**Newsletter May (KFRL)**

Organization of Workshop on Embedded Systems

During month of May, the KFRL team decided to organize a versatile workshop on Embedded Systems for CIS students. The workshop will focus on recent topics at the intersection of embedded sciences and communication systems. The aim of this workshop is to give students the exposure to different hardware modules ranging from Arduino boards, Xbee, LAN to GPRS module. Lots of efforts have been made for delivering a quality based workshop. During this workshop students will be divided into groups and each group will be given a kit including Arduino, Sensors, and Xbee board. Along with this kit different sensors and other components required for building small projects will also be provided to students. These kits are especially designed and prepared by KFRL team for this workshop. Besides a complete manual of the workshop has also been prepared and is available online for students to have an access to it. Important thing related to this workshop is, it is free of cost. Students just need to spend their time here for a week and can learn and explore new things. There are maximum 40 seats and students will get registered online. Seats will be assigned on first come first serve basis. Priority will be given to third and final year students.This is just an initial step by KFRL team for creating research and learning based environment in NED University. In future more advanced workshops will be conducted at more frequent rate.

Remote Programming

Remote programming is the ability to re-program sensor nodes remotely through wireless communication. Any wireless sensor node is consist of mainly three parts i.e., sensors (for sensing different parameters), microcontroller (for processing of sensed data), communication module (for transferring of data to coordinator or remote location). Mostly these nodes are deployed in locations where frequent access is not possible. Therefore it becomes difficult and sometimes impossible to control and monitor the deployed sensor nodes. Through remote programming deployed system will become more automate and easy to configure. This give you ease to re-program or made any changes to deployed sensor nodes through over the air programming. One of the most talented members of KFRL team, Muhammad Inshal Uddin, has come up with remote programming solution. He has designed a wireless sensor node which can be easily re-programmed through distant location. Furthermore, interactive application for users has also been designed, so that it becomes easier for them to understand and use the designed system. His future plans are to add more functionality by extending the remote programming from WSN to IoT. Through this system the user will be able to monitor and control his deployed sensor nodes no matter where he is round the globe.

Agricultural Kit

The Smart Agricultural team has designed a kit which is actually a wireless sensor node i.e., fundamental block of wireless sensor network (WSN).The designed Agricultural Kit is capable of sensing, performing data analysis and at the same time forwarding it to the server via XBee module. The most fascinating feature of the kit is that it can be remotely programmed from a distant site. At most 5 sensors can be pinned to the kit while XBee module is interfaced for reliable data transfer to coordinator.

Light Control System

The Smart Home team has come up with initial module of Light Control System for corridors of NED University. The idea is to efficiently utilize electricity and automate the system. The designed module is based on two sensors i.e., light and motion sensor. The function of light sensor is to differentiate between day and night. Since during day time there is natural light therefore there is not any need of artificial lights. During night/ in dark light sensor will activate the motion sensor. Its function is to detect the presence of humans and turn on the artificial lights through smart switch. The future plan is to make this system more efficient and cost effective. This is just an initial step for automating the light systems of corridors of NED University. After its successful implementation the project will be extended to automate complete electrical system of NED University.

Encryption Algorithm Development

The desire for privacy in the virtual realm, data encryption techniques have become widely used to ensure the protection of important information. The Smart Warehouse team has developed implemented an encryption algorithm for secure data transmission since the information need to be protected from non-authorized persons as the control system comprises of valuable vehicles in warehouse. The implemented encryption algorithm is based on RC4 stream cipher and makes use of random permutations.

Submitted Proposals

Around 11 research proposals have been submitted to different funding agencies like ICT R&D, PSF, other national and international funding organizations to further encourage research environment and development in the proposed projects which includes Smart Irrigation, Smart Home, Smart Warehouse and Smart Health.