Automated Farming with Interfaced Robot: The Review

Farming Robot

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***Abstract*— In India,agriculture plays important role for food production by using various new technologies.The main objective of our project is to yield higher growth of crops by reducing the efforts of farmers.In this project it is possible to control supply of pump by cell phone from any place of the world. . In recent times, the farmers have been using irrigation technique through the manual control in which the farmers irrigate the land at regular intervals by turning the water-pump ON/OFF when required. This process sometimes consumes more water and sometimes the water supply to the land is delayed due to which the crops dry out For this IC8870 is used to convert Dual Tone Multi Frequency(DTMF) signal into binary signal.By this project we can make efficient use of time by using microcontroller IC89C52 which is used to interfaced IC8870and ULN2003.**

Keywords—DTMF, Microcontroller, Irrigation, Interface

I. INTRODUCTION

India is a country in which more than 65% people earn their living by farming.Conventional irrigation methods have several problems such as increase in workload of farm labour and often it leads to problem such as over- irrigation and under-irrigation and leaching of soil.In today's life everyone gives importance to time.Time does not wait for anybody and hence everything should be performed in time.Automation is becoming an increasingly important feature of agricultural production. In dairying, livestock production and horticulture, smart machines can do more of the physical and mental work. And as the reach of automation grows, so do the implications for owners, managers and employees. Robotics are found at all levels of the agrifood value chain from production to retail. Pioneering restaurateurs in Asia are using robots to welcome guests, prepare dishes, and deliver orders to customers. A U.S. developed hamburger machine is capable of producing 360 hamburgers an hour. MacDonald's is evaluating the potential of automated cashiers.Farming system capable of controlling many electrical appliances in an irrigation or field using mobile handset where data transmission is carried wirelessly.Another important point is not only monitor the security in the field but also save water,energy and man power in agriculture sector.So we design such a system that will be efficient and effort reducing of farmers.Also spraying of fertilizers becomes important,for this sprayers are used on the robotic vehicle.If 3G camera is used then it is possible to spray fertilizers from any place of the world.The aim of this paper is to control the device or equipments from remote places through mobile handset.Hence automation is a single solution to some of the above problems to achieve quality as well as environmenta balance.Apart from this,the growing interface,optimization,quality control and product tracking are few more advantages that India has now estimated to receive from higher automation control.The main idea behind the proposed architecture is to design system, which would be used as a platform which provides the services needed to perform remote control of agricultural devices. The farmer should be able to on/off the Irrigation Device,Cultivation Device, Seeding Device, and decide the pesticides proportion and monitor the farming activities remotely. Many times user misses their farming tasks because he/she is not able to remember all the activities and their correct timing on which it is necessary to perform that activity. This system should provide reminder to the user so that their farming activity will take place on time and also provide all online information about any particular crop.

II. LITERATURE REVIEW

Agriculture is humankind's oldest and still its most important economic activity, providing the food, feed, fiber, and fuel necessary for our survival. With the global population expected to reach 9 billion by 2050, agricultural production must double if it is to meet the increasing demands for food and bio energy. Given limited land, water and labor resources, it is estimated that the efficiency of agricultural productivity must increase by 25% to meet that goal, while limiting the growing pressure that agriculture puts on the environment.

Robotics and automation can play a significant role in society meeting 2050 agricultural production needs. For six decades robots have played a fundamental role in increasing the efficiency and reducing the cost of industrial production and products. In the past twenty years, a similar trend has started to take place in agriculture, with GPS- and vision-based self-guided tractors and harvesters already being available commercially. More recently, farmers have started to experiment with autonomous systems that automate or augment operations such as pruning, thinning, and harvesting, as well as mowing, spraying, and weed removal. In the fruit tree industry, for example, workers riding robotic platforms have shown to be twice as efficient as workers using ladders. Advances in sensors and control systems allow for optimal resource and integrated pest and disease management. This is just the beginning of what will be a revolution in the way that food is grown, tended, and harvested.Clearly, farmers will need a more holistic approach

to agricultural robotics—relying on either machines or human assistance, based on the task at hand. But with robot farmers becoming increasingly nimble and intuitive, it is expected that within the next 20 years, all farms will utilize some form of this technology.

III. OVERALL ANALYSIS

An automated farming saves a lot of water which is the need of the time today as compared to traditional farming.In remote areas,electricity is present for 12 hours a day,at that time farmer has to work for day and night for watering of crops as per availability of electricity.Also during night there is riskof theft thus security plays an important role.Another problem arises when the level of water from wells or tanks goes below minimum,at such motor is to be made OFF otherwise thre is possibility of burnt out of motor.

