International Journal of Innovative Research in Science and Engineering
Vol. No.3, Issue 05, May 2017
www.ijirse.com
ISSN (O) 2454-9665
ISSN (P) 2454-0663

AUTOMATION AND SMART IRRIGATION USING ATMEGA 328 MICRO CONTROLLER AND SENSORS

Anand Mohan[1], Divya Singh[2], Prashant Chaturvedi[3]

[12]Student, Electronics & Communication, LNCT Bhopal, RGPV, (India)

[3]Assistant Professor, Electronics & Communication, LNCT Bhopal, RGPV(India)

ABSTRACT

Recently, I actively participated in my technical events organised at state level in which more than 180 colleges of Madhya Pradesh, India took part. I worked on projects of embedded, robotics , home automation, statistical study of atmosphere and irrigation,etc. In this paper , I have shown more interest in automation and Irrigation. Automation, the word itself clears what does it mean.

1. The technique, method, or system of operating or controlling a process by highly automatic denotes, as by electronic contrivances, reducing human intervention to a minimum.

2. A mechanical contrivance, operated electronically, that functions automatically, without perpetual input from an operator.

For automation ,i have used three fundamental elements:-

1. Software (programming language(Wiring language) using IDE of Arduino and

2. Micro-controller (Atmega 328p) to burn the sketches that is programs)

3. Sensors like LDR, Ultrasonic sensors, IR Sensors, Temperature and humidity sensors, CO sensors and home made sensors for irrigation.

It was a nice exposer doing these things practically, I learn many things. While going through these process I faced my problems, difficulties and many errors and at last I came up with their solutions .Solutions ,regardingnot only for hardware, configuration and alternatives but also possible software problems. After completing this article, we will capable of dealing with automation and the challenges raised during it because this paper has contents about making of things automated, difficulties faced while making of things and their possible solutions.

Keywords: Smart, Automation, micro-controller, Sensors.

I. INTRODUCTION

Home automation refers to handling and controlling home appliances by utilizing micro-controller or computer technology. Automation is popular now days because it provides ease, security and efficiency. In this, a sensor senses the status of appliances and updates to web server. If utilizer is far away from home, he can access and transmute status of appliances i.e. switches it on/off. Utilizer can utilize local PC. This paper will describe approach of controlling home appliances by utilizing web server. A. Quandary verbal expression Home automation refers to control the abode appliances by utilizing computer technology. Computer Systems enables

International Journal of Innovative Research in Science and Engineering
Vol. No.3, Issue 05, May 2017
www.ijirse.com
ISSN (O) 2454-9665
ISSN (P) 2454-0663

From remote control of lighting through to intricate micro-controller or computer predicated networks with sundry degrees of astuteness and automation. Home automation provides security, energy efficiency and facilitate of avail hence, it is adopted more. It withal provides remote interface to home appliances to provide control and monitoring on a web browser.

1.1 LITERATURE SURVEY: N. Sriskanthan [8] has implemented the model for home automation utilizing Bluetooth via PC. But, Bluetooth has range circumscription. Hasan [9] has developed a telephone and PIC remote controlled contrivance for controlling the contrivances.pin check algorithm was acclimated to implement the system where it was with cable network but not wireless communication.

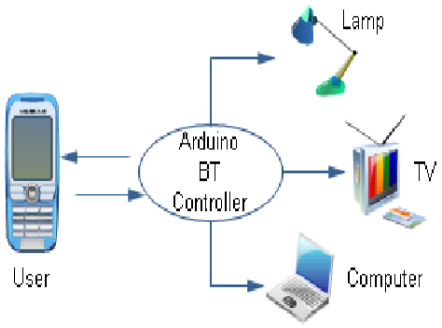


Figure 1.Home automation system block diagram.

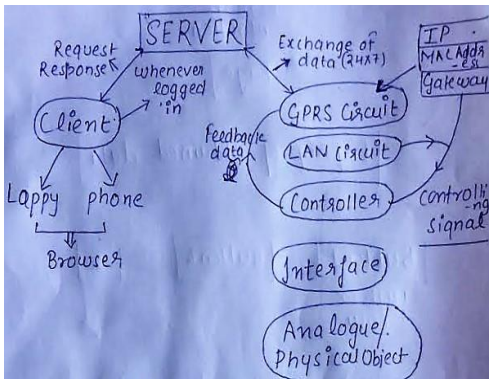


figure 2 block diagram of data exchange at different level.

