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|  | INSTITUTE OF TECHNOLOGY BLANCHARDSTOWN |

**B.Sc. in Computing in Information Technology**

**BN302, BN013, BN104**

**Group Project Ideas**

**2014 - 2015**

1. **Luke Raeside**

**Note: I would encourage any group of students to come and talk about your own ideas in the area of software development especially in the area of e-learning, online development, Apps etc.**

**1.1 Daily e-Voting**

**Project Description**

Explore the area of digital voting systems using webpages and mobile apps. Develop a new online voting system that uses emoticons (smiley faces etc.) to express a populist view on a daily topic or several daily topics (the topics can be many and varied but must be organised and stored for long-term statistical analysis). This project must include research into existing sites/apps of a similar nature, the area of cyber-bullying within social networking, social networking, and statistical analysis for voting/polling systems.

**Technologies**

Databases, Java, Javascript, UML, Android IOS

**1.2 Web-based Internationalized E-mail Calendar/Organiser**

**Project Description**

Create a Web-based Calendar/Organiser so that users can receive automatic e-mail (and/or text) reminders about important dates and events which will occur. The system must allow users to register with their details and will subsequently store the individual users' calendar information. The system should also provide for internationalization of the system so that users from different countries can user the site (English, French, Spanish, for example).

**Technologies**

Java, JSP, Databases, XML, UML

**1.3 Web-based Collaborative E-Science related journal entry system**

**Project Description**

Create a collaborative e-Science journal entry system for schoolchildren carrying out science projects. This system aims to support journal entries from groups of schoolchildren attempting to complete a collaborative science project. The system must be capable of registering the students’ names and details and then forming the students into groups and projects. The system will then permit students’ part-taking in a science project to make journal entries that are time-stamped for the duration of a project.

**Technologies**

Java, JSP, Databases, XML, UML

**1.4 Web-based book trading site**

**Project Description**

Create a Web-based Social School Book Trading site. The site should allow Irish students and their parents to post up books that they are willing to trade/sell. The site will require a number of ways to communicate and advertise the books that are requested/available.

**Technologies**

Java, JSP, Databases, XML, UML

**1.5 Web-based Sport (e.g. Golf, Snooker etc.) Club**

**Project Description**

Create a Web-based system for a sport club. This website will allow members to join and record their scores during the course of a season. The scores and handicaps can be centrally administered by the sport club committee as will the fees and membership applications etc. The website should supply a visual score entry system that players can use to record their own personal statistics. It is also possible that a live feed can be broadcast from the “clubhouse”. Obviously I would be open to similar for other sports. The site could also be expanded for notifications of the next 10 events in the club and the e-mail notification of events that are due soon.

**Technologies:**

Java, JSP, Databases, XML, UML

**1.6 Web-based GAA/Football Training Site**

**Project Description**

Create a Web-based GAA/Football training site that advises players/managers on many of the training exercises and drills that could be carried out by the coaches and teams. The site could allow suggestions and perhaps rate the drills.

**Technologies**

Databases, Java, JSP, UML

**1.7 International Student Centered Social Education Network**

**Project Description**

Create a Web-based Social Education Network. This network will be operated by students with experts invited to join and contribute. The network should model the Moodle-type environment except that the students are the main users, i.e., content etc. The system should allow non-anonymous students to register with the site, to add material, invite participants and provide the same type of functionality you would expect from Twitter or Facebook.

**Technologies**

Databases, Java, JSP, UML

**1.8 Web-based XML spreadsheet and graph generator**

**Project Description**

Create a Web-based XML spreadsheet and graph generator. The system should allow the user to enter spreadsheet data (numerical data) into a Web-based spreadsheet system. The system must then store that data entered into XML format. The system will also be capable of reading this data and producing a variety of image-based graphs to represent the data visually.

