Review: IOT Based Smart Multipurpose Agricultural Robot

Dr. S. B. Dhoble[1]

Mrunmayee Gahukar[2], Ankita Rahate[3], Roshani Borkar[4], Dipali Bansod[5], Sanket Yelekar[6]

Electronics and Communication Engineering, Priyadarshini Bhagwati College of Engineering, Nagpur, India.

ABSTRACT: *This robotic system is named as agricultural robot, nothing but the machine which assembles with electronic equipment or components & performs specific operation as directed by instructor. This technology provides optimum and efficient solution for wide range of production in agriculture field. The robot is capable of performing operation like automatic ploughing, seed sowing and chemical spraying.*

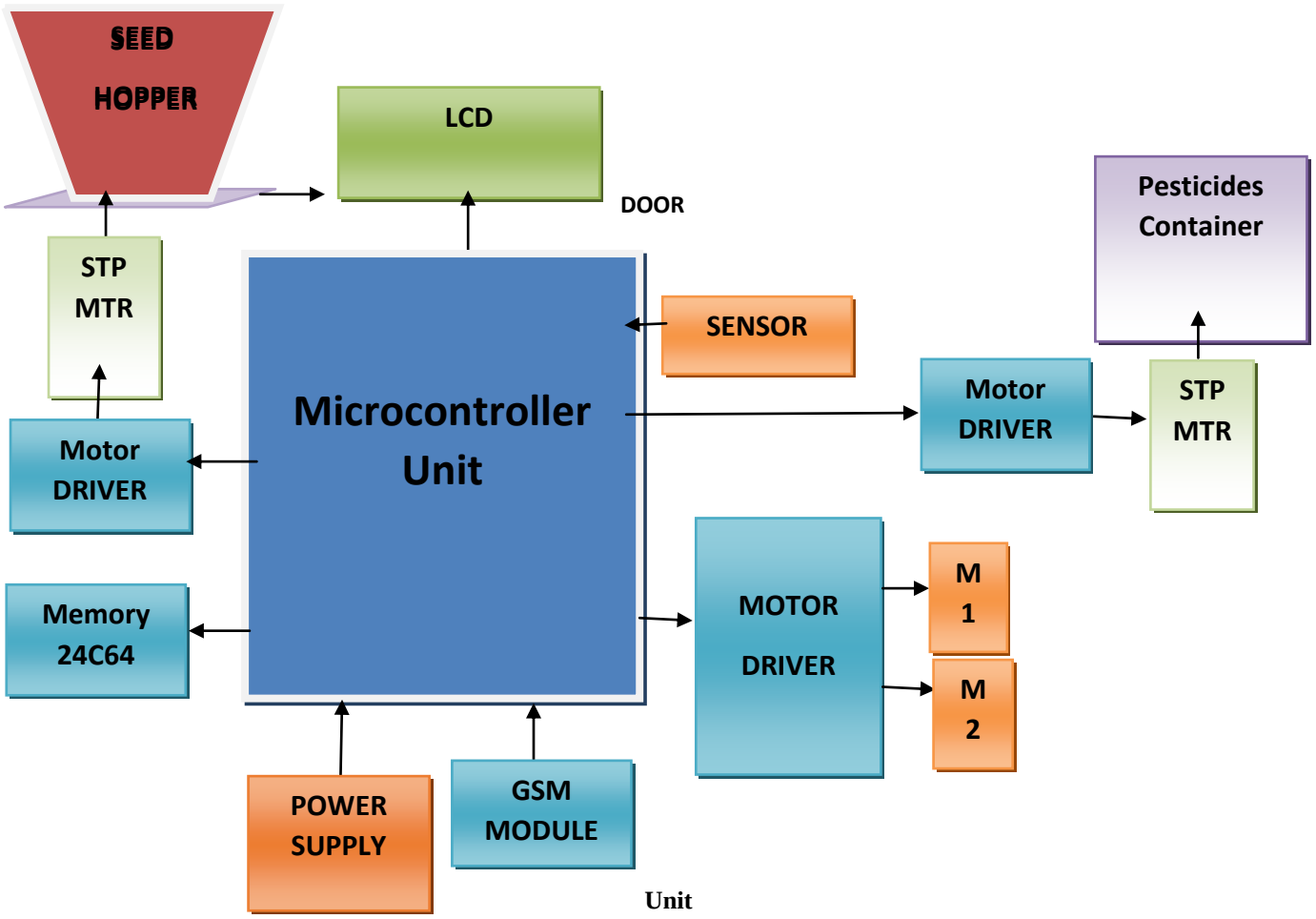
Keywords: *AVR Controller unit, GSM module, DC motors.*

1. INTRODUCTION:

As name indicates robot is basically related with agriculture field. Agricultural robot performs seeding operation at specific interval of distance and time. For define distance range we can include keyboard i.e., as farmer decided at which particular distance seeding operation will perform. Robot must work in particular area of field. Therefore, we include ultra-sonic sensor for detect limit of area and turn toward a particular direction. It will provide the technology which will give us a proper feedback from the seed hopper continuously, it will monitor seeds in the hopper when seeds going to end, it will send us a feedback message and will show current statues of the hopper.

It will also provide the technology which will give us a proper feedback from the Pesticides container, it will monitor Pesticides in the container when Pesticides level going to end, it will send us a feedback message and will show current statues of the Pesticides container. while minimizing the ecological impact. The need to optimize food production also introduces the challenge to reduce the cost for labour and mineral fuels and thus to minimize the operation hour of machinery in the field to the minimum required.

