Design and Fabrication of Automatic Grass Cutter

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Abstract-In today's world ,Automation is very important part for invention.The present technology commonly used for cutting the grass over the field which creates pollution and loss of energy. The old grass cutter need to be replaced by automated one where system will work for guidance Automatic grass cutter will reduce the effort required for cutting grass in the lawns. Powersupply is used to run the motor and various sensors will be used to detect and avoid the unnecessary objects in the field during operation.This device show that how technology can be used to reduce human effort. so we are trying to make a daily purpose machine which is able to cut the grasses in lawn.Itwill project the operation aand obstacle detection.The grass cutting machine is available in various type like reel (cylinder), mower, rotary and mulching mower, professional mower. But these are very costly and unaffordable.Eventually,the improvement of redesign grass cutting machine finally will able to meet user requirement andsatisfactions.

I.INTRODUCTION

Nowadays, pollution is the major issue in the universe. In case Gas powered lawn mowers due to the emission of gases it is responsible for pollution. Also the cost of fuel is increasing hence it is not efficient. Traditionally, lawn mowers are often clunky pieces of machinery that involves a lot of strength and energy to use.These present and high-tech grass cutters however, have been creatively designed to make the whole landscaping process much simpler and easier for the user. From automatic lawn mowers that can incredibly cut the grass by its own through, which is convenient and easy-to-use grass-cutting devices make straightening up your lawn more pleasing.

We also use reel push mowers for smaller hard to access areas like pathways and parks. There's no oil, and no pollution. Just clean air, less noise, and green grass. The other objective is that the automatic lawn cutter has to differentiate between grass and concrete while monitoring its surroundings continuously. We wanted an ultrasonic sensor to sense if the lawn cutter was heading into an object. Safety is the main concern while designing the lawn cutter. As it has blades we wanted our lawn cutter not to be in operating mode if it was being held in the air by the user.

Knowing that the user would be randomly holding the lawn cutter we needed a sensor to detect orientation. An automatic lawn cutter will relieve the consumer from mowing their own lawns and will reduce both environmental and noise pollution. The goal of the computer vision is to enable the machine to make inferences and take actions based on visual inputs. The area of image analysis is in between image processing and computer vision.

1. Lawn mower and its types

1.1. Cylinder or reel mowers:
A cylinder or reel mower carries a fixed ,horizontal cutting blade at the desired height of cut .over this a fast spinning reel of blades which force the grass past the cutting bar.Each blade in the blade cylinder forms a helix around the reel axis and the set of spinning blade describes a cylinder of all mowers .A properly adjusted cylinder mower makes the cleanest cut of grass,and this allows the grass to heal more quickly .The cut of a well-adjusted cylinder mower is straight and definite, as if cut with a pair of scissors. This clean cut promotes healthier, thicker and more resilient lawn growth that is more resistant to disease, weeds and parasites. Lawn cut with a cylinder mower is less likely to result in yellow, white or brown discoloration as a result of leaf shredding.

1.2 Rotary mowers:
The entire proposed modelling and architecture of the current research paper should be presented in this section. This section gives the original contribution of the authors. This section should be written in Times New Roman font with size 10. Accepted manuscripts should be written by following this template Ones the manuscripts is accepted authors should transfer the copyright form to the journal editorial office. Authors should write their manuscripts without any mistakes especially spelling and grammar.

A rotatory mower rotates about a vertical axis with the blade spinning at high speed relying on impact to cut the grass. This tends to result in a rougher cut and bruises and

shreds the grass leaf resulting in discoloration of the leaf ends as the shredded portion dies. This is particularly prevalent if the blades become clogged or blunt. Most rotary mowers need to be set a little higher than cylinder equivalents to avoid scalping and gouging of slightly uneven lawns, although some modern rotaries are fitted with a rear roller to provide a more formal striped cut. These machines will also tend to cut lower (13mm) than a standard four-wheeled rotary.