**Technologies**

Java, JSP, Databases, XML, UML

**2 Simon McLoughlin**

**2.1 Electronic menu system for the JCM Hospital (James Connolly Memorial)**

The catering department at the JCM currently require a smartphone application that will allow patients to choose their meals on a daily basis. Currently this is paper based and the menus are only in English so some non-English speaking patients cannot even read them. This app will be multi-lingual and allow most patients to select their meal using their smartphone or a tablet provided in the ward. There are other features the app might provide too such as stock updates etc or whether a patient is fasting. This is a real world application and the student(s) will be meeting with catering in the JCM so looking for dedicated student(s).

**Prerequisites:** Strong programming skills, Interest in Mobile Application Development.  
  
**Technologies:** Mobile App development (Android, Objective C, Phone Gap), Network Programming, Databases.

**2.2 Language Speed Testing for Image Processing**  
There is quite a bit of debate as to the speed performance of Java vs. .NET vs. C++ for doing computationally expensive tasks such as image processing. This project will compare and contrast the execution time for common image processing routines such as thresholding, edge detection etc. This facility could also be made web-based if time permits.  
  
**Prerequisites:** Good Java/Programming skills. Interest in learning new languages. Interest in image processing.  
  
**Technologies:** Java, C#, C++, Image Processing, Analysis of algorithms.

**2.3 Rangefinding on a plane**

No not the aerial variety, the flat variety. A current problem that exists is how to best find the distance (range) to a point detected in an image under the constraint that the point lies on a plane. The real world equivalent of this is where a vehicle is travelling along a road with a camera mounted on it and it is analysing features on the road, like road markings etc. Frequently, the distance or range to the feature from the camera is required. A number of ways exist to find this but which is most accurate and robust- this project will answer this question.

**Prerequisites:** Good Java/Programming skills. Interest image processing.  
  
**Technologies:** Java, C#, Image Processing.

**2.4 People Detection/Surveillance from a live webcam**  
In this project the student will develop a computer vision based surveillance system that identifies people entering the cameras field of view. The motion pattern of the people may also be extracted to identify suspicious movement. Through Java/C++, a set of images will be provided from a live webcam in real time. The images will then be processed efficiently in Java so that moving objects can be extracted and classified according to their shape or other visual cues. Suspicious movements may also be flagged by analyzing unusual motion patterns. The development for this project will be mainly done in Java with some C programming for image acquisition.  
  
**Prerequisites:** Good Java/Programming skills, Interest in Computer Vision  
  
**Technologies:** Java, Computer Vision Expertise, Hardware Interfacing   
  
**2.5 Image Mining Tool**

The area of Data Mining involves discovering patterns or knowledge in large data sets. These data sets may be numeric, text based, image based etc. When it comes to mining large image sets, the images will typically need to be processed to extract higher level information than the raw pixel data. This higher level information might be object edges, colours, shapes etc. An image mining tool would facilitate this pre-processing and formatting of data so more traditional data mining approaches could be taken on the extracted information.

**Prerequisites:** Good programming skills, interest in Image Processing and Data Mining.  
  
**Technologies:** Java, Image Processing, Data Mining.

**2.6 Golf range finder**  
A valuable tool for the recreational golfer is a range finder whereby they can estimate the distance to the hole through an optical viewfinder. Such instruments are effective when the height of the flag is standard and so its size due to perspective projection reveals the distance to the hole. A similar instrument is proposed based on using a mobile phone camera or a point and shoot camera. The flag may even be located in the digital image automatically using image processing routines and the projected image size and distance to hole calculated using standard formulae. The development will be done in Java (Android).  
  
**Prerequisites:** Good Java/Programming skills, Interest in Mobile Computing and Computer Vision  
  
**Technologies:** Java (Android), Computer Vision and Mobile Computing Expertise.

**2.7 Shank Detection**  
Technology assistance is becoming more and more common in golf swing analysis and improvement. One swing flaw that is difficult to cure and observe by the naked eye is the shank where contact with the ball is made at the point where the club shaft joins the clubhead. Using very high frame rates this project proposes to image the contact zone and analyse the contact location on the clubface with a view to shank detection. This will be done by capturing images of the contact zone using industry standard machine vision cameras. Then the images will be processed using Java to identify the contact location.  
 **Prerequisites:** Good Java/Programming skills. Interest in image processing. Interest in golf an advantage but not essential.  
  