II. IMPLEMENTATIONS

Basically,there are mainly two types of implementation one should keep in their mind:

2.1 Software implementation: Wiring is an open-source electronics prototyping platform composed of a programming language, an integrated development environment (IDE), and a single-board microcontroller. It was developed starting in 2003 by Hernando Barragán.

The documentation has been engendered with designers and artists in mind. There is a community where experts, intermediate developers and tyros from around the world share conceptions, erudition and their collective experience. Wiring sanctions indicting software to control contrivances annexed to the electronics board to engender all kinds of interactive objects, spaces or physical experiences feeling and responding in the physical world. The conception is to indicate a few lines of code, connect a few electronic components to the Wiring hardware and observe how a light turns on when person approaches it, indicate a few more lines, integrate another sensor, and optically discern how this light changes when the illumination level in a room decreases. This process is called adumbrating with hardware; explore lots of conceptions very expeditiously, cull the more fascinating ones, refine and engender prototypes in an iterative process.

ISSN (O) 2454-9665
ISSN (P) 2454-0663

This language is very much similar to c &c++. At first, we define pins and initialize pin values. It consists of two loops void setup(){} and void loop() {}. In void setup(), put your setup code there, to run once and in void loop(),put your main code here, to run repeatedly.

To develop web page ,you can use IDE like eclipse, netBeans, etc. for java language and HTML to design your we page. There is no limitation for language. One can choose according their convenience. It is advised to store their generated data on cloud so that one can access from anywhere at anytime. It does not only make availability 24x7 but also safe, reliable and easy to maintain.

Beginners can use Wordpress, Blynk,etc. if they face difficulty in developing web page. Since ,on these platform web pages can be created easily by drag and drop.

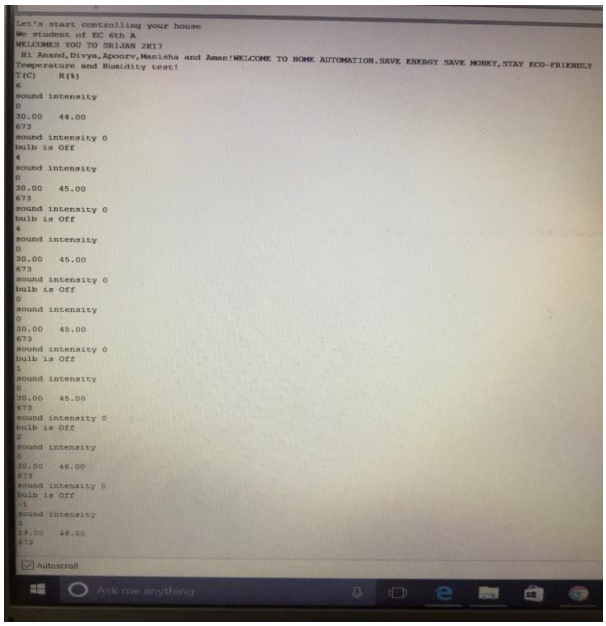


Figure 3 displaying (sound intensity, temperature , humidity, water label, soil moisture, etc.)