1.3 Gasoline (petrol):

Extensive grass trimming was not common before the widespread application of the vertical shaft single cylinder gasoline/petrol engine. In the United States this development paralleled the market penetration of companies such as the Briggs and Stratton company of Wisconsin.

1.4 Electricity:

Electric mover are further subdivided into corded and cordless electric models. Both are relatively quiet, typically producing less than 75 decibels, while a gasoline lawn mower can be 95 decibels or more.

1.5 Automated Lawn Mower:

Most people do not associate air pollution with mowing the lawn. Yet emissions from lawn mowers, snow blowers, chain saws, leaf vacuums and similar outdoor power equipment are a significant source of pollution. Today's small engines emit high levels of carbon monoxide, a colorless, odorless, poisonous gas. They also emit hydrocarbons and nitrogen oxides, pollutants that contribute to the formation of ozone. While ozone occurs naturally in the upper atmosphere and shields the earth from harmful radiation, ozone at ground level is a noxious pollutant.

2. Uses of grass cutter

If you live in a home with a yard, you probably use at least one kind of grass cutter to keep your yard looking tidy. Grass cutters have different intended uses and come in many types and sizes, but they all have roughly the same use: to keep the glass trimmed. Whatever your grass-cutting needs, a tool stands ready to help you do it. Choosing the right grass cutter for the task makes the work easier and leads to satisfying the results.

2.1. Lawnmowers

Lawnmowers are the most common kind of grass cutter that most homeowners use. Mowers may be rotary types where blades swirl horizontal to the ground, or reel mowers where blades cut vertically. Typically gas or electric powered, rotary mowers may be self-propelled or rely on man power to make them move. For large areas, reel mowers are pulled behind lawn tractors. Smaller versions are manually pushed across lawns. Lawn mowers are designed to keep grass cut short, but a good rule is to never cut of more than one-third of the height of your grass. Most mowers have levers that allow you to raise or lower the mowing blades to cut the grass to your desired length.

2.2. Edge Trimmers:

Edge trimmers are a common style of grass cutter, used primarily along edges of your lawn and areas that a lawnmower cannot reach. They feature a gas or electric motor and a spindle that spin a piece of hard plastic line that cuts grass off when the line hits the grass. Some heavy-duty trimmers are equipped with cutting blades, but these are geared toward cutting thick brush rather than the grasses cut with edge trimmers. People often use the term"whipper- snipper" to describe this useful grass-cutting tool.

2.3. Manual Shears:

If you want your yard to appear meticulous, you may make use of set of handheld grass shears. These manual grass cutters or trimmers work as large, scissor-like devices for trimming your grass. While it's impractical to cut the entire lawn with this type of tools, they are useful for cutting the edges of your lawn, especially next to patios or close around trees or gardens. This prevents accidental damage that can be caused by mower and trimmers. Manual grass shears work best with sharp, clean blades. Operate them in the same manner you would a large pair of scissors.

2.4. Sod Cutters:

If you want to tear up lawn and seed or re-sod it, a sod cutter will make the work easier. Homeowners don't typically own sod cutters, because they aren't needed on a regular basis. Instead sod cutters can be rented from garden centers or equipment rental stores. Sod cutters look like a cross between lawnmower and a tiller. They have sharp, spinning blade that cut through the grass and its roots, lifting up large strips so you can roll them up and remove them. Sod cutters work for removing grass for new garden spaces or preparing for a new lawns.

II. LITERATURE SURVEY

1. Introduction:

Literature survey is something when you look at a literature (publications) in a surface level , or an Ariel view. It includes the survey of place people and publications is context of Research. It is a phase where the researcher tries to know of what are all the literature related to one area of interest

2. Related Works:

SOLAR POWERED AUTOMATIC LAWN MOWER [2009]