**Technologies:** Java, Image Processing, Machine Vision.  
  
**2.8 Remote Laser Pointer Mouse**  
This project proposes to allow a presenter’s laser pointer to be also used as a remote mouse. This would allow the laser pointer to push buttons, minimize windows, start programs etc remotely. This would be achieved by imaging the projected image of a PC desktop (which could be running powerpoint) and detecting any laser interactions with that desktop. These would then be interpreted using image processing and the correct action invoked (e.g. open an application).  
  
**Prerequisites:** Good Java/Programming skills. Interest in image processing.  
  
**Technologies:** Java, Image Processing, Machine Vision, Windows programming.

**2.9 Mobile Personal Trainer**  
GPS systems are becoming more of a standard than an extra with mobile phones today. This opens up a whole new area of application development based around GPS technology. One such application is that of a personal trainer where GPS measurements are taken from the phone (which may be strapped to a person arm) and used to provide the user with information regarding their progress. This could be in the form of a report at the end of a workout showing details such as how far/how fast a person ran, where they slowed down etc. or could also give intermittent messages via sound or display regarding a persons current speed, milestones etc.  
**Prerequisites:** Good Java/Programming skills, Interest in Mobile Computing and GPS  
  
**Technologies:** Java (For resource constrained devices), Mobile Computing, GPS technology.  
  
**62.10 Headset power monitor on mobile phone**  
One of the few problems with many headsets/hands-free systems is that there is no battery indicator on them leaving the user frustrated when the device runs powerless when they need it most. This project aims to communicate with bluetooth headsets from a mobile phone and obtain information regarding the battery level so this can be displayed to the end user on the phone’s screen. This will involve investigating ways to determine the battery level from a headset, bluetooth information exchange and general mobile application development. This will be done mainly through JME and the Sensor API.  
  
**Prerequisites:** Good Java/Programming skills, Interest in Mobile Computing, Signal processing.  
  
**Technologies:** Java (For resource constrained devices), Mobile Computing, Signal Analysis, Bluetooth protocol.

**2.11 Mobile Stroke Saver**  
This project will present a golfer with helpful information about the current hole they are playing. This could be triggered by GPS information or connection to a web service. The information returned might be about potential hazards, a map of the hole, green contours etc. A 3D fly-by could also be an option.  
  
**Prerequisites:** Good Java/Programming skills, Interest in Mobile Computing  
  
**Technologies:** Java (For resource constrained devices), Mobile Computing Expertise, GPS, networking, graphics.  
  
**2.12 Road sign and Delineation Visualisation**  
There are currently a number of postgraduate students in ITB working on computer vision in the area of road sign and delineation analysis. Essentially this work involves the automatic detection of road signs/lines/studs and the analysis of these objects in terms of their reflective efficiency. A current problem that exists is how to present the processed data in a graphical, colourful way to interested parties. It is proposed that a good approach to this is through Google Earth where kml files will be auto-generated to render these objects in the best possible fashion. Other approaches will also be considered.  
  
**Prerequisites:** Reasonable ability to program, Interest in Geographical Information Systems (GIS).  
  
**Technologies:** Java or .NET framework, Google Earth, KML, Fireworks.  
  
**2.13 Mobile Baby Monitor**  
This project will investigate the feasibility of streaming video from a wireless camera to the end users mobile phone for the purpose of baby monitoring. Ideally this would replace the sometimes large CRT video monitors required to monitor a baby while sleeping. In addition the image could be analysed to identify particular movements.

**Prerequisites:** Good Java/Programming skills. Interest in image processing.  
  
**Technologies:** Java, Image Processing, Machine Vision, Windows programming.

**2.14 Autotrader Search Update (or equivalent search engine)**

Autotrader is the biggest online car sales website in the UK. However when searching for a car you cannot specify new additions. You may only want to see cars that have been posted since your last search or cars posted since a particular date. This tool will save a users search results along with dates etc and when doing subsequent searches will allow the user to specify recent additions only or cars posted beyond a certain date.