GPRS system is not used in our project as it has certain disadvantages such as speed,distance factor,reliability.There is a great need to do this project in order to save the resources.Also to protect the motors from hazards.

A. *To save electricity.*

B. *To save human as well animal life.*

C. *To minimize the human effort during tillage or ploughding, sowing, fertilizing*

D. *To save natural resources like water.*

E. *To save unnecessary labor.*

F. *To obtain fully automated farming system*

IV. METHODOLOGY

We live in a world where everything can be controlled and operated automatically, but there are still a few important sectors in our country where automation has not been adopted or not been put to a full-fledged use, perhaps because of several reasons one such reason is cost. One such field is that of agriculture. Agriculture has been one of the primary occupations of man since early civilizations and even today manual interventions in farming are inevitable.Earlier, farmer faced the problem of sending SMS and making calls, overcoming which we are designing an Android application which does the work by button clicks, here the hardware works in three modes of operation viz. Humidity, Automatic and Manual modes

Due to the explosive spread of the smart phone and the rapid phone were widely developed in a variety of fields, such as: internet news, games, industry applications, and general living information. Information technology was also used to develop applications for the agriculture cultivating system, seeding system and Irrigation System.

Compare and decide method:The circuit operates on various input signals which comes from various processes. mainly we have using signals from transistors, transistor is the heart of our project because we haven't use any sensors in our project.

All the processes or automation done without any sensors.Rough farming work like ploughing , sowing and fertilizing we have doing with the help of mobile phone by using DTMF technology.Overcoming the technical difficulties of working with delicate fruits and vegetables, working in unpredictable terrain and weather conditions will be hurdles for developers bringing automation to market. The pace of the market adoption of automation in agriculture is unpredictable, as it's based on the cost of the equipment, competitive pressures, the management culture of the business and labour supply. Automation is however a central feature of the emerging vision of data-driven, precision agriculture. This vision requires a re-think of the management of the ag enterprise. Today's manager can exercise control over inputs and resource use at an unprecedented level of granularity. This ability opens the way to a more cost-effective, productive and environmentally-sustainable agriculture. And, it makes the central focus of 21st century management clear -- leveraging the intelligence of the hybrid machine-human workforce.

A. *EXISTING SYSTEM*

In the existing system farmers have to travel to fields often at odd hours just to switch ON/OFF the motor due to erratic power supply. Existing aids like auto-starters are unreliable and incapable of communicating the operating state of the motor, to the farmer, especially when a farmer has more than one motor pump set; he has to run around to make sure that all the motor pumps are working when the power is available. At times, motor pumps are left running for longer than what is necessary because of the effort involved in switching OFF the motor. This leads to wastage of both electricity and water.

B. *PROPOSED SYSTEM*

.All the above techniques have some issues like security,water level control and so on.For overcoming this problems this system is used.We have made a robotic vehicle which encloses various circuits like power level control,water level control of field,automatic information of animals or unauthorized person with automatic night lamp along with pump control by cell phone.

Circuit of robot includes microcontroller which is used to interface IC and in turn the relays.Instead of sensors we are making use of transistors for switching.IR transmitter and receiver are used for security oriented circuit.Hence transistors is the heart of our project.

Spraying of Pesticide : The pesticide liquid which is contain by a tank is came through the rubber pipe to the tip of DC motor , at that shaft of motor a fan blade is attach , which revolves at the delay time of robot or on front of crop. Due to revolution the liquid get spray on crop. The standard level is maintained by how much time delay we provide to the robot or the time in which the robot stands in front of crop.

Ploughing: This application is very easily archived by attaching the rotavator at the back side of the robot. For this application we require to give good mechanical strength to the robot, because it is quit heavy and when it is place on soil for ploughing purpose, it required extra force to move forward. This is the initial operation in the farm. Only this application required no delay time.

Power Supply: To make system echo friendly and beneficial for farmer we can provide the solar panel as a source power to the operation of whole process. Echo friendly in the sense of it doesn't required any fuel and source for operation, it saves electricity and fuel. Minimum pollution as well as saves the convention power. Due to open space of farming field it will easily available, exception is the cloudy environment in rainy session .The solar energy is non conventional source of energy so we can makes system life longer.

