**ABSTRACT**
This research investigated the possibility of implementing a multifrequency and multiprotocol wire-less smart home node by using Universal Software Radio Peripheral (USRP) and the open-source GNU Radio platform. Such an implementation could provide a high level of interoperability between various devices leading to a higher level of flexibility and easier implementation of current and future smart home standards and protocols.

**NEED AND SIGNIFICANCE**
Modern consumers have an insatiable appetite for technology. Many of these devices use incompatible wireless frequencies and signal structures. From a consumer’s viewpoint, a modern smart home should:
- Provide simple interactive operation for all devices.
- Provide advanced whole-home entertainment
- Provide wide range of services like energy management, multimedia, security, control, communication, and interaction to outside world
- Adapt to multiple users and changing environments

Current Smart Home systems are limited to proprietary wired architecture having high costs, multiple incompatible standards and minimum flexibility.

In this project, we are implementing a multifrequency and multiprotocol wireless access point for the home that allows cognizance, reconfiguration and interaction for wireless devices.

**MATERIALS AND METHODS**
- USRP N210/B100
- Multicore PC with
  - NVidia CUDA graphics card
  - PCI Express bus
  - 1/10 Gig Ethernet
- RF Daughter cards
  - LFTX/RX (0 – 30 MHz)
  - Basic TX/RX (1 – 250 MHz)
  - SBX (440 – 4400 MHz)
- UHD Driver
- GNU Radio Software on Ubuntu

**SYSTEM ARCHITECTURE**

**PRELIMINARY RESULTS**
To demonstrate the capabilities of our system, Digital Video Broadcasting (DVB) and FM applications have been developed.
- Figures 4 and 6 show DVB spectrum, constellation and displays from laptop webcam to the desktop
- Figure 5 shows FM receiver with Radio Data System Decoding

**CONCLUSION**
- Implement Wi-Fi, Bluetooth and other standards
- Use Cognitive Radio to determine and allocate frequencies
- Extend the initial work to utilize CUDA/GPU and parallel computing for complex high-capacity signal format processing – a universal access point.

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