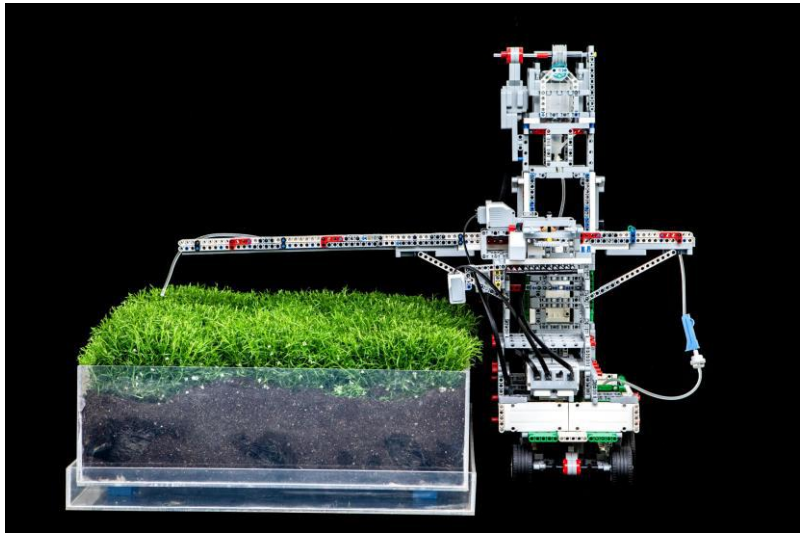
This invention is an automatic irrigation device of lawn. At present, the irrigation mode we see in the park is to automatic set the time for the irrigation with fixed watering amount, and the irrigation device is fixed and immovable, and the irrigation is incomplete (defect).

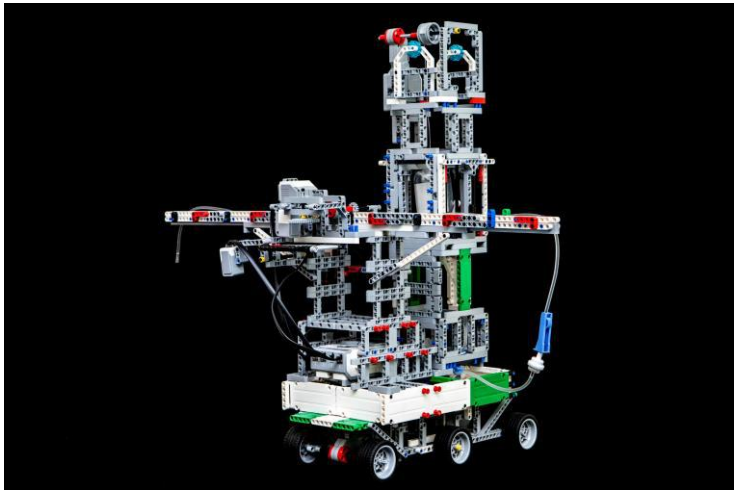
The lawn is the whole green ground cultivated by the artificial planting or grass seed sowing in the park. It is an integral part of the landscape and also a place for recreation and entertainment. In order to ensure the normal growth of lawn, especially in the hot season, it is necessary to irrigate the lawn regularly.

At present, the lawn is usually irrigated by the artificial irrigation or the irrigation sprinkler installed at the fixed point. This irrigation mode is time-consuming and laborious, the irrigation efficiency is low, and it is affected by the installation position of irrigation sprinkler, so it can not ensure that each lawn is irrigated. There are also the automatic irrigation devices of lawn on the market, but such devices cannot change the watering amount for irrigation according to the actual weather or the growth height of lawn, which is easy to cause a waste of water resources. Furthermore, the lawn will encounter the diseases and insect pests during the growth, and the traditional irrigation device cannot play a role in the prevention and control of diseases and insect pests. In order to solve above problems, it is necessary to design a driverless irrigation device of lawn.

My Invention (I)

- 1. My device can judge the reflected light value of ground by the photoelectric sensor, and its built-in program can determine the watering amount according to the weather conditions. For example, it can judge whether it is cloudy or sunny according to the reflected light value from the sensors, so as to judge the watering amount.
- We know that the water content of lawn is about 75% - 85%. We detect the growth of lawn and monitor the growth height of grass through the ultrasonic sensors, and the watering amount will be changed under different growth heights.



