Micro-Parameters Measurement and Video Monitoring for Effective Farming using ARM7

S. S. Kulkarni[1] J. K. Singh[2]
[1,2]Department of Electronics & Telecommunication Engineering
[1,2]VACOE, Ahmednagar, Maharashtra, India

Abstract— The automatic detection of motion around the robot is possible by using this system. Movable robot is used to perform surveillance task for farm. In the designing of robot it includes several subsystems that are planning subsystem, online video and image transmitter sensing system formed by sensor, controlling system. System measures micro parameter and other parameters. It measures micro parameters that are nitrogen, potassium and phosphate in the soil as well as Humidity, pH, soil moisture, temperature and light intensity. NPK measurement is further useful to improve productivity and finalization of fertilizer combinations proportion of content can be managed in the process of chemical mixing during fertilizer formation .this system reduces the manpower for performing the task like humidity level checking and checking of micronutrient level, temperature level, to perform all these functions on manual basis ,it require more efforts and time, but this system remotely monitor and estimate variations of level of parameters in greenhouse of agriculture. With the help of proposed system reduction of no of required nodes, NPK measurement from pH, measurement and detection of level of moisture, temperature, humidity, pH of the soil is possible these are the main objective of the research development. To make the system more practical some test had been conducted.

Key words: Video Monitoring, ARM7, Micro-Parameters Measurement

I. INTRODUCTION

This paper includes the factors which are helpful for effective farming. By using robotic environment every part of focused surface can be covered ,so that requirement of no of nodes decreases for measuring the parameters .measurement of NPK In turns helpful for finalization of fertilizer combinations proportion of content can be managed in the process of chemical mixing during fertilizer formation. The system is simple to design and develop and provide viable solution for farm monitoring and control. The function of sensor in this system is measurement of micro parameter and level detection of Humidity, temperature, soil pH, soil moisture [1]. System provides accuracy to the field of agriculture, deciding the fertilizer combination after micro parameter measurement helps to maintain quality of soil.

A. System Design

This research has focused on the use of modern technology to help manage farming, According to the past development system based only for the investigation, but this system is now useful for investigation and the parameter measurement. Further another system is developed for only the parameter measurement which is not sufficient [2]. Third system is for the measurement of level of water in soil with the help of moisture sensor in limited area [3]. Now this

overcomes by using this system. Next to this one system is comes which is used to measure potassium only hence we have decided to include all the parameters [4]. Concept diagram of the system is given as below.
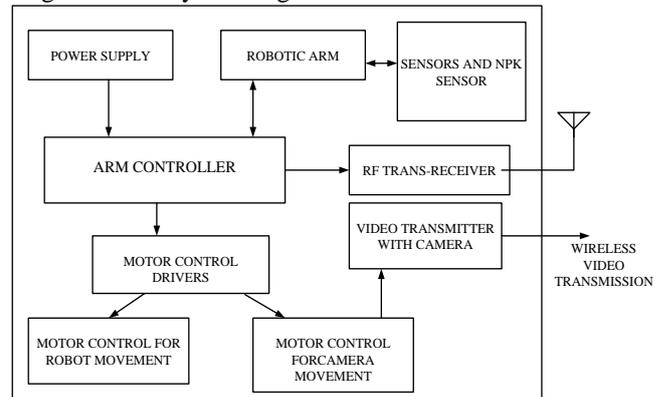

Fig. 1: Transmitter of Robot

In the Block diagram of transmitter, ARM controller is used to manage robot movement, there is a robotic arm on which sensors are mounted with suitable place between them, management of motion of the robot is carried out through programming, and RF transreceiver is used to share data in between robot and user. Video Camera is placed over the robot which is also move when there is a requirement [5].
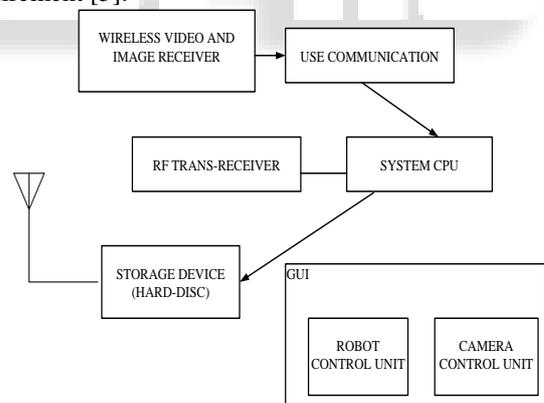

Fig. 2: Receiver of Robot

At receiver central programming unit with graphical user interface, have provision for storage of the information. With the help of movement manager user can manage movement of robot towards forward backward, left right from user side.

