International Journal of Scientific Engineering and Applied Science (IJSEAS) – Volume-2, Issue-3, March 2016
ISSN: 2395-3470
www.ijseas.com

Automated Embedded Technology for Smart Irrigation Using Arduino Controller

V.Ellakkia [1], G.Pushpha Antanet Sheebha [2] and P.Mahalakshmi[2]

[1,2,3]Ganadipathy Tulsi's Jain Engineering college ,

ABSTRACT

The Embedded technology is now in its prime and the wealth of knowledge available is mind blowing. It plays a major role in integrating the various functions associated with it. This needs to tie up the various sources of the department in a closed loop system. This proposal greatly reduces the manpower, saves time and operates efficiently without human interference. This project puts forth the first step in achieving the desired target. With the advent in technology, the existing systems are developed .

Keywords—smart irrigation; moisture sensors;PIR sensors;Fire sensors; GSM communication;

INTRODUCTION

Irrigation in India includes a network of major and minor canals from Indian rivers, groundwater well based systems, tanks, and other rainwater harvesting projects for agricultural activities. Of these groundwater system is the largest. In 2010, only about 35% of total agricultural land in India was reliably irrigated. About 2/3rd cultivated land in India is dependent on monsoons. Irrigation in India helps improve food security, reduce dependence on monsoons, improve agricultural productivity and create rural job opportunities. Dams used for irrigation projects help produce electricity and transport facilities, as well as provide drinking water supplies to a growing population, control floods and prevent droughts.

Water is the most critical input for enhancing agricultural productivity, and therefore expansion of irrigation has been a key strategy in the development of agriculture in the country. The ultimate irrigation potential of India has been estimated to be 139.5 mha, comprising 58.5 mha from major and medium schemes, 15 mha from minor irrigation schemes and 66 mha from groundwater exploitation. India's irrigation potential has increased from 22.6 mha in 1951 to about 90 mha at the end of 1995. It is estimated that even after achieving the full irrigation potential, nearly 50 percent of the total cultivated area will remain rain fed.

If we analyse agricultural growth during the past four decades, we find that high-yielding varieties, irrigated area expansion and fertilizer use have been the major factors contributing to the achievement of green revolution in India. The present level of consumption of total nutrients (NPK) is 14.3 million tonnes/year. On an all-India basis, per-hectare consumption of fertilizer (NPK), which was a meagre 2.0 kg/ha during the early sixties, has risen tremendously during the last 35 years or so, to a level of 76.5 kg/ha.

The share of water use other than for agriculture was only 13 percent in 1985, which is likely to become 27 percent by 2025. Such a fast growth of water need in the face of emerging supply constraints is likely to result in a wide supply gap for irrigation water in the near future.

Proposing a technique of automation in irrigation we have used moisture sensors, PIR sensors & Fire sensors. The subsequent sections deals with the working

MOISTURE SENSORS

Measuring soil moisture is important for agricultural applications to help farmers manage their irrigation systems more efficiently. Knowing the exact soil moisture conditions on their fields, not only are farmers able to generally use less water to grow a crop, they are also able to increase yields and the quality of the crop by improved management of soil moisture during critical plant growth stages.

PIR SENSORS

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors.

FIRE SENSORS

Fire alarm systems have become increasingly sophisticated and functionally more capable and reliable in recent years. They are designed to fulfil two general requirements: protection of property and assets and protection of life. As a result of state and local codes, the life-safety aspect of fire protection has become a major factor in the last two decades.

GSM TECHNOLOGY

GSM stands for Global System for Mobiles. This is a world-wide standard for digital cellular telephony, or as most people know them Digital Mobile Telephones. GSM was created by the Europeans, and originally meant "Groupe Special Mobile", but this didn't translate well, so the now common more globally appealing name was adopted. GSM is a published standard by ETSI, and has now enjoys widespread implementation in Europe, Asia, and increasingly America.
There are many arguments about the relative merits of analogue versus digital, but for my mind it comes down to this: Analogue sounds better and goes further, Digital doesn't sound as good, but does a whole lot more. Check out the links page for sites that have some good discussion on the Digital v Analogue debate.

