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Rowbot

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***Abstract*— Agriculture has become a less preferred career option due to the increase in labour wages and overall increase in the cost of farming. Considering the rate of population growth, there is a need to intensify the rate of food crop production so as to compensate the increasing food demand. The method of sowing seeds has been an expensive process with respect to the labour cost. This project addresses the modern day problem of diminishing interest in farming and farming spaces. It serves as a real time solution to the problems related to farming. An android phone along with IOIO board has been used to drive a robot to sow seeds in a field or space divided into rectangular pieces. The system also includes an efficient automatic irrigation system based on micro-controller that irrigates the farm based on the moisture content of the soil in various parts of the farm. This project is inspired from the countries whose major Gross Domestic Product (GDP) is dependent on the agriculture and scarcity of water and labour hinders its economic growth. The farmers working in the farm lands are dependent on natural water resources for irrigation of the land. For farms that are installed with water pumps, the watering of the plants is based upon the convenience and rough estimate of water requirement judged by the farmer. With the existing automatic irrigation systems, the moisture content of the soil is checked at only one point in the soil which can create an illusion of water presence or absence throughout the field.**

The aim of our project is to maximise the accuracy of an automatic irrigation system as well as minimise the physical presence of a human for seed sowing as well as irrigation, hence the micro-controller as well as the IOIO board have been employed.

***Index Terms*— Accelerometer, Android device, Atmega-32, IOIO, CC2500 Module, Hygrometer.**

I. INTRODUCTION

Even after expanding in almost every sector in terms of economy, the major economy is dependent on agriculture, approximately 27.4% to the gross domestic product (GDP), and accounts for about 18% share, of total value of country's export. This project is to develop a system (Robot +irrigation) for helping the farmer to automate the seed sowing and irrigation processes manually. The farmer gives the field dimensions as input which the robot uses to sow seeds. The main aim of the project is to modernize farming and minimize the human intervention. The system is referred as "Row-Bot" which functions with the help of an IOIO board and an At-mega- 32 microcontroller.

The IOIO (pronounced "yo-yo") is a board specially designed to be controlled by an Android 2.0 OS or higher device. The board can easily be connected to an Android device via a USB or a compatible Bluetooth and can be controlled by an Android Application.

The Android application developed, takes in the field dimensions as input from the farmer on the mobile phone. Automating the process of sowing will reduce the cost, by eliminating the need for human labor. The automatic irrigation system functions with the help of an Atmega-32 microcontroller [1]. Water saving is the main aim of our work. The human beings are mainly responsible for wastage of water in agricultural fields due to the unawareness of farmers about sufficient supply of water [3]. Automatic irrigation system not only helps in eliminating the human necessity for irrigation but also provides a method for optimum water management.

II. AIM & OBJECTIVE

A. *Aim*

The main aim of the Row-Bot system is to develop and to test an automation system having low cost equipment and feedback type controller for automatic seed sowing and site-specific management of irrigation systems. The field attributes (length & breadth) are fed into the mobile device fitted on the robot. For irrigation the data available from the various sensors will be received at the wireless base station for proper control, based on hygrometer (soil moisture sensor) data.

B. *Objective*

Our prime objective is to automate the process to seed sowing and irrigation, by making use of a fully functional, automatic robot which implants seeds just by taking the length and breadth input from the farmer. The robot is equipped with a path correction so as to direct itself along the correct path.
[4] Our project also incorporates the use of appropriate wireless network to collect the data from moisture sensors, of various areas of the field and use this information for irrigation.

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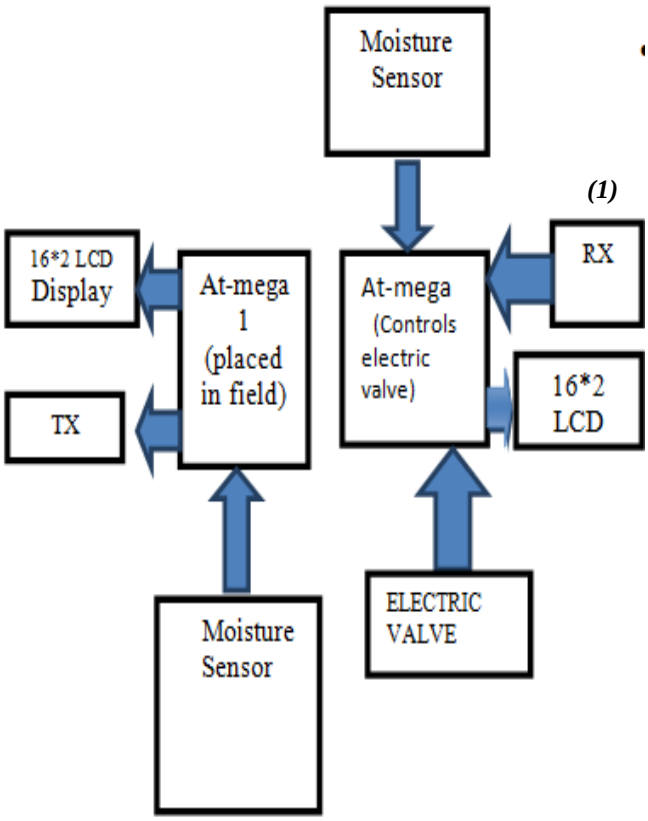
III. PROPOSED SYSTEM