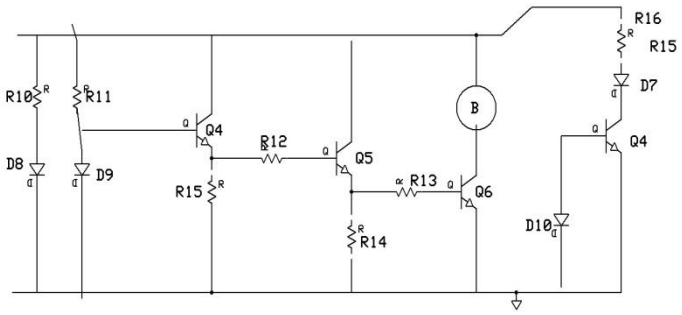

Fig 1-Automatic information of animal or unauthorised person and automatic night lamp.

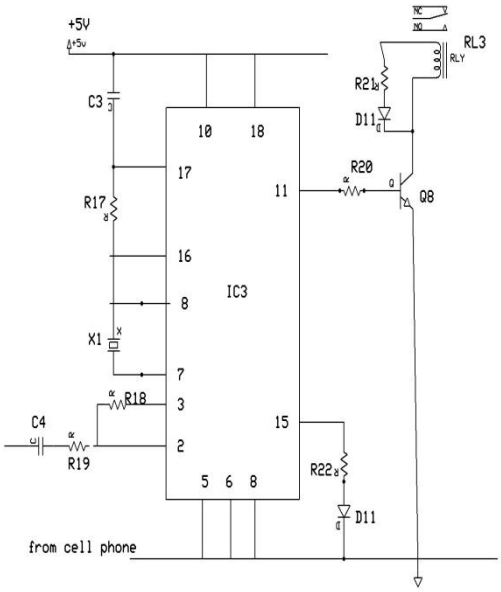

Fig 2-Water level controller

C. CELL PHONE

Here cell phone near circuit is use as a wireless receiver. The speaker wire is head phone connect to the input of DTMF to binary converter.

D. DTMF TO BINARY CONVERTER-

It is use to convert DTMF signal into binary signal this section has four output that is connect to the microcontroller IC.

E. MICROCONTROLLER-

It is use to interface DTMF signal with relay. Here we use 40 pins ATMEL series microcontroller IC having 4 port and each port has 8 bit any port is possible to use as a input or output port.

F. ULN 2003-

The current obtain from microcontroller IC is not sufficient to drive relay. Therefore for relay driving IC ULN 2003 is used.

G. TRANSFORMER-

Power supply is the first and the most important part of our project. For our project we require +5V regulated power supply with maximum current rating 500mA.

Step down transformer is the first part of regulated power supply. To step down the mains 230V A.C. we require step down transformer. Following are the main characteristic of electronic transformer.

1. Power transformers are usually designed to operated from source of low impedance at a single frequency.
2. Transformer ratings are expressed in volt-am pier. The volt-ampier of each secondary winding or windings are added for the total secondary VA. To this are added the load losses.
3. Temperature rise of a transformer is decided on two well-known factors i.e. losses on transformer and heat dissipating or cooling facility provided unit.

Circuit diagram of power supply-

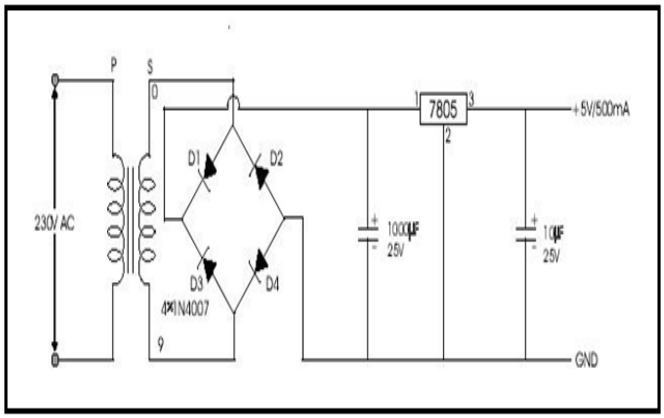

Fig 3- Power Supply Design

V. CIRCUIT ACTION

Here different components are used for different functions so detailed working of given circuit is explained step by step as follows.

Speaker wire of cell phone connected at pin no.2 of IC1 here from cell phone we can send DTMF signal and that signals are converted into binary signal by IC1 here +VCC of IC1 is at pin no. 10 & 18 and ground pin no. are 5, 6 & 9 the binary signal is obtained at pin no 11,12,13,14 of IC 1 and that binary signal is given to pin no.1, 2, 3, and 4 of microcontroller IC89C52. In microcontroller IC port 1 is used as a input port and output port is port no 2.+ VCC of microcontroller IC is given to pin no. 31 and 40 and ground is connected to pin no. 20 and crystal of 11.05 MHZ frequency X1 is connected at pin no.18 and 19.and output is obtained at pin no. 23,24,25,26,27,28. And current obtained from IC2 is not sufficient to drive the relay so IC 3 means ULN 2003 IC is used as a current booster or as a relay

driver and output from microcontroller ic is given to pin no. 1,2,3,4,5,6 of IC3 and output is obtained at pin no. 11,12,13,14,15,16 of IC 3 and to that output terminals relays 1 to 6 are connected to drive the supply of motor.