**Prerequisites:** Good programming skills, Interest in Web Development, XML etc.  
  
**Technologies:** Java, Web Development.

**Choose your own!**

My area of interest is in Machine Vision/GPS technology/Mobile Computing so would be willing to supervise a feasible and interesting project in these area(s). If you have any ideas, come and talk to me.

**3 Kevin Farrell**

**3.1 Supercomputing Galactic Evolution: a two-dimensional simulation of a gravitational N-Body problem**

## Aims

To study the evolution of a galaxy, one has to simulate the movement, under the force of gravity, of a great many stars in that galaxy. Such problems are called *‘Gravitational N-Body problems’*. To perform realistic simulations, one needs to use High Performance Computing (parallel computing) resources in order to compute the simulation in a reasonable time.

This project has the following main aims:

1. Write a (single-processor) program which simulates, in two dimensions, the evolution of a galaxy using Newton’s law of gravity
2. Write a parallel program to run the ‘galactic evolution’ simulation on either the Department of Informatics NVIDUA GeForce GTX 460 CUDA-based GPU (336 cores) or the HPC Beowulf Cluster (46 nodes)
3. Write a program to visualise the movement of the stars/evolution of the galaxy
4. Test the computational speed-up achievable with the parallelised program.

## Technologies and Skills Involved

* 1. C and/or CUDA C
  2. Parallel Programming
  3. Development on Linux platform
  4. Programming language for visualisation of the simulation; could be, for example: Java, Qt, or some other appropriate language

1. Some basic theory of N-Body simulation

## 3 Hardware Involved

* 1. Standard PC, and
  2. Department of Informatics HPC Cluster or CUDA Server

## Calling all Render Wranglers – Building a Render Farm!

* + 1. ***Aims***

The Department of Informatics has a newly-installed High Performance Computing Cluster (Linux Beowulf Cluster). This cluster consists of one Master node and 45 slave nodes connected via a Gigabit ethernet switch. All nodes are Intel Pentium 4 PCs. Together, these machines can be made act as a single supercomputer, thus allowing the execution of complex programs in a much shorter period of time than would be possible on a single machine.

One use of such a system is the rendering of computer-generated imagery (CGI), typically for film and television visual effects, using off-line batch processing. The images are rendered from a model which is created beforehand using content-creation software, such as Blender. So-called render farms are now common place in the film industry, so much so that the job title of *“Render Wrangler”* frequently appears in film credits! The aims of this project are:

1. to create a render-farm using the HPC cluster
2. create content to be rendered, run it on the HPC cluster
3. test the capabilities of the HPC cluster
   * 1. ***Technologies and Skills Involved***

* Linux system administration
* Distributed render queue managers
* Blender, the free open source 3D content creation suite
* Parallel Computing
  1. ***Hardware Involved***
* Standard PC, and
* Department of Informatics HPC Cluster

**Other Requirements**

Site visit to, and liaison with, one or more GP practices. (Some initial contacts have already been made)

## 3.3 A Linux-Based, Open Source, Electronic Voting System with Voter-Verifiable Paper-Based Audit Trail

* + 1. ***Aims***

To develop a Linux-based, open source, electronic voting system combing a voter-verifiable paper audit trail. Such a system will implement Ireland's Proportional Representation (PR) system, known as Single Transferrable Vote (STV). The system will aim to address the concerns expressed by the *Commission on Electronic Voting* and other groups, such as the *Irish Computer Society*.

