CHAPTER 3

HARDWARE IMPLEMENTATION

3.1 INTRODUCTION

This system is designed for agricultural automation, integrating multiple functionalities such as spraying pesticides, cutting grass, and seed sowing. The pump (used for spraying pesticides), the cutter (a motor with blades for cutting grass), and the seed sowing mechanism all operate on DC power supplied by a rechargeable battery. The battery provides the necessary power to the pump, cutter, seeding motor, and other components within the system. The battery is efficiently charged using a solar panel and charger, ensuring continuous operation.

A remote controller (an Android mobile with a controlling application) is used to manage the movement of the system, along with the activation of spraying, cutting, and seeding operations. The device connects to any Android mobile with Bluetooth support, enabling real-time control. At any given time, only one user can control the device; for another user to take over, the first user must disconnect, or the device must be rebooted to reset the connection.

Following the user's instructions, the system moves across agricultural fields, spraying pesticides on plants and herbs, cutting grass in agricultural lands and sowing seeds in the soil efficiently. The integration of these three functionalities spraying, cutting, and seeding enhances agricultural productivity while reducing manual labor.

3.2 CIRCUIT DIAGRAM

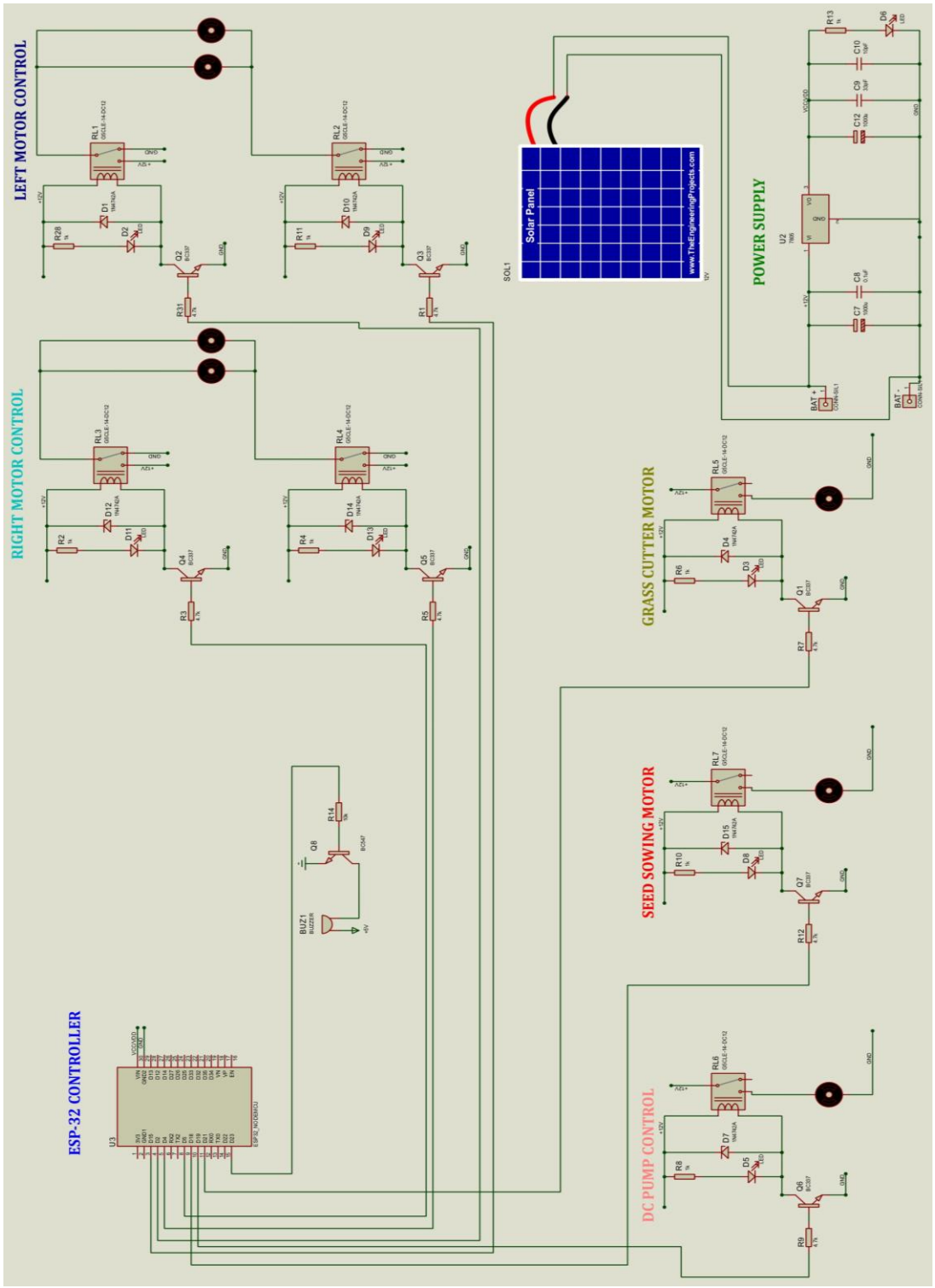

Fig 3.1 CIRCUIT DIAGRAM

The controller used in this circuit is the ESP-32. It serves as the main processing unit, controlling various motors and components. The ESP-32 receives and processes input signals and sends control signals to different sections.

3.2.1 MOTOR DRIVER INTERFACING

The motors are controlled using relays. The ESP-32 sends control signals to the transistor circuits, which, in turn, activate the relays for motor operation. The right and left motors are connected to their respective relays for movement control.

3.2.2 MOTOR INTERFACING

Two motors are used for movement, controlled by relays. The right motor is connected to RL3 and RL4, while the left motor is connected to RL1 and RL2. The relays switch the motors on or off as per the ESP-32's instructions.

3.2.3 DC PUMP CONTROL

The water pump motor is controlled using Relay RL6.

- The positive terminal of the pump motor is connected to the Normally Open (NO) pin of RL6.
- The negative terminal is connected to the battery negative terminal.
- The battery positive terminal is connected to the Common (COM) pin of RL6.
- The coil pin of RL6 is controlled by the ESP-32.

3.2.4 SEED SOWING MOTOR INTERFACING

The seed sowing motor is controlled using Relay RL7.

- The positive terminal of the motor is connected to the NO pin of RL7.
- The negative terminal is connected to the battery negative terminal.
- The battery positive terminal is connected to the COM pin of RL7.
- The relay coil pin is connected to the ESP-32 for control.

3.2.5 GRASS CUTTER MOTOR INTERFACING

The grass cutter motor is connected to Relay RL5.

- The positive terminal of the cutter motor is connected to the NO pin of RL5.
- The negative terminal is connected to the battery negative terminal.
- The battery positive terminal is connected to the COM pin of RL5.
- The relay coil pin is controlled by the ESP-32.