Examples of what digital can do that analogue doesn't (or doesn't do very well) are, Fax send & receive, Data calls, and Messaging. Throughout the evolution of cellular telecommunications, various systems have been developed without the benefit of standardized specifications. This presented many problems directly related to compatibility, especially with the development of digital radio technology. The GSM standard is intended to address these problems.

From 1982 to 1985 discussions were held to decide between building an analog or digital system. After multiple field tests, a digital system was adopted for GSM. The next task was to decide between a narrow or broadband solution. In May 1987, the narrowband time division multiple access (TDMA) solution was chosen.

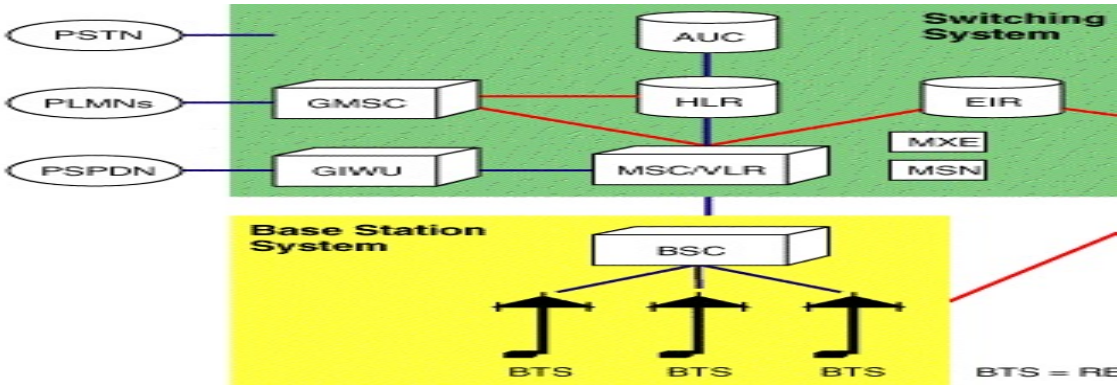


TABLE I. A COMPARISON OF DIFFERENT WIRELESS RECHNOLOGIES

Wireless Mode	GSM	Wi-Fi	XBee
Operating band(kB/s)	1850-1990	11000+	20-250
Coverable Distance(m)	NIL	100+	20-70 100+ (Amplifier)
Power Consumption (mA)	5	300	30
Memory /kB	64GB	70+	40+
Technical Advantages	Cost. Efficient	Bandwidth spectrum	Low Power consumption and Cost

HARDWARE

Figure 1 shows a schematic of experimental setup containing hardware as well as software module.

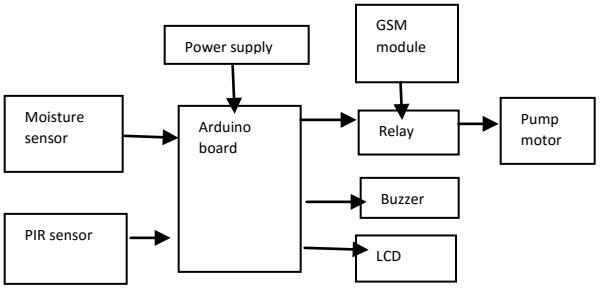


Figure 1 Hardware configuration

In this figure, moisture sensor, microcontroller (ATmega 328) and the GSM module are connected to form a sensory node. This node then sends data to the hub that is connected to the PC in order to deposit data into a database.

In the prototype, an aquarium pump is to supply water to the soil. The aquarium pump's motor is controlled via a relay on the control board that operates the motor under specific conditions explained in the algorithm in Figure 3. The relay is controlled by a transistor interfaced to microcontroller.

PIR sensor to sense the person or animal in the farm, the fire sensor is to sense the fire, which gives us the intimation through the Bluetooth, pc and buzzer.