- Figure 2: Block diagram of Path Traversal and seed dispensation

The block diagram of the automated Irrigation system is shown in Fig. 1. It consists of two micro-controllers connected with two Soil Hygrometers dipped into the soil for precise measurement of soil moisture at various points in the field. One of the micro-controllers is used to control the electric valve used for irrigation as well as check for moisture content in the soil while the other microcontroller is at a point in the field to solely collect data. The information obtained from the field microcontroller is transmitted wirelessly to the controller controlling electric valve. Whenever, the moisture content will go low at both the points, irrigation will be initiated by turning on the electric valve and would be turned off in all other cases.

- The android device will act as an interface between the farmer and the IOIO board through the application running on android device. The interface is as shown in Figure 3. Through the application in the android device the farmer will enter the length and breadth of the field. The Robot will follow the path traversal algorithm, Figure 4, using the inputs and sow seeds at regular intervals. The in-built accelerometer sensor will be used to make sure that the Robot does not deviate much from its actual desired path.

IV. CONCLUSIONS AND FUTURE SCOPES

It can be concluded that the modern use of electronic, electrical, and mechanical systems will be very advantageous for agricultural output. The ROW-BOT system eliminates the use of humans to sow the seeds which in turn reduces the cost and also speeds up the cultivation process. The automatic irrigation system provides optimum use of water resources. Conservation of water resources and reduction in cost of agriculture is possible with these methods. In this age of population explosion the huge demand of food can be met with this state of the art process.

In the days to come, we can apply food, nutrients to the plants and crops by air mixed with very less water, with better monitoring and processing.

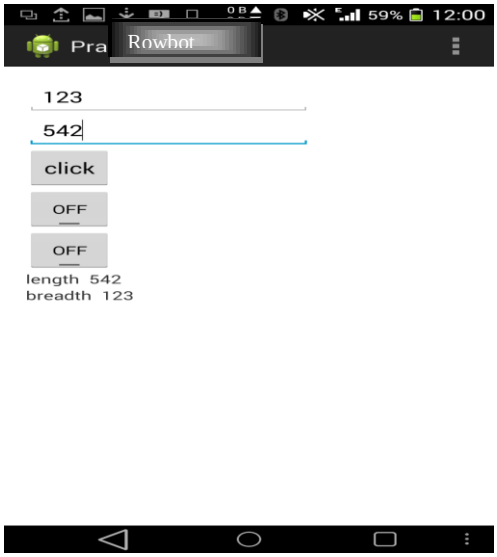


Figure 3: Screenshot of Rowbot interface application

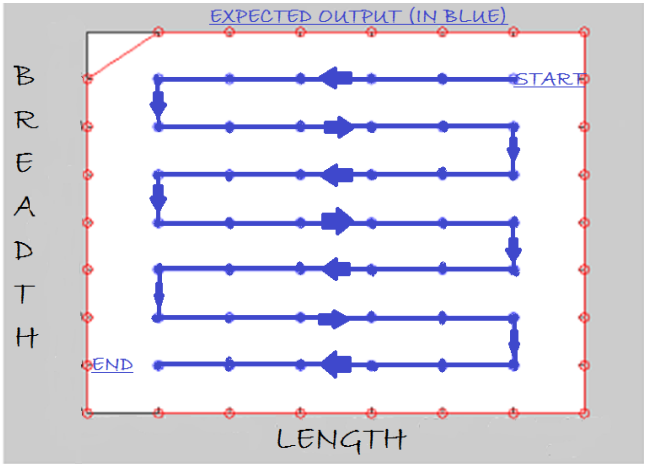


Figure 4: Path Traversal Output(expected)

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