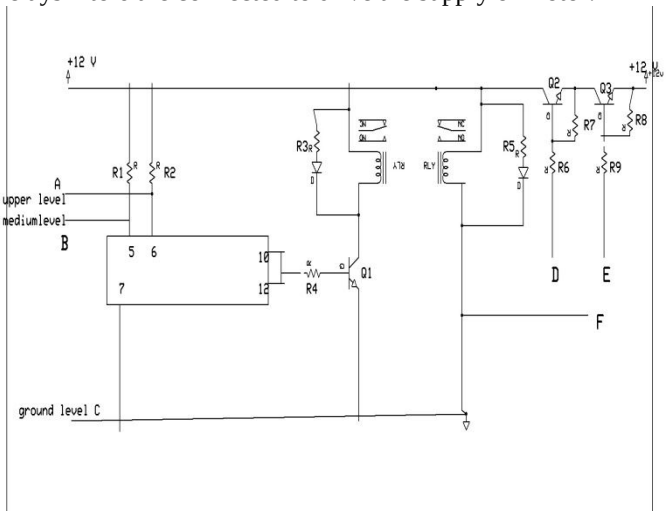

Fig4-Pump control by cell phone

Since earlier days farmer is supposed to visit their agricultural land and check the moisture content of soil manually. To avoid more human efforts this technology can be used. It allows the user to monitor and maintain the moisture remotely irrespective of time. It is really an effective and economic way to reduce human effort and water wastage in agriculture land. Current techniques in agriculture have reduced the ground-water level and availability of human resource. This Irrigation control system using Android can help farmer in many ways through the use of Humidity, Automatic and Manual modes of operation. Apart from agricultural fields, this system can be used in Cricket stadiums or Golf stadiums and also in public gardens. The system has a huge demand and future scope too. It allows a lot of development within it and leads to the standard and useful system which can be used vary widely in agricultural field.

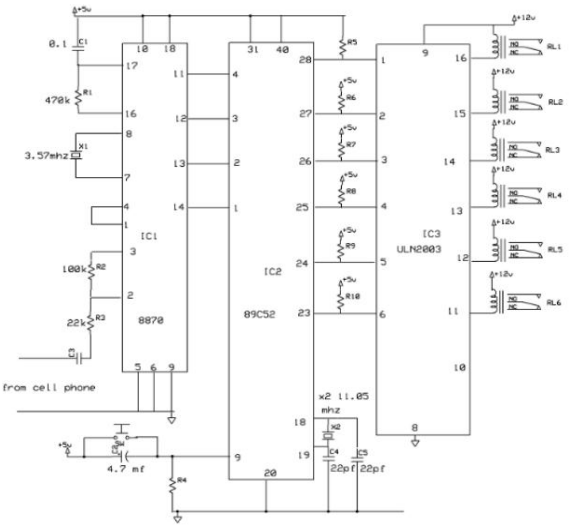

Fig5-circuit diagram of robot

A. ADVANTAGES:

Electrical pump supply water only when sufficient water is present in the well. If water levels decrease below inside the well then supply of water stops automatically.

Here we can get automatic information about the coming person in the field.

At night the light in the field gets ON automatically for this IR receiver is used and at day it will switch OFF.

Water is pumped only when there is need of water to the plants. When whole field is filled with water, the supply of water stops automatically.

Due to automation process this circuits saves the electrical energy.This project is very helpful for saving the important working of farmer.All the components required are easily available in the local market and has low cost.It reduces the usages of man power for performing all activity in field.

B. DISADVANTAGES:

Mobile tower range is necessary.

If any problem created in the circuit. There it is possible to repair only by known person.

VI. APPLICATION AREA

It is applicable at green house, field, home garden. The productivity of the crop can be increased considerably. Banks, lockers. Security system.

VII. FUTURE SCOPE

This project can be extended to measure the moisture level of soil along with its salinity. Further we can make improvements to overcome the structural errors to give a small and compact size robot. It is possible to done many modification in the system few of them are explain as follows.