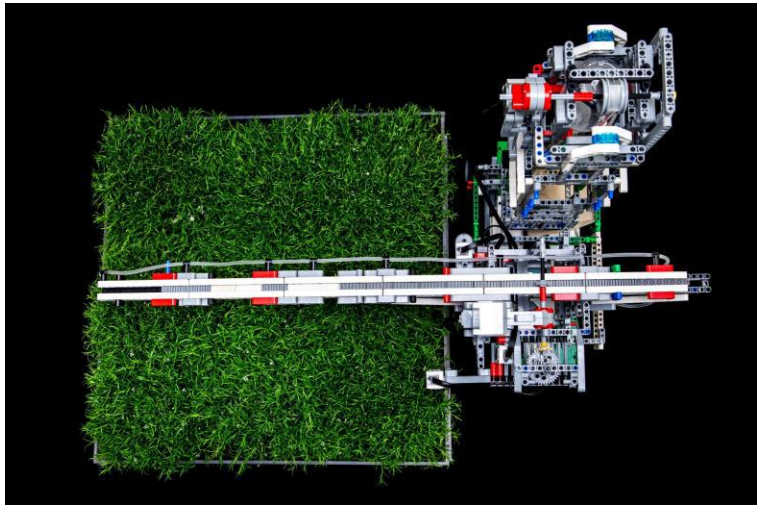


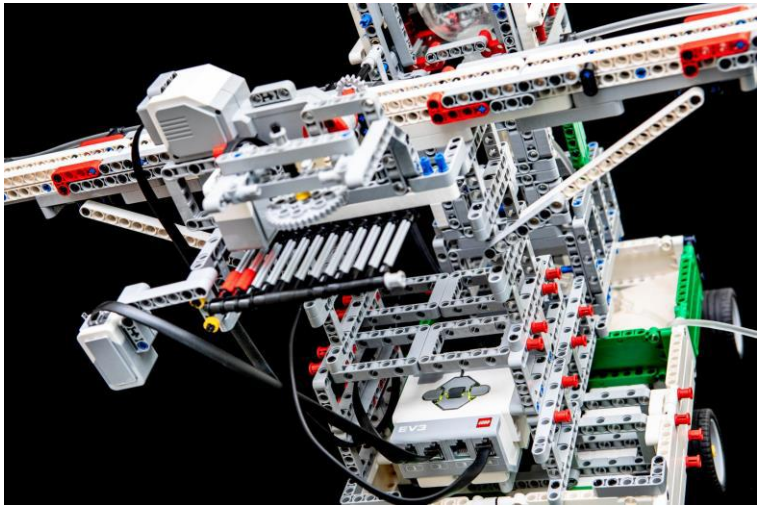
- 2. Furthermore, the lawn will encounter the diseases and insect pests during the growth. The traditional automatic irrigation system is watering. My device can also add the medicine that shall be sprayed into the water tank to kill the insects, so as to effectively prevent the diseases and insect pests, and ensure the normal growth of lawn. What we previously see is sprayed watering fixed in the middle of lawn, which is relatively fixed and is directly connected with the underground water pipe. At this time, I take the water tank storage mode and install the wheels under this device. We can set the specified watering route by programming, to realize the whole travel and return routes of driverless irrigation device. Firstly, it can expand the scope of irrigation effectively. Secondly, it provides more flexibility in watering, and it is not limited by the fixed spray.

My Invention (II)

- 3. In this invention, I use the principle of telescopic manipulator, and a track is made by the engagement of gear and rack, so that the manipulator can push forward with the delivery pipe. Then both the short and long-distance irrigation can be realized, and the problem of small irrigation area can be solved farthest. After pouring the water set by the system, the manipulator will retract automatically.

- 4. The entire device is executed according to the programming, which can avoid the waste of manpower effectively.





Beneficial Effects

1 This Invented Device with Driving Mechanism

The dual axis servo motor is started during the use, and the output axis of the dual axis servo motor drives the first connecting rod for rotation. When the first connecting rod rotates, it can drive the first bevel gear for rotation, while the first bevel gear is engaged with the second bevel gear, to drive the second bevel gear for rotation together, and the second bevel gear is fixedly connected with the rotation axis. Furthermore, a rolling bearing is connected between the mounting cover and the mounting base, and the mounting cover is rotationally installed on the mounting base through the rotation axis and the rolling bearing. The operating state of dual axis servo motor is controlled by the MCU control chip according to the monitoring range of the device body during the use. The rotation direction of mounting cover can be controlled by the forward or reverse rotation of dual axis servo motor. With the above design, the device body can rotate in a circle or in a certain angle range as required, which greatly increases the monitoring range of device body.

2 This Invented Device with Lens Cleaning Mechanism

When the dual axis servo motor operates during the use, it will drive the first gear for rotation through the first connecting rod, while the first bevel gear is engaged with the second bevel gear, to drive the second bevel gear for rotation together, and the second bevel gear is fixedly connected with the second connecting rod, to drive the second connecting rod for rotation. The end of second connecting rod is fixedly connected with the transmission bevel gear, which is engaged with the gear ring to drive the gear ring for rotation. The gear ring is fixedly connected with a transparent glass plate that matches with the monitoring camera. When the gear ring rotates, it can drive the transparent glass plate to produce the friction with the glass plate cleaning block, so as to remove the dust and mosquito secretion on the surface of transparent glass plate, and perform an automatic cleaning function of transparent glass plate, which better ensures the monitoring effect of monitoring camera.

3 This Invented Device with Insecticidal Mechanism

For the insect pests exhibit the phototaxis, the light of the LED light belt for the insecticidal mechanism can attract the insect pests to approach during the use. The gear of insecticidal mechanism is fixedly connected with the output axis of dual axis servo motor, so that the gear can rotate with the dual axis servo motor, and the gear is engaged with the pinion, so that the pinion can rotate with the gear. For the tooth proportion between gear and pinion, it can drive the pinion for rotation rotate more quickly when the gear rotates, and the pinion is fixedly connected with the fan vane through the connecting shaft, so that the fan vane can also rotate quickly, and generate a certain suction to attract the insect pests near the movable mounting cover to the direction close to the fan vane. Furthermore, the insecticidal grid is fixedly installed inside the movable mounting cover, insect pests will be electrocuted when they approach the insecticidal grid, which can play the role of deinsectization. With above design, the device body can be not only used for deinsectization, but also reduce the insect pests staying on the camera lens, which better ensures the cleaning of transparent glass plate and the monitoring effect of device body.

Development Prospects

The existing design can not adjust the irrigation water according to the actual situation, which is easy to cause the waste of water resources and can not play a role in the prevention and control of lawn diseases and pests.

This invention solves the problems of watering amount, diseases and insect pests, saves the manpower, and adopts more advanced and scientific methods for watering the lawn. For the lawn cover s a large area, such multifunctional driverless irrigation device is required in future, which can be applied to a wider range of fields.