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Dual Mode Lawn Mower using Sensors and GSM

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Abstract: This dual mode lawn mower using GSM and sensors is an autonomous lawn mower that will allow user the ability to cut their grass with minimal effort. Unlike other robotic lawn mowers on the market, this design requires no perimeter wires to maintain the robot within the lawn and also with less human effort for the operation. One main advantage of this project work is that it can be used automatically or manually. In the automatic mode of operation, no human effort is required and helps to trim the lawn very efficiently and easily with less time. Through an array of sensors safety takes major consideration in the device, this robot will not only stay on the lawn, it will avoid and detect objects and humans. In manual mode of operation, we make use of DTMF ie, control over the mower using GSM which has a very wide range of network and hence can be used to control the mower. Lawn mower is equipped with solar panel for the battery being charged using renewable source of energy. Electricity can also be used to charge the mower. This design contains a microcontroller AT89S52 belonging to family 8051, multiple sensors, LCD display, motors and blades.

Key words: GSM, DTMF, BASCOM.

I. INTRODUCTION

A lawn mower is a machine that uses one or more revolving blades to cut a lawn to an even height. The blades may be powered either by hand, pushing the mower forward to operate the mechanical blades, or may have an electric motor or an internal combustion engine to spin their blades. Some mowers also include other abilities, like mulching or collecting their clippings. There are several types of mowers, each suited to a particular scale and purpose. The smallest types are pushed by a human user and are suitable for small residential lawns and gardens. Riding mowers are larger than push mowers and are suitable for large lawns. The largest multi-gang mowers are mounted to tractors and are designed for large expanses of grass such as golf courses and municipal parks [1].

- **Existing system**

The present existing system have equipment that are used to trim the lawn, is manually driven. The mechanical cutting machine requires no power but manually handled rolled over the grass. Enhancement was done to decrease the man power by making use of a Fossil Fuel for the same purpose [1].

Even though the work required monitoring or was made run by man. The main disadvantage of this type of mowers is that it uses Non-Renewable source of energy and also causes pollution to some extent. Electrically powered lawn movers are also used that has a long wire extension and requires to be driven manually.

- **Proposed system**

The system is based on Robotic lawn mower which will allow the user to cut the grass with minimal effort. Unlike other robotic lawn this design requires No perimeter wires to maintain the robot within the lawn and also with less human effort.

This robot is installed with both automatic and manual operation mode. This design of "dual mode lawn mower using GSM and sensors" contains a microcontroller, multiple sensors, and a solar charging system. Adding these elements together, we get our lawn mower. The sensors are the eyes of our robot. Here in this project we make use of both conventional and non-conventional resource of energy, which is the main advantage.

The mower can be controlled automatically using sensors or manually using DTMF over GSM. This robotic mowing device is solar powered which gets charged its battery while mows on the lawn from sunlight and also we can charge it manually from main supply.

II. SYSTEM DESCRIPTION

Here in this section, we are going to explain the block diagram of this Project and each block has been explained in detail as sub chapters.

It also provides the entire idea of the hardware required for the model as shown in the Fig 1.

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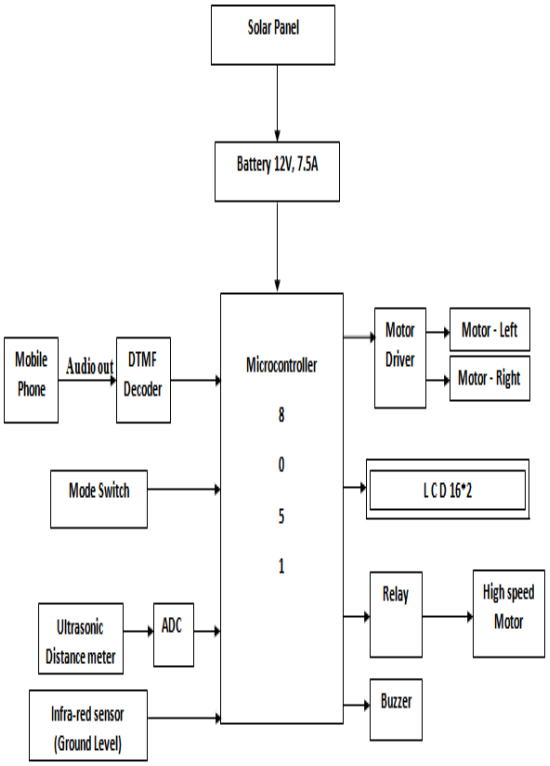