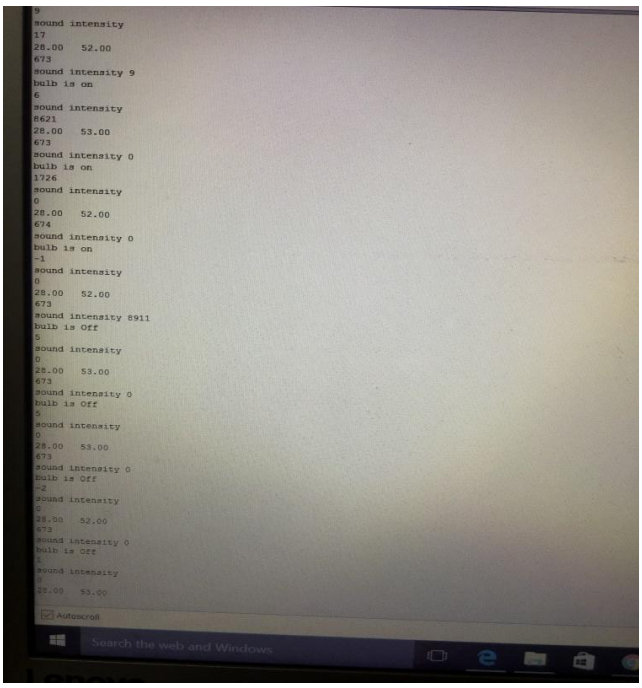


Figure 4 is displaying state of bulb ON/OFF

ISSN (O) 2454-9665
ISSN (P) 2454-0663

2. ***Hardware implementation:***

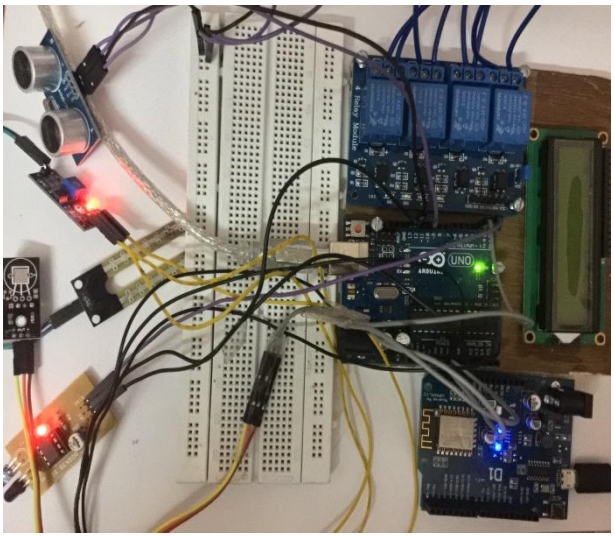
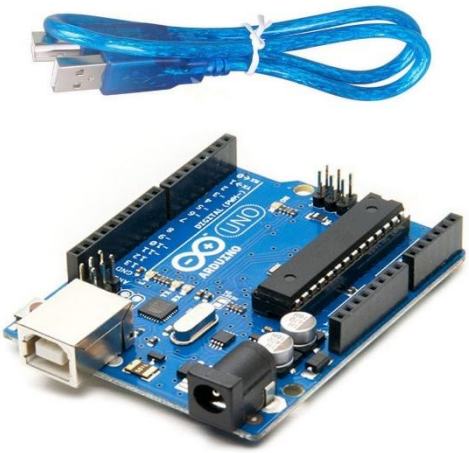


Figure 5 Bread board, wires(M2M,M2F,F2F), circuits,relays,sensors(IR,ultrasonic, DHT11, Soil moisture sensor),LCD display

Components and it's specificstions used: Bread board, wires(M2M,M2F,F2F), circuits(Atmega328 micro-controller in arduino board, 4 relays, wemos wifi),relays,sensors(IR,ultrasonic, DHT11, Soil moisture sensor), LCD display.



Arduino Uno R3 ATmega328P ATMEGA16U2 Compatible with USB Cable

- Microcontroller ATmega328P
- Operating Voltage : 5V
- Digital I/O Pins 14 (of which 6 provide PWM output)
- PWM Digital I/O Pins 6 Analog Input Pins
- Flash Recollection 32 KB (ATmega328P) of which 0.5 KB utilized by bootloader.

ISSN (O) 2454-9665
ISSN (P) 2454-0663

Figure 6. Arduino board with USB data cabl

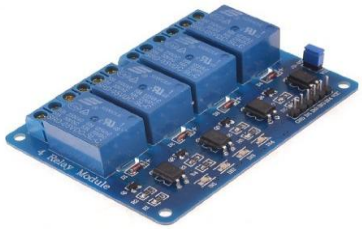


Figure 7. Four channels relay

• 5V 8-Channel relay interface board and each one needs 15-20mA driver current

• Equipped with high-current relay, AC250V 10A

• DC30V 10A

• Standard interface that can be controlled directly by microcontroller (Arduino, 8051, AVR, PIC, DSP, ARM, ARM, MSP430, TTL logic)

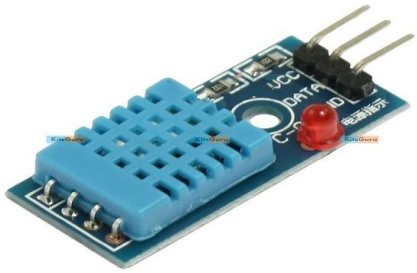


Fig. 8 DHT-11(Temperature & Humidity Sensor)

