An Intelligent model of FAN automation for smart house

Subir Saha, Md. Niaz Imtiaz, Md. Akkas Ali
Pabna University of Science and Technology & Bangladesh University of Engineering and Technology

ss.buet@gmail.com
rabby_cse_buet@yahoo.com
akkas.buet@gmail.com

ABSTRACT

Embedded system use in smart house is very common now-a-days. Electrical device like TV, Computer, Mobile, Fan etc. are very common for day to day life of everyone. These sorts of device are controlled manually by man or by remote control with different controller or different switch. As we are being more digitalized day by day and getting rid of any sorts of manual devices then we are more inclined to the digital controlling system. Developing countries are radically using this type of systems in a very large scale. We develop a system model that will help the developing smart house smarter. Our developed system works with the current electrical system. We developed the system that works automatically with the increase or decrease of temperature. If the temperature goes to 37° or more the fan runs with full speed the fan also run slower/faster when the temperature goes down/increase in every 2° and vice-versa. When the temperature is ≤ 20° it’s automatically stops. It can also operate manually though it has a switch connected to motor.

Keywords
ADC – Analog to Digital converter, DAC– Digital to Analog converter, IC- Integrated Circuit, ULN2003- Driver for stepper motor, LM 35 – Linear Mode Temperature Sensor.
INTRODUCTION:

Starting from scratch we develop our system by studying LM 35\(^1\)\(^2\) temperature sensor. The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the centigrade temperature. It gives 10 mV analog values\(^3\) in every centigrade increase or decrease of temperature. To calibrate analog to digital value conversion we use ADC\(^4\). The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient centigrade scaling. The LM35 device does not require any external calibration or trimming to provide typical and various application of smart home model. After getting the value from ADC it is being calculated to fan rotation. Then we started developing our model by using microcontroller and its peripherals\(^5\). We use ULN2003 for stepper motor rotation. We also use 7-segment display to display the current temperature.

SYSTEM DESIGN:

In design phase First of all we make a prototype [Figure: 1] for our design. The prototype works for the black box of various electrical devices that we used to build our system.

Our system model is to control the temperature of a room and a automation of the speed of a fan. For this purpose we make sure to know the real temperature of the room. It must be very precise because by using temperature we are going to control the speed of fan. For this we use temperature controller sensor LM 35 which gives 10 mV of analog DC voltage value for each increase and decrease. It means if the room temperature 25 centigrade then LM 35 will give us 25 X 10 = 250 mV . The value got from LM 35 was digitalized by microcontroller ADC. We are using two 7-segment displays thus we can show 0-99° temperature. Our second steps are to control the speed of fan. For this we use stepper motor and its driver ULN 2003 to interface with microcontroller. As we are in moderated temperature zone so we suppose at 20° there will no need of fans. At temperature (T) will 20° < T ≤ 25° fan’s speed will as slow as the stepper motor allow. Then when 25° < T ≤ 27° its speed goes one step higher than previous. By this we can speed up the speed of fan by every 2° . When the temperature in 37° or more the speed of fan is it’s full operating and the speed depends on its manufacturing speed. Meanwhile we have also an extra switch by which we can stop the fan manually.

PIN DIAGRAM and CONFIGURATION:

To implement the system prototype we simulate our design in Protues simulator. Implemented in the code for microcontroller using AVR studio and to convert the code to the hexadecimal value we use ponyprog simulator. Our simulated design is in figure 2.
OPERATING METHODS:
To operate our model for smart house or any other application user must have to take some measures that for microcontroller the power supply must be 5 V DC. If there is some problem user has to use voltage regulator IC-7805 for uninterrupted voltage regulation services.

ADVANTAGE OVER PRESENT:
Though it is an automated system model the fan in a room is controlled automatically. In the moderated temperature country likes ours it is very often seen that at the first night the temperature is very high and last night it was low and vice-versa. If the speed of fan is same for all time then it will cause interruption for sleep and also cause cold and fever for the user. Our system works as a regulator as well as a controller. This model will cost less than market value of fan regulator.

CONCLUSION and FUTURE SCOPE:
We start our model from scratch and finally we got a run able model which works to improve the smartness of house and helps to make it automated. The model that we designed there will not any relation with person now we are trying to automate by the movement of person to room both in and out going case. We also work for the room where we use table fan then the table fan moves by the presence of person in the room with direction.

REFERENCES
[1] Akyildiz, I.F., Su, W., Sankarasubramaniam, Y., Cayirci, E. Wireless sensor networks: a survey. Computer Network 38(4):393-422, 2002
[2] Poonam1 , Prof. (Dr.) Yusuf Mulge Remote Temperature Monitoring Using LM35 sensor and Intimate Android user via C2DM Service in IJCSMC, Vol. 2, Issue. 6, June 2013, pg.32 – 36
[3] Ms. Rita M. Shende Prof. P. R. Gumble., Low Power High Speed 4 Bit Resolution Pipeline ADC Design in Submicron CMOS Technology inijarcsse Volume 3, Issue 1, January 2013 ISSN: 2277 128X
[4] BonJae Koo, Young Soo Park and SungHyun Yang , Microcontroller Implementation of Rule-based Inference System for Smart Home in International Journal of Smart Home Vol. 8, No. 6 (2014), pp. 197-204.
[5] AakankshaPimpalgaonkar, MansiJha , Nikita Shukla, KajolAsthana A Precision Temperature Controller Using Embedded System International Journal of Scientific and Research Publications, Volume 3, Issue 12, December 2013 1 ISSN 2250-3153
Author's Biography

Subir Saha is now working in Pabna University of Science and Technology as a Lecturer of Computer Science and Engineering. Previously he also served for Green University in Bangladesh as Lecturer of CSE for 2 years. He achieved his B.Sc. degree in Computer Science and Engineering from Bangladesh University of Engineering and Technology in February, 2013. Now he is doing his MSc in the same department. His research interests are System Network, Embedded Systems, Bioinformatics, E-learning.

Md. Niaz Imtiaz was graduated from Bangladesh University of Engineering and Technology in CSE in 2011 is now working in Pabna University of Science and Technology as a Lecturer of Computer Science and Engineering. Previously he served as a Lecturer of CSE in Noakhali Science and Technology University for 1 year 3 months. His research interest are Wireless Networks, Routing Protocols, Software Engineering

Md. Akkas Ali is now working in Pabna University of Science and Technology as a Lecturer of Computer Science and Engineering. Previously he was a Lecturer of University of Information Technology and Science for 2 years 3 months. He achieved his B.Sc. degree in Computer Science and Engineering from Chittagong University of Engineering and Technology in 2012. Now he is doing his MSc in the same department in Bangladesh University of Engineering and Technology. His research interests are Biometrics, Network Security