## Functionality of the System

The system will, at minimum, consist of the following *secure* components:

* A GUI front-end for the voting booth
* A real-time vote-storage system with contemporaneous vote-backup
* A paper vote printing, visualising and dispensing system.
* A separate vote-counting system

## Technologies and Skills to Learn

* Linux OS
* Linux kernel configuration and compilation
* Linux OS and Desktop Security
* Encrypted Filesystems
* Java, Qt or GTK+
* Voting Systems

## Hardware Involved

* Standard PCs
* Four USB Flash drives

**3.4 Simulating the Spread of the Ebola Virus using a Cellular Automaton Framework**

***1. Background and Aims***

In 2008, research reported that infectious diseases kill more people worldwide each year than any other single cause. Such diseases, also known as communicable diseases, are spread by a variety of means; for example, by touching, breathing, eating, sexual contact, etc. One such disease, which has recently obtained high press-coverage is the Ebola virus, mainly affecting West Africa. On 23 September 2014, the US Centre for Disease Control (CDC) reported that, in the worst case scenario, 1.4 million people in West Africa would contract the virus by 20 January 2015.

The aim of this project is to create a model, based on a cellular automaton framework, to simulate the spread of the Ebola virus through a population, and to study how the disease progresses.

The project has the following main aims:

• Write a program which simulates the spread of the Ebola virus through a population located across a defined geographical area.

• Write a program to visualise the geographical progression of the disease.

• Make predictions about the spread of the disease taking into account external factors; for example: a 'good hygiene' scenario versus a 'poor hygiene' scenario.

1. ***Technologies and Skills to Learn***

• C Programming

• Development on Linux platform

• Cellular Automata

• Simple Epidemic Models

• Programming language for visualisation of the simulation; could be, for example: Java, Qt, or some other appropriate language

1. ***Hardware Involved***

• Standard PC running Linux is sufficient for development work

**4 Orla McMahon**

**4.1 Festival Advisor**

**Project Overview**

This mobile application will allow users to plan and book festivals such as music, comedy, film, in the same way that users use trip advisor to plan a holiday. Users will be able to search for information on festivals using a range of search criteria. They will be able to rate and review festivals and upload their own comments, photos, etc. Users can also share festivals that they are interested in using their own social media website.

**Technologies**

AJAX, JavaScript, XML or JSON, HTML, CSS, PHP. jQuery (or equivalent framework), Web Server such as Apache

**4.2 Online Educational Tool that teaches Irish to Primary School Children**

**Project Overview**

At primary level some students struggle with Irish as a subject.

The aim of this project is to create a fun, interactive online learning tool that will assist children in learning Irish at primary level.

This could involve the use of games, spoken words and sentences, quizzes etc.

This app may also be used in the classroom by the teacher for class activities.

It is aimed at the 4-7 age group.

**Technologies**

AJAX, JavaScript, XML or JSON, HTML, CSS, PHP. jQuery (or equivalent framework), Web Server such as Apache

**4.3 Fitness-For-Life**

**Project Overview**

The ITB Fitness-For-Life is a health and fitness programme that offers students and staff an opportunity to get fit. It is implemented through the sports and management programmes.

The aim of this project is to provide an online app that will record the users training and nutritional progress throughout the programme. The user can check that they are meeting their targets both on a fitness and nutritional level. It will also provide information about assessments, daily and weekly training and nutritional plans and goal setting.

**Technologies**

AJAX, JavaScript, XML or JSON, HTML, CSS, PHP. jQuery (or equivalent framework), Web Server such as Apache

**4.4 IT Hire**

**Project Overview**

Currently there are a lot of IT jobs available in Ireland. As a result there are numerous medium to small companies looking for qualified IT consultants to complete project work.

The aim of this project is to provide a medium whereby both companies/people looking to hire and people looking for work can present their appropriate details.

The pool of data can include project details, timeframe, budgets etc.

It can also include details about people for hire such as experience, cost and reviews.

A blog section may also be included and it may also allow users to get quotes for specific jobs.

**Technologies**

AJAX, JavaScript, XML or JSON, HTML, CSS, PHP. jQuery (or equivalent framework), Web Server such as Apache

**4.5 Life@ITB**

**Project Overview**

The aim of this project is to provide a mobile application that provides a fun and interactive way that describes student life on the ITB campus.

It may possibly be developed for 1st time students as an aid to induction but may also contain information that is relevant to other students.