.Indication LED's

• Working voltage 3.3 V-5 V

• Humidity quantification range 20 percent -95 percent, sultriness quantification error +-5 percent

• Temperature quantification range 0 -50, quantification error +-2 degrees

Figure 9 (Soil & moisture sensor)

ISSN (O) 2454-9665
ISSN (P) 2454-0663

• Operating voltage: 3.3V~5V; Dual output mode,analog output more precise; A fine-tuned bolt aperture for facile installation

• With power (red) and digital switching output (green); Having LM393 comparator chip, stable

• Panel PCB Dimension: Approx.3cm x 1.5cm; Soil Probe Dimension: Approx. 6cm x 3cm; Cable Length: Approx.21cm

• Interface Description(4-wire); VCC: 3.3V-5V; GND: GND

• DO: digital output interface(0 and 1); AO: analog output interface

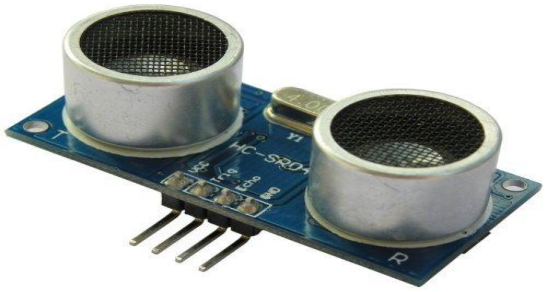


Figure 10. ultrasonic sensor

- Working Voltage: 5V(DC)
- Static Current: Less than 2mA
- Output Signal: Electric frequency signal, high level 5V, low level 0V
- Sensor Angle: Not more than 15 degrees
- Detection Distance: 2 cm to 450 cm
- High Precision: Up to 2mm
- Input Trigger Signal: 10us TTL impulse
- Echo Signal: Output TTL PWL signal
- Note: The module has a blind spot of 2cm (very near)
- So obstacle held too closely will not be detected

How to make one's own soil & moisture sensors in bulk at home: It is important that one should know how to make your own soil and moisture sensors so that you may get a precise and best result when the project is implemented on large scale. It is easier and effiecient to construct own I bulk at the home itself.

A ***soil moisture sensor*** is utilized to quantify the moisture content of the soil, which avails in regulating the watering cycles for optimal plant magnification. You can make your own soil moisture sensor at home which is an economical alternative to the kindred contrivances available in the market. The sensor is made utilizing metal probes which are inserted into a block of gypsum; the resistance between them gives you the moisture levels

ISSN (O) 2454-9665
ISSN (P) 2454-0663

which are read utilizing an analogue quantifying contrivance. The steps below guide you through a simple facile to do process of how to make your own soil moisture sensor:

Step 1 – Setting the Metal Pieces

If you are utilizing metal wall hangers straighten them out (you can utilize nails which are more facile to utilize, ascertain they are 1 1/2 inches in length) set them about 15 millimeters apart. Insert them into the straw which is cut to about 4 inches in length. Put glue on the top end to hold them in place. Ascertain a component of the nails protrude beyond the straw.

Step 2 – Commixing Plaster of Paris and Making the Mould

The ideal material for moisture sensors is gypsum, but Plaster of Paris works just as well as it is gypsum heated at very high temperatures. Commix the plaster according to the directions given on the label; utilize a minute skewer or screwdriver to insert the Plaster of Paris into the straw. Gently tap the straw to settle the Plaster of Paris and abstract air bubbles. When you reach the top utilize the edge of the screwdriver to compose a scarcely conical shape; set the probe aside in an upright position to let dry. You can tape the probe against a flat wall to hold it in position.

Step 3 – Preparing the Probe

Dry the probe for 24 hours afore you proceed to the next step. Cut away part of the straw to reveal the dried Plaster of Paris, you can utilize a cutter to do this. Now your moisture sensor is yare to be tested.

Step 4 – Testing the Contrivance

To test the moisture sensor hook up the cables of the analogue quantifying contrivance to the protruding nails. This will give you a reading which will be the standard reading of the contrivance when dry; you can utilize these to gauge the moisture content of the soil by comparing the readings.

