****Cairo University

Faculty of Engineering

Electronics and Electrical Communications Engineering Dept.

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| SMART SPECTRUM SENSING SYSTEM |
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| Prof Dr. Hazim Tawfik |

Hazim.tawfik@gmail.com

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| Student Names | Student E-mail Addresses |
| Ashraf Ibrahim Mohamed Roshdy | irashraf\_e.20@hotmail.com |
| Ahmed Mohamed Ismail | eng\_ahmed\_mohamed\_2008@yahoo.com |
| Ahmed Mohamed Nabih Mohamed | nabieh\_ahmed@yahoo.com |
| Akram Abou El Kasem Ali Kasem | akram\_aboelkasim@yahoo.com |
| Mohamed Ahmed Kamel Mahmoud | murder\_inc\_9873@yahoo.com |

SMART SPECTRUM SENSING SYSTEM

Prof Dr. Hazim Tawfik

**Abstract:**

Wireless telecommunications are growing very rapidly. This leads to increasing the spectrum demanded. Therefore, better utilization of the entire spectrum is needed.

Our objective is to design a smart system aware of its surrounding environment by sensing RF spectrum at different ranges including: Global System for Mobile Communications(GSM) operating at 900 MHz, Digital Cellular System(DCS) operating at 1800 MHz, FM range (88-108 MHz), etc…, and detecting the spectrum holes. Based on specific parameters, it can take the suitable decisions to get the best utilization of the spectrum.

Spectrum sensing can be implemented using two different techniques, namely Energy Detection(ED) or Matched Filter (MF). The added value of this project is the implementation of the two mentioned techniques using GNU Radio and Universal Software Radio Peripheral (USRP).

**CONCLUSION:**

Spectrum is a very valuable resource in wireless communication systems, and it has been an interesting point for research and development efforts over the last

several decades. In this project the challenge of spectrum congestion was discussed. It was found that most of the operators did not use their specified band with the best efficiency. The spectrum-sensing concept was introduced to help in solving this problem. The whole system was implemented using USRP kit and GNU radio software. The system was used to detect the channels and the holes in the GSM band

Energy detection and matching algorithms were introduced to enable spectrum sensing. The energy detection was discussed. A smart method for calculating the threshold of detection dynamically based on environmental measurements was introduced. The results of the energy detector based system were tested and verified using TEMS. Next the waveform-based method was introduced to fix the problems of the energy detection, e.g. the unreliable results of the energy detection under heavy noise.