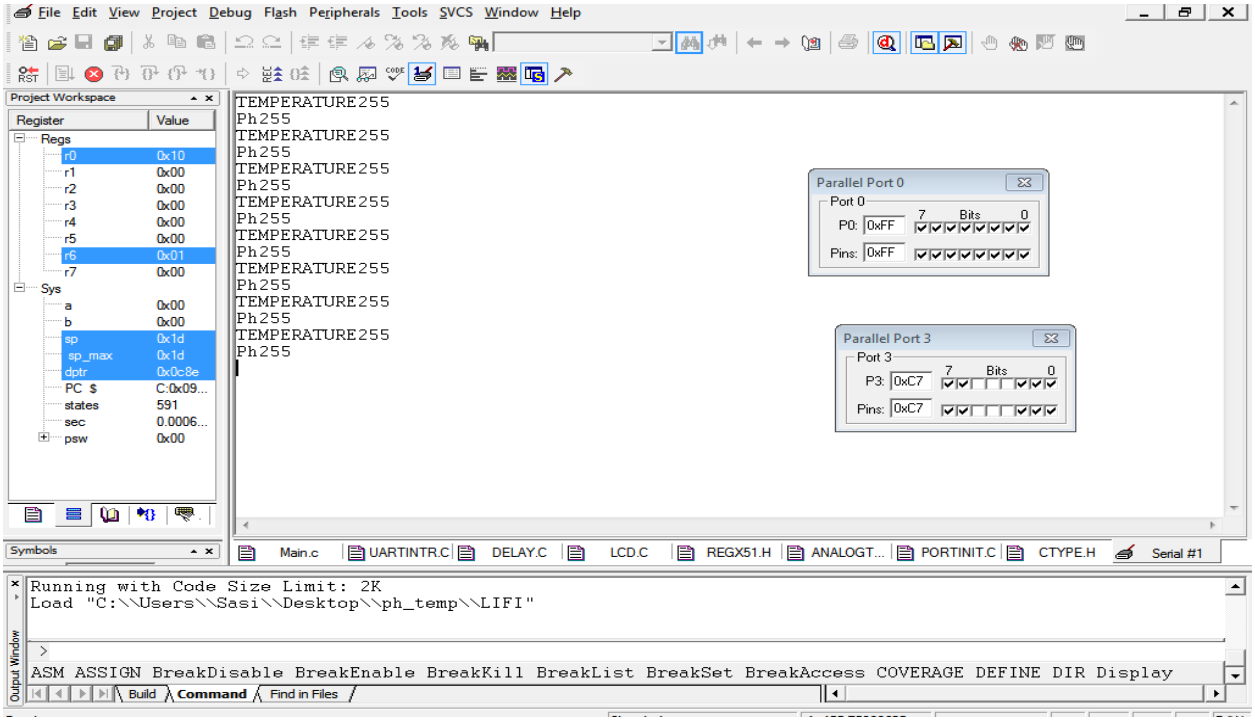
SOFTWARE

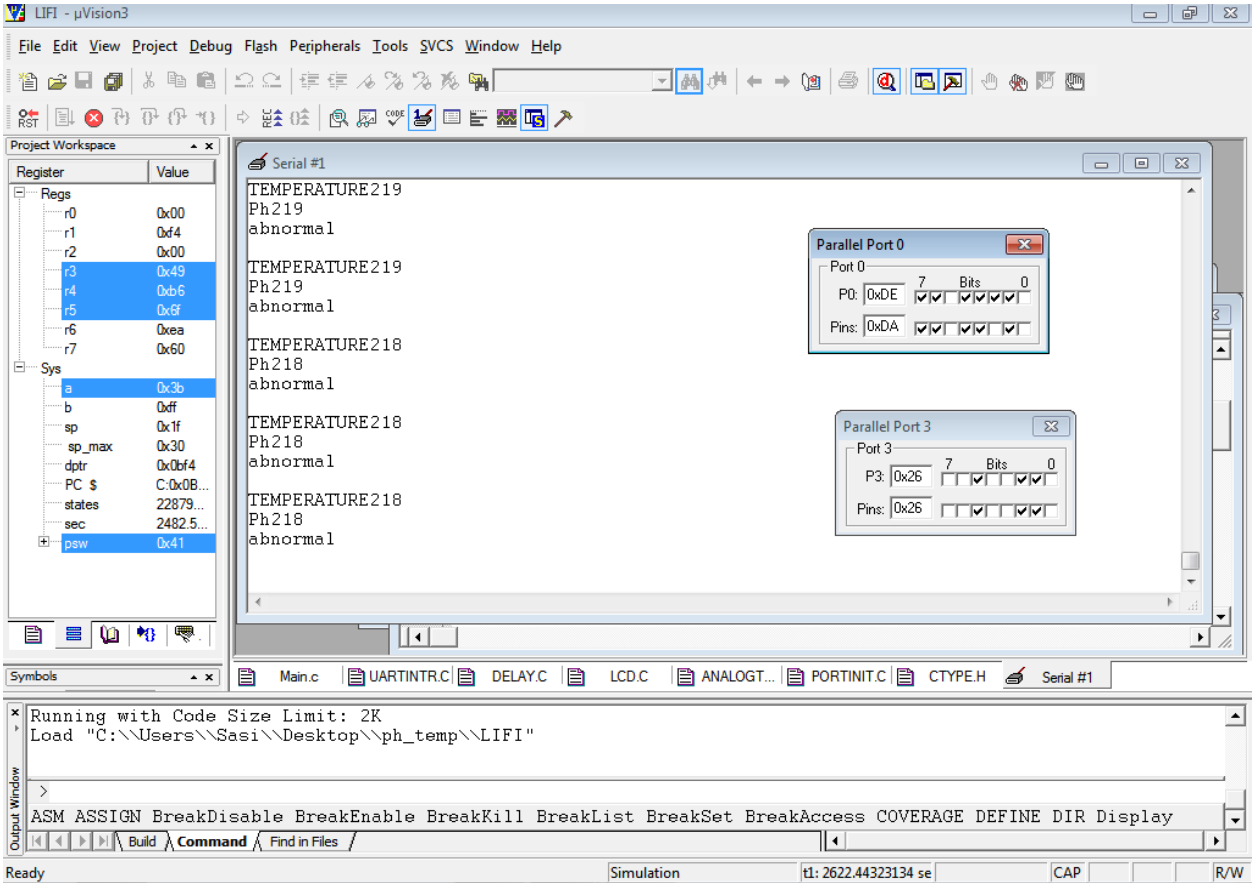
The microcontroller is programmed with

EMBEDDED C
KEIL COMPILER
LABVIEW

With the help of LIFI-µVision . Robot can be controlled using LAB VIEW from the PC, so that robot will move in all directions inside the field. If we give command to adjust the pouching blade, and we can control the seed spreader valve and water tank valve using LABVIEW. If any problem occurs in valves and blade, buzzer will be alarmed and in PC we can view the condition. PH LEVEL sensor is used to find the ph content in the water level. all the values will be displayed in the LCD.

International Journal of Scientific Engineering and Applied Science (IJSEAS) – Volume-2, Issue-3, March 2016
ISSN: 2395-3470
www.ijseas.com





CONCLUSION

It has been shown that a low-cost sensor fabrication performs well, in a consistent manner, in sensing ground moisture. The communication device and the controller setup are shown to work as expected and record the moisture data to a PC remotely. Fire indication is given through the piezoelectric buzzer and sensing of the entry of a third person is done with the help of the PIR sensor.

FUTURE ENHANCEMENT

Many features can further be added to this system which includes web-based communication, and weather adaptive systems. This type of system is a good solution for condition monitoring of agricultural setups as it is low in cost. Also sensor that can detect the oestrogen levels in body fluids can be developed. This idea is highly efficient for environmental sustainability.

REFERENCES

[1] A. H. Kioumars, and L. Tang "ATmega and XBee-Based Wireless Sensing" in 5th International Conference on Automation, Robotics and Applications (ICARA), IEEE, Wellington, 6-8 December 2011.

[2]C. Tatsiopoulos, and A. Ktena "A smart Zigbee based wireless sensor meter system" in Proc. 2009 IEEE Int. Conf. Syst., Signals, Image Process., pp. 1–4, 2009.

[3] Zhou, B., et al.(2007) A wireless sensor network for pervasive medical supervision.

[4] Smart Irrigation Using Low-Cost Moisture Sensors and XBee-based Communication,IEEE 2014,Global Humanitarian Technology Conference.