It can include information such as, a map to navigate around the campus, a customised Google map that will provide directions from various regions, college facilities, clubs and societies, sports facilities including push notifications about various sports activities, student union activities which will also include push notifications about upcoming events, etc.

This project could be developed as a SAAS (Software as a Service) whereby it could be used by other 3rd level colleges through customisation.

**Technologies**

AJAX, JavaScript, XML or JSON, HTML, CSS, PHP. jQuery (or equivalent framework), Web Server such as Apache

**4.6 Problem Aid/Knowledge Share**

**Project Overview**

College life for students involves completing many projects. In some cases quite a lot of time could be spent trying to solve both simple and complex problems.

The aim of this project is to provide a platform that may assist students in solving various problems within subject areas such as Computer Programming. It could be tailored to include a social media platform whereby only class members are allowed to join a specific group. Problems can be listed per subject area, tagged based on concepts and solved by class members. Problems can be rated according to their level of difficulty and solutions reviewed.

**Technologies**

AJAX, JavaScript, XML or JSON, HTML, CSS, PHP. jQuery (or equivalent framework), Web Server such as Apache

1. **Michael O’Donnell**
   1. **Network Simulation using OPNET**

OPNET is a software solution for managing networks and applications. OPNET can create, design and implement scenarios in application troubleshooting, application monitoring, network monitoring, network configuration management, capacity management and network simulation. OPNET software can simulate a wide variety of different networks, which are linked to each other through routers and switches.

There are many possible projects that could be implemented successfully using OPNET. You could use the following ideas as starting points:

* + TCP vs. UDP: influence of different transport protocols on application and network performance
  + TCP Flow Control: influence of window size, MTU, and other parameters on
  + : influence of different queuing mechanisms on delay, jitter, and traffic loss application and network performance
  + TCP Throughput: influence of window size, MTU, and other parameters on application and network performance
  + QoS: Impact of Queuing Policy
  + Comparing a Flat IP addressing scheme with a Hierarchical scheme in Network Design
  + Wireless Network Design
  + Use of MPLS and various routing protocols
  + QoS in MPLS networks
  + Comparison of the performance of different routing protocols in various topologies.
  + VOIP over MPLS VPNs

**5.2 Intrusion Detection Systems**

Intrusion Detection Systems such as SNORT or the Cisco 4215 IDS can be used to monitor networks and to block unwarranted intrusions. There is scope here to investigate the effectiveness of such systems and to customise them to meet new attack patterns from the outside.

One solution is the deployment of Virtual Honeynets using VMWare which has the advantage of running all the systems on a single system.

The student can design and implement a Virtual Honeypot/Honeypot system and customise IDS signatures to protect the network from malware intrusions.

**5.3 Honeypot**

Installing a Honeypot/Honeynet inside your network as an early warning system can significantly improve your security. Malicious hacking of computer networks is on the increase and becoming more sophisticated in their variety and their ability to seriously compromise a network within minutes of unsecured exposure to the Internet.

One solution is the deployment of Virtual Honeynets using VMware which has the advantage of running all the systems on a single system.

Projects here can design and implement Honeypot/Honeypot systems and analyse the data collected by attacks generated by either the student or from the Internet or both.

**5.4 Penetration Security Testing**

Kali Linux, for example, is a penetration testing and security auditing platform with advanced tools to identify, detect and exploit any vulnerabilities in the target networking environment (either Windowed or Linux platforms). You could perform information gathering, discovery, enumeration, social engineering, exploitation, privilege escalation, maintaining access and reporting of any target system.

* 1. **Online Music Store**

**Project Description**

Plan and design an Online Music store that allows visitors register with the application, search for music items by song, album or artist or on multiple combinations of these keywords and view the latest releases and chart toppers. The application will have an administrator’s page that will allow the administrator maintain user details and manage the music items in the inventory.

**Technologies**

JSP, JDBC, Tomcat/Resin, MySQL, SSL

* 1. **Online Banking**

**Project Description**

Your system should aim to incorporate the following services into the functionality of a banking application.