Fig. 1 Block diagram dual lawn mower

The block diagram shown in the fig.1 consists of following components:

- Microcontroller AT89S52
- Arduino [ADC]
- Regulated power supply
- Relays
- 16*2 LCD Display
- DC motor
- DC motor driver
- Ultrasonic sensors
- IR sensors
- DTMF decoder

L298 Motor Driver

L298 46V, 2A Dual DC Motor Driver module can drive bipolar two DC motors at the same time. Each L298 has two H-Bridges [2]. Each H-Bridge can supply 2Amp current. L298 has heat sink for better heat dissipation and fly back diodes for protection from back EMF as shown in Fig 2.

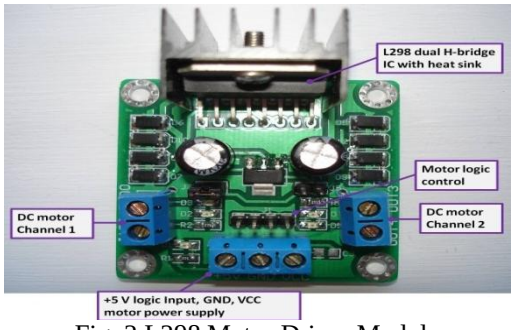

Fig. 2 L298 Motor Driver Module

Technical Specification:

- Power Supply: Over FRC connector 5V DC, External Power 9V to 46V DC.
- Dimensional Size: 44mm x 37mm x 14mm (l x b x h)
- Temperature Range: 0°C to +70 °C

III. IMPLEMENTATION

The Fig 3. shows the flow chart that depicts the operation of the lawn mower in automatic mode. Once the mower is started the mode of operation (automatic/manual) has to be selected. If the mode of operation selected is to be automatic, then the sensors and the blades starts to make their play. The lawn mower advances forward to do the desired work and the sensors keep looking for obstacle. when an obstacle is encountered, the distance between the obstacle and mower is calculated. For a minimum distance from the mower to the obstacle the mower stops and makes a turn of 180 degrees to left. Now again, the sensors will be looking for the obstacle and if it finds any, 180 degree turn to the right is made. This makes a complete one cycle [5]. Now again the sensors will look for obstacle and if any obstacle found second cycle will commence thus this cycle continues till the end of the field.