A. Here only few functions are done by this robot it is possible to increase functions.

B. By using 3G mobile it is possible to see working of robot.

C. It is possible to use GSM module in this system.

D. We can place camera in the system to get visual information

E. *.By using VLSI IC it is possible to minimize the circuit.*

VIII. CONCLUSION

This project has attempted to introduce an efficient smart farm system. It has incorporated automation into various aspects of the farm. A new design for animal enclosures is put forward to improve the living conditions of livestock, as well as reduce manual labor. It includes an automated light, temperature, humidity and sprinkler system. The humidity and moisture control mechanisms make sure the animals are comfortable in the enclosures they are kept in, by adjusting the settings as per requirement. This paper demonstrates that with the integration of information technology to the farm environment, systems and appliances will be able to communicate in an integrated manner. This will result in

convenience, energy efficiency, and quality and safety benefits.

From this project we can conclude that this system is used for the farming purpose means we can do so many farming related works like swing, nangarni, fertilizer, spraying. And by this project we can avoid the losses like financial losses.

ACKNOWLEDGEMENT

We would like to express our sincere thanks to Prof. Garima Gurjar and Prof. Neha Bansal for taking time from their busy schedule to provide us with great deal of help, support and encouraged us to work diligently at every aspects of our project. Their views have always been equitable striking perfect balance between encouragement and constructive criticism. Their constructive tips and suggestions helped us to successfully do the project. We have benefited a lot from their immense knowledge and experience.

We would also like to thanks our family, mentors, colleagues and our friends for unending support to complete this task.

REFERENCES

[1] Nattapol Kaewmard, Saiyan Saiyod, "Sensor data collection and irrigation control on vegetable crop using smart phone and wireless sensor networks for smart farm", *IEEE Conference on Wireless sensors (ICWiSE)*, pp. 106-112, 2014.

[2] Dedrick, A.R. and Erie, L.J. 1978. Automation of on-farm irrigation turnouts utilizing jack-gates. Trans. ASAE 21(1) 92-96.

Elliott, R.L. and Walker, W.R. 1982. Field evaluation of furrow infiltration and advance functions. Trans. ASAE, 25(2):396-400.

[3] Turnell, D.J. de Fatima, Q.V. ; Turnell, M. ; Deep, G.S. ; Freire, R.C.S. ―FarmWeb-anintegrated, modular farm automation system‖, Systems, Man, and Cyb

International Conference Publication Year: 1998, Pg.: 1184-1189 vol.2.

[4] Venkata Naga RohitGunturi, "Micro Controller Based AutomaticPlant Irrigation System", International Journal of Advancements inResearch & Technology, Volume 2, Issue4, April-2013.

[5] Irrigation, 5th Edition, Muhammad Irfan Khan Yousafzai, Claude H. Pair, editor, published by the Irrigation Association, 1993.

Microcontroller Based Closed Loop Automatic Irrigation System. Neelam R. Prakash, Dilip Kumar, Tejender Sheoran. International Journal of Innovative Technology and Exploring Engineering(IJTEE). ISSN: 2278-3075, Volume I, Issue-I, June 2012.

PC Based Automation of a Multimode Control for an Irrigation System. Azzouz Benzekri. University of Bournerdes, Algeria. Kamal Meghriche. University of Vesailles S-Q, France. Larbi Refoufi. University of Bournerdes, Algeria.

Automatic Irrigation System Using Microcontroller. Prathap Krishnamoorthy, Harshit Verma, Mohit Jain, Meeta Rathore. Electronics and communication engineering, SRM university. NCR Campus, Modinagar.

[6] Venkata Naga Rohit Gunturi ,―Micro Controller Based Automatic Plant Irrigation System‖, International Journal of Advancements in Research & Technology, Volume 2, Issue4, April.2000

[7] Turnell, D.J. de Fatima, Q.V. ; Turnell, M. ; Deep, G.S. ; Freire, R.C.S. ―FarmWeb- an integrated, modular farm automation system‖, Systems, Man, and Cybernetics, 1998. 1998 IEEE International Conference Publication Year: 1998, Pg.: 1184- 1189 vol.2

[8] Government of India, Ministry of Agriculture,Department of Animal Husbandry, Dairying and Fisheries, Annual Report, 2011-12 , http://en.wikipedia.org/wiki/Animal_husbandry_in_India

[9] S. Migdall, P. Klug, A. Denis, H. Bach, "The additional value of hyperspectral data for smart farming", *Geoscience and Remote Sensing Symposium (IGARSS) 2012 IEEE International*, pp. 7329-7332, 2012.

[10] http://www.fieldrobot.com/ieeeras/