Embedded Based Smart Agriculture Monitoring and Control Systems

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Abstract

Agriculture plays crucial role in the development of agricultural country. It's the backbone of our economic system. The only solution to this problem is smart agriculture by modernizing the current traditional methods of agriculture. In this system is mainly used to controlled and monitored tasks like Temperature sensing, soil moisture sensing, Motor on/off and spraying.

Keywords

Microcontroller,DC Motor,Sensor

I. INTRODUCTION

Agriculture in India has a significant history. Today, India ranks second worldwide in farm output. Agriculture and allied sectors like forestry and fisheries accounted for 16.6% of the GDP in 2009, about 50% of the total workforce. The economic contribution of agriculture to India's GDP is steadily declining with the country's broad based economic growth. Still, agriculture is demographically the broadest economic sector and plays a significant role in the overall socio-economic fabric of India.

In India most of the power generation is carried out by conventional energy sources, coal and mineral oil-based power plants which contribute heavily to greenhouse gases emission. Setting up of new power plants is inevitably dependent on import of highly volatile fossil fuels. Thus, it is essential to tackle the energy crisis through judicious utilization of abundantly available renewable energy resources, such as biomass energy, solar energy, wind energy, geothermal energy and Ocean energy. The projection for irrigation water demand basically depends on irrigated area, cropping pattern, effective rainfall, and soil and water quality. India's current population is 1100 million is expected to stabilize at some stage. The projected population is 1500 million by 2050 with agriculture remaining as the primary source of livelihood in rural areas.

The system discussed over here is based on natural and clean solar power. This is a whole automated system with self decision making capability. The decision making part will be carried out by the Microcontroller. The solar tracking system will help in capturing maximum sunlight from the sun. This energy will be stored in a DC Battery. The stored power will be used to drive the irrigation pump. Here the system will be a sensor based one where the pump will start only when there is the need of water to the land.

A) Embedded System

An embedded system has three main components:

i. It has hardware.

ii. It has main application software. The application software may perform concurrently N the series of tasks or multiple tasks.

iii. It has a real time operating system (RTOS) that supervises the application software and provides a mechanism to let the processor run a process as per scheduling and do the context-switch between the various processes (tasks).RTOS defines the way the system works. It organizes access to a resource in sequence of the series of tasks of the system.

An embedded system has software designed to keep in view three constraints:

i. Available system memory,
ii. Available processor speed
iii. The need to limit power dissipation.

B) Processors in embedded systems

Embedded processors can be broken into two broad categories. Ordinary microprocessors (μP) use separate integrated circuits for memory and peripherals. Microcontrollers (μC) have on-chip peripherals, thus reducing power consumption, size and cost.

C) Microcontroller

A microcontroller can be considered a self-contained system with a processor, memory and peripherals and can be used as an embedded system. The majority of microcontrollers in use today are embedded in other machinery, such as

automobiles, telephones, appliances, and peripherals for computer systems.

D) ATMEL AVR

The AVR is a modified Harvard architecture8- bit RISC single chip microcontroller.The AVR was one of the first microcontroller families to use on-chip flash memory for program storage, as opposed to one-time programmable ROM, EPROM, or EEPRO Mused by other microcontrollers at the time.

II. PROPOSED SYSTEM

In this proposed system, we use dynamic virtual unit in which the screen with number of buttons is designed using software and different operations are handled by manually touching the screen focused on the wall. Virtual reality hand buttons can control home appliances. It is nothing that it does the work what the hardware does. The block explains that the focus light projecting the screen and the camera captures the image and send the data to the system.

The system then passes the data through serial cable to the PIC microcontroller. This controller is electronic circuits that can be programmed to carry out a vast range of tasks. They can be programmed to be timers or to control a production line and much more. The data passed to the wireless zigbee. At the receiver the zigbee receive the data and gives it to AVR microcontroller. Based on the controller the relay is switched and the load is functioned.

A) Block Diagram

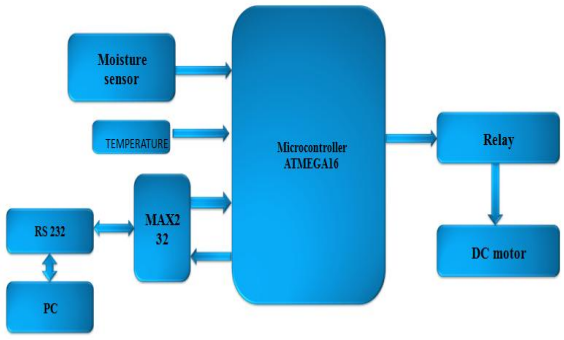

Fig 1.Block diagram of proposed system

For designing of system, there is a need of hardware components like resistors,Capacitors, Virtual reality sensing system, Zigbee etc. and also AvrStudio software is used to write the embedded Cprogramming is installed in the microcontroller with the help of compiler Xtreme Burner so as to operate it in required way by which it can handle the operation of hardware components.