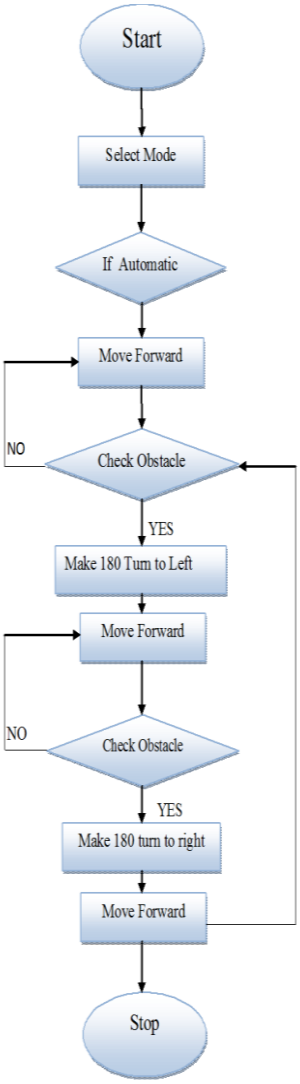

Fig 3: Flowchart for Automatic Mode

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Flow chart in Fig 4 describes the operation of lawn mower in manual mode. Like we already discussed about the mode selection, the manual mode of operation works on DTMF concept using GSM. Here after selection of manual mode of operation, a call from a cell phone has to be dialed from source to the destination. The equipment used in the destination may also be a cell phone. The call is received in the mower. Now the mower will be checking for the instructions. The movements of the mower can be controlled by the keypad in the phone. This signal is decoded in the DTMF decoder and the mower is controlled. The assignment of keys are done as, 1 is to move forward, 2 is for reverse, 3 to move left, 4 for right and 9 to stop.

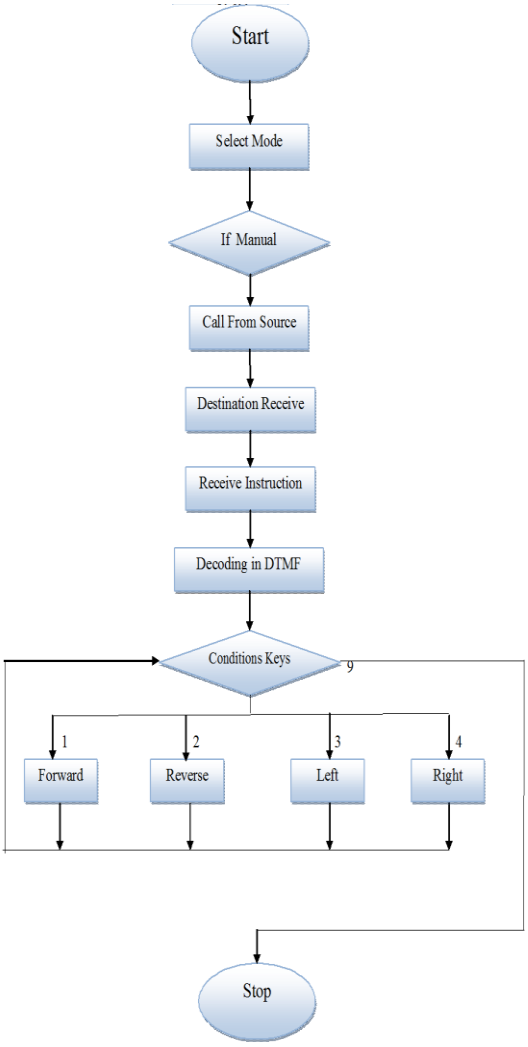

Fig 4: Flowchart for Manual Mode

- **BASCOM:** It is a relatively new programming language it was introduced in 1995.The BASCOM test board was designed for the testing of programs.

IV. EXPERIMENTAL RESULTS

The fig 5 gives the complete top view of different components put together for the proper working model of the lawn mower.

Fig 5: Lawn Mower Top View

The fig 6 gives the description of the LCD display that displays the status of the lawn mower at the start of the operation in order to select the mode of operation.

Fig 6: LCD Display

The fig.7 shows the ultrasonic sensor positioned at the top front of the lawn mower as to detect object (obstacle) in the path of the mower so that no damage is done to the mower and function in a smooth manner.

Fig 7: Ultrasonic Sensor

The fig.8 shows manual control of the lawn mower, where we make use of the GSM to control the mower. We make use of the DTMF decoder so that the instruction given is decoder in order to drive the mower.

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Fig 8: DTMF Decoder

V. CONCLUSION AND FUTURE SCOPE

It is a total package of energy saving and Time saving grass cutting machine with minimum human monitoring and cost. It is eco-friendly mower which uses renewable source of energy. It does not cause any pollution to the environment. It enables us to trim the grass in a very nice way and if the person is not satisfied he can switch over to the manual mode of operation to get the job done.
In the future many enhancements can be done in the lawn mower like, options for the cleaning of the leftovers can be employed, watering the lawn using a sprinkler can be used. make it convenient.

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