Step 5 – Tips and Advice

Wear protective gloves to bulwark your hands from any chemicals (such as Plaster of Paris), that may act as irritants. If you have metal hangers they are a better alternative to nails. One pack of Plaster of Paris can give you plenty of moisture sensors and they work well in grow boxes as well. Insert the moisture sensor into the soil so as to immerse leave the top of the sensor above the soil for precise readings.

III. PROBLEMS & SOLUTIONS

3.1 Hanging problem of Serial monitor.

While burning the sketch into micro-controller, there are few difficulties faced . It was due the excess numbers of sensors connected to the arduino board. If we connect more than 3 to 4 senors to the board without LED also,then I observed that **the Serial monitor of IDE was not working properly**.Although Arduino board has sufficient slot for connection but it is was unable to overcome it's load. To overcome this problem , what I did was an unusal way.I took a USB cable,cutted into two half .I connected one end to the powerbank or laptop port or smartphone adapter another end to Male to Male wire. Then I took a bread board and gave external DC supply of 5V to it and from it ,I fetched source voltage to different sensors. As, a result there was no voltage drop and hence this problem was resolved.

ISSN (O) 2454-9665
ISSN (P) 2454-0663

3.2 PORT Configuration.

When I connected the circuit board to the laptop USB Port,I face few difficulties regarding Port configuration. It is a general problem which is arised when the device is not recognised by the laptop USB Port. TO resolve it , open control pannel or better look for device manager under this tap then go to port and add or install your circuits. Once it is configured,it shows "COM *number"*.

IV. MAINTAINANCE

Few things should be kept in mind while working with the Circuits. First,circuits should be insulated properly to avoid the short-circuits. Specially, relay should be insulated because it works on high voltage which may give you an electric shock if touched with bare hand. Last, Make a proper connection according to the pin numbers alloted by the software to the micro-contrroller else a silly mistake in your connections may lead to a major problem and will damage your circuits and the appliances you are controlling through it.

V. PERFORMANCE:

S.no	Temperature	Humidity	Soil moisture level	Sound intensity	Present state of bulb	IR sensor reading
1	30	44	673	0	Off	0
2	30	44	673	676	On	0
3	29	46	673	0	On	65
4	29	49	673	8671	Off	69
5	28	50	673	0	Off	65

Figure 11. An Observation table on serial monitor-

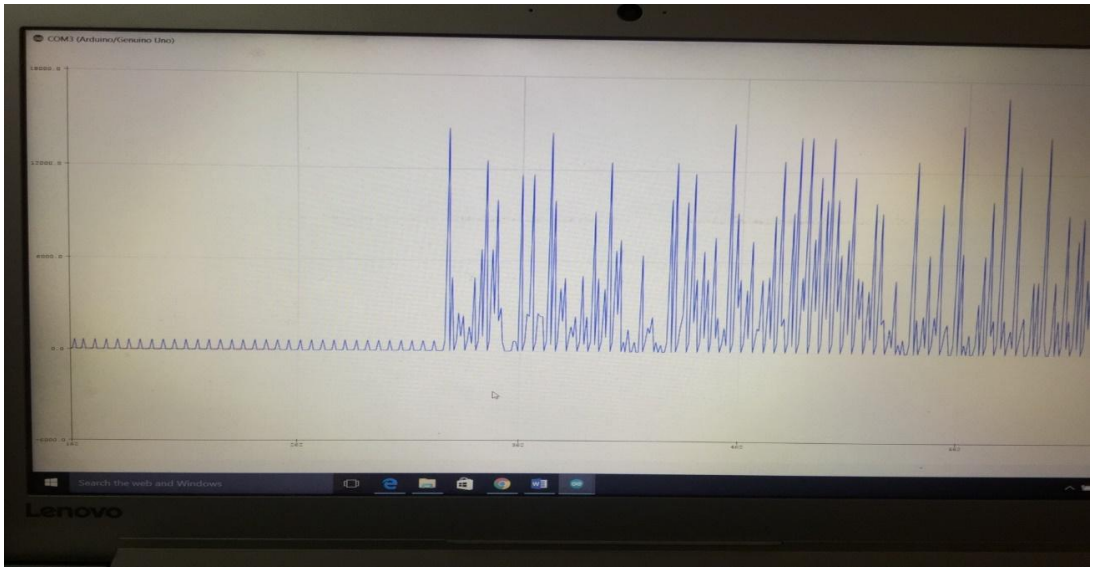


Figure 12. is displaying graph of temperature and humidity plotted a according to the data of DHT sensor

ISSN (O) 2454-9665
ISSN (P) 2454-0663

VI. APPLICATION

- Lighting Control: Just clap to turn on/Off an appliance.
- Control your appliances with sensing the change in temperature.
- Control your pump while irrigation and above head water tank and avoid water wasteage.
- HVAC Regulation: No Longer Burned by Your Heating Bill
- To avail Handicapped people
- Where less energy consumption is major factor
- Where water conservation is major factor.