Three key types of services will initially be offered:

* Inquiry Services: These include Balance Updates, viewing lists of transactions and downloading past account history.
* Bill Payment Services: Users will be able to pay bills electronically
* Transaction Services: These include facilities such as money transfers.

A separate mechanism will be requires for administrative functions. The administrator should be able to create new accounts, close accounts, enable online banking for a given customer and cancel bill payment transactions at the account holder’s request.

**Technologies**

JSP, JDBC, Tomcat/Resin, MySQL and SSL

1. **Mark Cummins**
   1. **Secure app investigation and development**

After all the recent Edward Snowdon revelations there has been a lot of security concern around privacy and fear of government spying etc. This has seen a huge increase in the number of apps claiming to offer secure chat or voice services. This project would involve examining and analysing some of these existing apps with a view to confirming or disproving their security and privacy claims. The second element of the project would be to produce and test your own secure privacy app for either IPhone or Android.

**Keywords**: mobile development, cryptography, network forensic, mobile device forensics, privacy

* 1. **SMS messaging services over GSM modem.**

SMS technology is a wide spread technology now. Almost everyone owns a cell phone. SMS can be used very effectively in many scenarios of life. One such application (others could be done) would be a student course notification service. Users could register for the service by sending a message in a preset format giving their course code and year etc. and they would then be registered to receive important course updates such as class cancellations, assignment and exam reminders etc. The system receives the messages either using an SMS gateway or a GSM module. Then the message is processed and the user is sent a confirmation code. Course coordinators could send updates to the system, again in preset formats, for relay onto subscripted students. An additional administration website could also be developed.

**Keywords**: Development, SMS gateway, GSM, Web development

* 1. **Rogue DHCP detector and analysis**

This project aims to develop a program that detects rogue DHCP servers. It monitors traffic on an Ethernet interface and examines DHCP replies. If it notices a DHCP reply from an Ethernet address that is not in its known list of DHCP servers, it informs the user of the situation by alerting the admin, and reporting some of the DHCP options in the DHCP reply.

Additional features, such as a defensive aggressive mode which would automatically attempt to nullify the rogue server by exhaustion of the address pools.

**Keywords**: Development, Networking, Security, DHCP, Monitoring

* 1. **ARP Counterattack vulnerability research**

This program aims to detect and remedy "ARP attacks." It monitors traffic on any number of Ethernet interfaces and examines ARP replies and gratuitous ARP requests. If it notices an ARP reply or gratuitous ARP request that is in conflict with its notion of "correct" Ethernet/IP address pairs, it logs the attack and sends out a gratuitous ARP request and a gratuitous ARP reply with the "correct" Ethernet/IP address pair in an attempt to reset the ARP tables of hosts on the local network segment. The tool should be set to notify registered admins of the attempted attack, and network location.

* 1. **Twitter Trends**

What do people tweet? Draw their feelings on a map to discover trends. In this project, you will develop a geographic visualization of twitter data across Ireland. The generated map could depicts how the people in different counties feel about water charges etc. or particular acts on X factor etc.

Collecting public Twitter posts (tweets) that have been tagged with geographic locations and filtering for those that contain the "xfactor" query term, assigning a sentiment (positive or negative) to each tweet, based on all of the words it contains, aggregating tweets by the county with the closest geographic center, and finally colouring each county according to the aggregate sentiment of its tweets. Green means positive sentiment; red means negative etc.

Other social media profiling or trending options are also possible.

**Keywords**: Development, Social media, Profiling, Twitter, Trending

* 1. **HTTP Headers usage statics and research**

Sites such as <https://Scans.IO/> record HTTP headers for most web traffic with weekly uploads of every internet-facing web server (150m records), including headers and content. This data is available for research and could be used to generate some interesting statics and current web server and web page trends. Detailed analysis of the headers would allow us to created detailed statics of the number of vulnerable webpages, vulnerable plugins, insecure cookies etc. Tis project would be a data analysis project with a view to creating detailed reports on the state of security based on capture http header data.

**Keywords**: HTTP, Data mining, Web, Security, Headers, Statistics