B) Data Flow Diagram

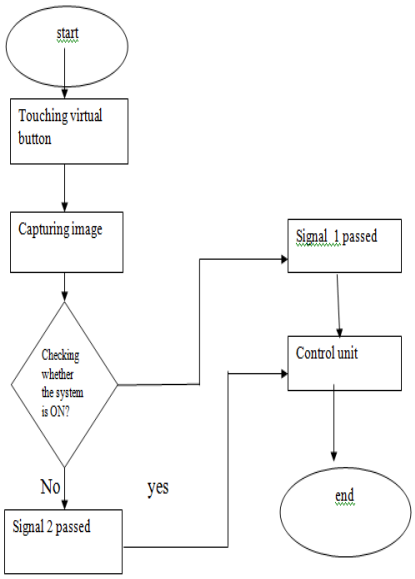

Fig 2.Data Flow diagram of proposed system

Figure shows the data flow diagram for the virtual reality sensing system connected to the microcontroller which can interfaced with personal computer. Virtual reality hand buttons can control home appliances. It is nothing that it does the work what the hardware does.

C) Proteus tool

Proteus is a powerful management tool, which can help your company to monitor and analyze the usage of your telephones hence allowing you to have more control of your telecommunications services.

Proteus can be used to:

- Apportion costs within your organization.
- Identify anomalies and use or abuse of your facilities.
- Monitor the quality of service provided by your customers when they call you.
- Identify whether you have a sufficient amount of lines to handle the traffic your organization generates.

Proteus records information about the connection and disconnection of each call, which takes place on the telephone system and stores this information in a file. The information can then be used to generate different reports for example, costing, operator, traffic etc.

III. RESULT & DISCUSSION

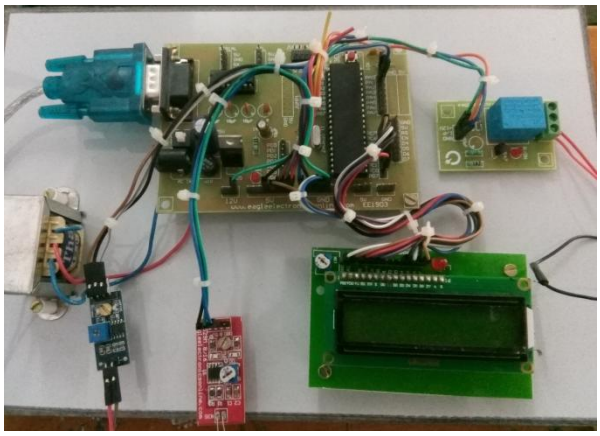

Fig 3.Proposed system Setup

Fig 4.Display of temperature and Moisture level(Minimum level)

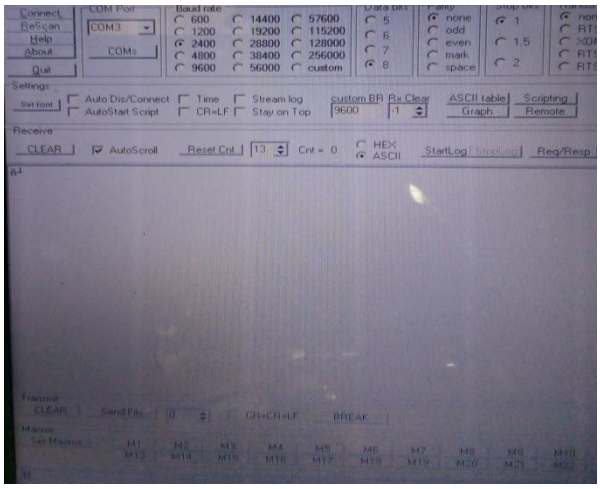

Fig 4.Control llimit of temperature and Moisture level viewed using Laptop

Fig 4.Display of temperature and Moisture level(Maximum level)

IV. CONCLUSION

In this paper, the design of the virtual reality-based Smart Home system is introduced. This paper has introduced the different aspects of the virtual hand-button interaction without haptic feed-back. The interaction method and its implementation are explained. We have concluded from the user studies that the task performance of the virtual hand-button interaction is more dependent on the hand avatar than the collision size of a button.

We have presented an alternative solution to the problem where the concealment of virtual objects by virtual hands makes interaction difficult. Representing a virtual hand with different granularities can be beneficial to have a better view of virtual cockpit objects, however our result shows that it has a negative effect on the interaction as the virtual transparent hand. We have observed that as the volume and details of the hand avatar decrease, the virtual hand-button interaction becomes less efficient.

The comprehensive experiments statistically proved that abstract hand avatars can reduce the task performance. We have demonstrated that the change of collision volume does not have a positive effect on the virtual hand-button interaction in the virtual cockpit environment. The participants achieved the most efficient interaction with the collision volume of a button which was as same as its visual volume.

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