Darwin Romas, Dr. Kwok

This project is an autonomous lawn mower that will allow the user to the ability to cut their grass with minimal effort,through an array of sensors this robot will not only stay on the lawn, it will avoid and detect the objects and humans.In this project they used safety sensors such as PIR sensor for human detection ,ultrasonic sensor for object detection and accelerometer which prevents lawn operation while being held.They use multiple sensors as a eye of robot such as humidity sensor to see difference between grass and concrete,IR sensor to detect the heat radiation from the human and ultrasonic sensors to detect if the robot heading into an object.The accelerometer was thought of being used because it can detect its orientation based on pre calibrated axis orientation.Nickel metal hydride is used because of low charging current.Like batteries there is range of motors to choose from so two 7.2dc motors with integrated gear head

Fully Automated Solar Grass Cutter [2015]

Rakesh poojari,Rajesh kumar,Hitesh B.patil

Automated solar grass cutter fully automated grass cutting robotic vehicles powered by solar energy that also avoids obstacles and is capable of fully automated grass cutting without the need of any human interaction .12v batteries to power the vehicle motor as well as grass cutter motor .They also use solar panel to charge the battery so need of charging it externally.Grass cutter and vehicle motors are interfaced to 8057 family micro controller working of all the motors.

The source is driven from the solar energy using photo voltaic panel which charges the battery and is utilized for powering operation of the system.The system controlled by P89V51RD2 micro controller.L298 driver circuit is used for compatibility of micro controller and motor.Toggle switch for movement operation .DPDT switch for movement operation.Wheel chain with 26 links on both sides are attached to platform support the whole model.In wheel two motors are used with 45 rpm. By this automated solar cutter is fully automated grass cutting robotic vehicle powered by solar energy.

Solar Based Wireless Grass Cutter [May 2016]
Vicky jain, sagarpatil, prashantbaganeprof .mrs.s.s.patil.

In this design of solar powered agricultural equipment will comprise direct current dc motors,a rechargeable battery ,solar panel,stainless steel blade and control switch.The remote will allow the user to control the speed and direction of grass cutter.In transmitter they use power supply,keypad,priority encoder, RF encoder,RF transmission. In receiver they used solar system with control charger,powersupply,micro controller(ATmega2560),RF receiver,RFdecoder,motordriver.they mention about renewable energy.so there is no running cost.

Solar Grass Cutter Robot With Obstacle Avoidance[2017]
G.Manojkumar,D.Aparna,V.Ajay Kumar

In this solar grass cutter has solar panel which converts solar which convert solar energy to electrical energy,micro controller ATMEGA 328 Act as controller of entire grass cutter machine .And ultrasonic sensor is used for object detection,L293D motor driver IC controls the motors simultaneously in any direction for the working of the robot .wheels they used are 150 rpm geared dc motor the voltage limits of geared dc motors which can be connected to the arduino micro controller board through the motor driver IC lithium Ion battery is used supply the power for the rotation of motors.

Automated Solar Grass Cutter [2018]

Mallikarjun,Mudda,Vishwateja,Srujankumar,Praveen kumar

The 10 watts solar panel is used to charge the batteries which are rechargeable the solar panel gives maximum 18v and 580ma current .we need charging circuit between solar panel and batteries.The changing circuit has voltage regulator which regulates voltage to 15v and one transistor to amplify the maximum current to circuit and diode is used .we use 12 voltage battery for entire circuit and another 12v volts for cutting blade.

The micro controller 8051 takes the input from the ultrasonic sensor senses the obstacle and gives feedback to micro controller then according to the program which was given to micro controller its turn left or right.The movement of bot is done by using the two DC motor of 100rpm.The motor are driven by using motor driver (L293D).It is also known as H-bridge .The main purpose of using motor driver is because that DC motors require the minimum voltage as 9v as input .But the micro controller gives output as only 5v so we require 9v to 12v for driving the motors .So we use motor driver which takes 5v as input and gives the 12v for motors .The L293D motor driver drives only two motors which can move in both direction .And the cutting blade is used to cut any type of grass .they used 1400rpm motor for cutting blade .The motors runs directly by 12v rechargeable battery .The DPDT switches are used for movement of bot and cutting blade separately.