VII. ADVANTAGES

(a) Adds Safety Through Appliance and Lighting Control

(b) Secures Home Through web control Increases Convenience through Temperature Adjustment

(c) Save time

(d) Save money and increase convenience

(e) Allow to appliances control when out of town

VIII. CONCLUSION

This paper gives basic idea how we can control home appliances by computer technology. The main objective of this project is to help handicapped people, energy and water conservation. It provides security and saves energy. As we are accessing devices by website, we can access it even if we are far away from home where the Wi-Fi is available with just a click on your smart phones or laptops.

IX. ACKNOWLEDGEMENT

I sincerely express my deep sense of gratitude towards my venerated guide Prof. Rahul Shrivtava& Uma Shankar kurmi for his valuable guidance, profound advice, sedulous inspiritment and avail during the completion of this work. His time to time subsidiary suggestions boosted us to consummate this task prosperously. He has availed us in all possible ways right from accumulating the materials to report preparation. I express my thanks to our Project coordinator Prof. PrashantChaturvedi for his kind cooperation. I elongate my sincere thanks to our Head of Department Dr. Rita Jain for providing all kinds of cooperation during the course**.**Conclusively, I am thankful to the fortifying staff Electronic & Communication Department and all those who directly or indirectly contributed to consummate this work.

REFERENCES

[1] J. Lertlakkhanakul, J.W.Choi and M. Y.Kim, Building Data Model and Simulation Platform for Spatial Interaction Management in Perspicacious Home, Automation in Construction, Vol. 17, Issue 8, November 2008, pp. 948-957

ISSN (O) 2454-9665
ISSN (P) 2454-0663

[2] A. R. Al-Ali and M. AL-Rousan, Java-predicated Home Automation System, IEEE Transactions on Consumer Electronics, Vol. 50, No. 2, May 2004,

[3] R. J. C. Nunes and J. C. M. Delgado, A Cyberspace Application for Home Automation, 10th Mediterranean Eletro-technical Conference, MeleCon 2000,Vol. I. pp. 298-301

[4] D. H. Stefanov and Z. Bien, The Keenly Intellective House for Older Persons and Persons with Physical Disabilities: Structure, Technology Arrangements, and Perspectives, IEEE Trans- actions On Neural Systems And Rehabilitation Engineering, Vol. 12, No. 2, June 2004, pp. 228-250

[5] C. Douligeris, Keenly intellective Home Systems, IEEE Communications Magazine,Vol. 31, Issue 10, October 1993, pp. 52-61

[6] Y.-J. Mon, C.-M. Lin and I. J. Rudas, Wireless Sensor Network (WSN)Control for Indoor Temperature Monitoring, ActaPolytechnicaHungarica,Vol. 9, No. 6, 2012, pp. 17-28

[7] E. N. Ylmaz, Inculcation Set Design for Keenly intellective Home Applications, Computer Applications in Engineering Inculcation, Vol. 19, Issue 4, December 2006, pp.

[8] N. Sriskanthan and Tan Karand. "Bluetooth Predicated Home Automation System". Journal of Microprocessors and Microsystems, Vol. 26, pp.281-289, 2002.

[9] E. Yavuz, B. Hasan, I. Serkan and K. Duygu. "Safe and Secure PIC Predicated Remote Control Application for Keenly Intellective Home". International Journal of Computer Science and Network Security, Vol. 7, No. 5, May 2007.

[10] AmulJadhav, S. Anand, NileshDhangare, K.S. Wagh "Universal Mobile Application Development (UMAD) On Home Automation" MarathwadaMitraMandal's Institute of Technology, University of Pune, India Network and Intricate Systems ISSN 2224-610X (Paper) ISSN 2225-0603 (Online) Vol 2, No.2, 2012

[11] Rana, JitendraRajendra and Pawar, Sunil N., Zigbee Predicated Home Automation (April 10,