2. BLOCK DIAGRAM OF AGRICULTURAL ROBOT:



Unit

3. BLOCK DIAGRAM DESCRIPTION:

AT89S52 MICROCONTROLLER

The AT89S52 may be a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in system programmable non-volatile storing. The on-chip Flash allows the program memory to be reprogrammed in-system or by a standard non-volatile memory programmer.

By joining a versatile 8-bit CPU with system programmable flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly flexible and cost effective result to many embedded control applications.

The AT89S52 produce the resultant standard features 8K bytes of flash, 256 bytes of RAM, 32 I/O lines, watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex interface, on-chip oscillator, and clock circuitry.

In addition, the AT89S52 is a static logic for operation right down to zero frequency and supports two software selectable power saving modes.

The Idle Mode stops the CPU while allowing the RAM, timer/counters, interface, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until subsequent interrupter hardware reset.

MEMORY

Here we are using 24C64 EEPROM memory to store the information about the last indication of the operation of the motor whether it was ON or OFF.

Sensors

A sensor is use to monitoring Seeds and Fertilizer/pesticide level. That is based on Switching Principle.

LCD Display

We are using LCD display to show the real time water levels in the tank in percentage form and to indicate the dry run condition.

Servo & DC Motor

A servomotor is rotary or linear actuators that permit for appropriate controller of angular or linear position, velocity and acceleration. It consists of appropriate motor coupled to a sensor for position feedback. Servomotors are using in applications such as robotics, CNC machinery or automated manufacturing. This DC motor with metal gear head is usually used in various robotics applications has following electrical and mechanical provisions.

Motor driver

Motor drivers are use to describe the direction of movement of door motor. It is used to give high voltage and high current as an output to run the motors which are used in the projects for movement of the any object.

Power Supply

Initial stage of every electronic circuit is power supply system that provides required power to drive the entire system. The specification of power supply depends on the power requirement and this requirement is determined by its score.

For our project we require + 5 and +12 Volts supply. +5 Volts and. 5Volts given to Micro-controller, segment etc. +12 Volts are used to drive the motor.

4. WORKING PRINCIPLE:

It is a small car structure agricultural robot. This IOT based agricultural robot performs ploughing, seeding and pesticide spraying. As the power supplies gets on, the agricultural robots starts moving forward and perform ploughing with the help of DC motor. L293D motor driver are used to control the wheels of robot. The next operation is seeding; the agricultural robot moves forward and drop a seeds from the seed hopper at a specific distance. The door of the hopper gets open when the seeds get drop in the soil then get closed

automatically. After that, the pesticides get sprinkle on the crops from pesticides container with the amount required for the crops this is controlled by the servo motor.

When the level of seed hopper and pesticides container going to the bottom line it gets sensed by the sensor and sends a feedback message to the operator to fill the containers with the help of GSM.

5. ADVANTAGES:

- Small in size
- pollution free
- Efficient use of chemicals and pesticides
- It works faster than human efforts which definitely save time.
- This fully automatic robot which works on open architecture principle and does a lot of work in farms, so it reduces human labour.
- The sensors and electronic drives for making this system are easily available in market and cheap which reduces the cost of the system.

6. APPLICATION:

- It is used only for agricultural purposes: ploughing, seeding and pesticide spraying purpose.
- The system detects different environmental conditions & take actions accordingly which humans can't do accurately.
- The robot is capable to do the seeding work with a reduced time interval than the time required for doing it manually.

7. CONCLUSION:

In this IOT controlled agricultural robot also called agrobot, it has been designed, builted and demonstrated to carry out ploughing, seeding, spraying pesticides in an agriculture field. The agricultural robot will assist the farmers in increasing crop yielded and protect them from harmful chemicals of pesticides. Implementation of agricultural robot has significant saving in terms time, efficiency and saving the wastage of resources and reduced utilization of man power should pay cost once the system is activated.

8. FUTURE WORK:

Since the designed agricultural robot is used only for sowing of seeds and spraying of pesticides controlled through internet of thing, the following features can be added for enhancing the current project work: pH meter can be in order to determine the pH of the soil which helps to identify the suitable pesticide/fertilizer to be employed moisture level sensor can be employed to know about the moisture control present in the soil of the farmland and also the robot can work on solar energy it will save electricity and can also be reduced environmental pollution. Also can perform harvesting, picking fruits and monitoring of crops.

9. REFERENCES:

[1] Clemens R.L. Meat traceability in Japan.Iowa Ag Rev.2015.

[2] Li H., Zhang B., Zhang L., Xue Y., He M., Ren C. A food traceability framework for dairy and other low-margin products.IBM J. Res. Dev.2016.

[3] Ndraha N., Hsiao H.-I., Vlajic J., Yang M.-F., Lin H.-T.V. Time-temperature abuse in the food cold chain: Review of issues, challenges, and recommendations. Food Control.2018.

[4] Vatari S., Bakshi A., Thakur T. Green house by using IOT and cloud computing; Proceedings of the IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT); Bangalore, India. 20–21 May 2016; pp. 246–250.

[5] Shaikh F.K., Exposito E., Zeadally S. Enabling technologies for green Internet of Things.IEEE. Syst. J.2017.

[6] M. Seelye, G. Sen. Gupta, J. Seelye, & S. C. Mukhopadhyay. Camera-in-hand Robotic system for Remote Monitoring of Plant Growth in a Laboratory. Proceeding of IEEE International Instrumentation and Measurement Technology Conference (2015).