A Survey Paper On Solar Based Automatic Grass Cutter [2019]

Singh suraj, salve rahulRajender, Bangarmamata pandhari, U.V.patil

Automated solar grass cutter is a fully automated grass cutting robotic vehicle powered by solar energy that also avoids obstacles and is capable of fully automated grass cutting without need of human interaction.The system users 12volt batteries to power the vehicles movements as well as grass cutter motor. We also use solar panel to

charge the battery so that there is no need of charging it externally.The grass cutter and vehicles motors are interfaced to an 8051.The family micro controller that controls working of all the motors.It is also interfaced to an ultrasonic sensor for object detection.The micro controller moves the vehicles motors in a forward direction in a case of no obstacles is detected. On obstacle detection,ultrasonic sensor monitor it and the micro controller thus stop the grass cutter motor so as to avoid any damage to objects/human/animals. Micro controller then turns robotic vehicles offuntil it gets clear of the objects and moves the grass cutter in the forward again.

III. PROPOSED SCHEME USING IMAGE PROCESSING

This machine was the catalyst for the preparation of modern-style sporting ovals, playing fields (pitches), grass courts, etc. This led to the codification of modern rules for many sports, including for football, lawn bowls, lawn tennis and others.It will be easier for the people who are going to take the project for the further modifications.This project is more suitable for a common man as it is having much more advantages i.e, no fuel cost, no pollution and no fuel residue, less wear and tear because of less number of moving components. we propose a system which uses camera to identify the object is an obstacle for our grass cutting machine.The camera captures the image of obstacle and then analyse the image.Afteranalysing the image the machine decide whether to cut the obstacle or not.If it detects the obstacle it rotates 90 degree and move one meter in forward direction and again turn 90 degree to start the procedure.
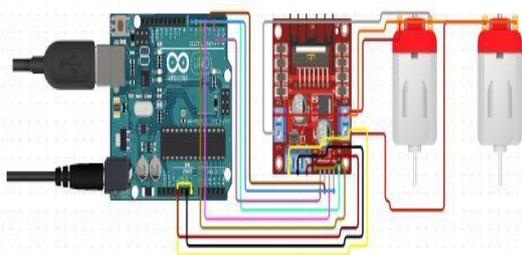

Fig no. 1 proposed scheme using image processing.

We use mat lab R2018a to collect the data set using logi tech camera then we have to store the images in our hard drive and train the data set after the data training we have to analyse the data using web cam and pass the output to the arduino uno .Then the arduino uno capture the output data and sent it to the motors which are connected to the relay.If we want to turn left we have to constant the left wheel and give motion to the right wheel.If we want to turn right we have to constant the right wheel and give motion to the left wheel.If any obstacle struck under the grass cutter the vibrator sensor stop the machine and move backward and further proceed the process.

IV. RESULTS AND DISCUSSION

1. Image Acquiusition

Image acquisition is the first step in system development to acquire the sample image. In this step, some of the samples are already taken from the internet and some are manually captured. The sample images are already stored in the project location.

The software platform that is used to execute the system is MATLAB2018a. User can choose which image to be load by typing the file name and its extension inside the input of the code.

2. Image Segmentation

After the image is captured, it will undergo to the next process called Segmentation. In computer vision, image segmentation is the process of partitioning a digital image into multiple segments. The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyse. The techniques used for performing image segmentation are as follows :
* Image Filtering and
* Image Thresholding
3. Image Filtering

Filtering is a technique for modifying or enhancing the image. It is performed using Median Filter. The median filter is normally used to reduce the noise in an image, and preserves useful detail in the image.

4. Image Thresholding

Image Thresholding is a form of Image Segmentation. It is a way to create a binary image from a grayscale image. It is a simple and effective way of partitioning the image into foreground and background.We have to capture the image and stored in a particular drive and then run the matlab coding it passes the output to the arduino controller and then further proceed the process.

V. CONCLUSION

This automatic grass cutter is focused on how the project works and explains in detail about the hardware components that will be implemented in this project.And describes components are used and basic knowledge about matlab that are compatible to connect with each other for the process of image processing.

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