II. SENSOR INFORMATION

A. Moisture Measurement

Tension meter with transducer is used for measurement of moisture, power requirement: 12-24 V DC, OUTPUT: 4-20 Ma, Current consumption 20 Ma, Tension range: 0-100 Centibar.

B. Humidity measurement

P-Hs-220 humidity sensor is used sensor output is proportional to output voltage. At 90% humidity the output voltage is 2.7 V.

C. Temperature sensor module

LM 35 sensor is used to sense the temperature, Temperature range:-55 to +150 degree Celsius, Operating voltage range: 4 to 30 V, Linear scale factor +10Mv/degree Celsius.

D. pH measurement

It measures the generated voltage of a pH electrode. The standard pH probe is used to generate voltage of 59Mv/pH range. To obtain 1 Volt per pH, preamplifier is used with gain of 16.7.Precise voltmeter that measures voltage of pH electrodes. Here Alpha pH 500 Transmitter with pH Electrode the requirement of such measurement is an amplifier which has the feature of gain of voltage-pH conversion.

E. NPK Micro sensor

These are semiconductor based micro sensors it uses Ion Selective Field Effect Transistor. NPK micro-sensors have precision agriculture to assist in precision irrigation, supplying data to farmers, variable-rate technology (automated fertilizer) and collecting spatial information.

F. Light Intensity Measurement

Light dependent resistor (LDR) is used for measurement of light intensity. In the system voltage divider network using LDR and resistance is designed so as the intensity of light changes voltage drop across LDR also changes hence potential proportional to intensity. Change in the potential is amplified by using amplifier.

III. HARDWARE IMPLEMENTATION

ARM Controller at the center and motor control drives used for management and to control movements of robot through the agricultural land surface, sensors are mounted on one arm placed on the robot, RF transreceiver share data between robot and user, robot movement are managed by program. Video Camera is also movable At the receiver, with the help of DC motors this robot is movable in agricultural field towards the required direction and then collect the information of parameters and real time video monitoring also possible which is further useful to find the problems taking place in crops and other elements. Video monitoring improves quality inspection. GUI is used to display each parameter along with the real time video. Here Wireless camera Xcam2 is used. It consists of a Built-in 2.4 GHz Video Sender. XC10A transmits video and sound both to the VR31A or only video to the VR36A receiver which is connected to TV. Wireless Camera is connected Wireless Video Transmitter and Wireless Receiver. Combination of Wireless 2.4 GHz technology with a wireless power source provides Flexibility. The VR36A Video Receiver works with X10's Wireless Cameras. Conversion of video signals into wireless radio frequency (RF) is done through this camera and then it transmits these signals to the Video Receiver which is connected to a TV at your home (distance limit is up to100 ft.). The Video Receiver converts these signals back to video signals, which are fed through a cable to your TV's Video input jack.

IV. SOFTWARE USED

1) Software: Keil 3.0
2) Operating System: Windows XP
3) Visual Studio 2008
4) Visual Basic 6.0

V. CONCLUSION

Sensors are utilize to measure micro parameters (NPK),after measurement of micro parameters finalization of combination of fertilizers can be done in the process of chemical mixing, it helps to maintain quality of soil and plants, essential for effective farming. With the robotic arm, number of required nodes decreases for the measurement of micro parameter.

REFERENCES

[1] S. Khakal and Prof. S. G. Galande, "Real-time Video Monitoring and Micro-Parameters measurement using Sensor Networks for Efficient Farming," International Conference for Convergence of Technology 2014.
[2] S. M. Aziz and D. M. Pham, "Energy Efficient Image Transmission in Wireless Multimedia Sensor Networks," IEEE, communications letters, Vol. 17, No. 6, June 2013.
[3] Singh and M. Bansal, "Monitoring Water Level in Agriculture Using Sensor Networks," International Journal of Soft Computing and Engineering (IJSCE) ISSN: 2231-2307, vol. 1, issue 5, November 2011.
[4] DI Walter H. Mayer, Agricultural Ict Infrastructure-Also Requisite for Precision Farming.
[5] Sivasoundari and S. Kalaimani, "Wireless Surveillance Robot with Motion Detection and Live Video Transmission," International Journal of Emerging Science and Engineering.