

# AIMRL Project Ideas 2016 – 2017

By

Dr. Syed Waqar ul Qounain

Mr. Kamran Malik

Mr. Anzar Ahmad

Mr. Bilal Shahzad

Mr. Mian Muhammad Mubasher

## Car Data Telemetry

Driving is a safety critical task that requires a high level of attention and workload from the driver. Despite this, people often perform secondary tasks such as eating or using a mobile phone, which increase workload levels and divert cognitive and physical attention from the primary task of driving. Except these distractions, the driver may also be overloaded for other reasons, such as dealing with an incident on the road or holding conversations in the car. One solution to this distraction problem is to limit the functionality of in-car devices. The limiting can take the form of withholding an incoming phone call or delaying the display of a non-urgent piece of information about the vehicle. In order to design and build these adaptations in the car, we must have an understanding of the driver's current level of workload. Traditionally, driver workload has been monitored using physiological sensors or camera systems in the vehicle. However, physiological systems are often intrusive and camera systems can be expensive and are unreliable in poor light conditions. It is important, therefore, to use methods that are non-intrusive, inexpensive and robust, such as sensors already installed on the car and accessible via the Controller Area Network (CAN)-bus. In this project suitable data mining methodology would be investigated human activity monitoring while driving.

## Learning of Optimal Driver Personality Profile

This research project is focused on learning most suitable personality with respect to driving behavior using computational evolutionary techniques. In this project, road infrastructure would be modeled using existing standard road infrastructure formats e.g. [OpenDRIVE](#). On modeled road infrastructure, artificial vehicular traffic population would be generated. The vehicle population would use existing models of acceleration and lane change such as Intelligent Driver Model and MOBIL respectively. Each agent in the population would also have a personality. A relationship between personality and behaviors would be modeled in this project. A performance measure of optimal personality would be identified

and simulation based experiments would be conducted in different contexts using suitable vehicular traffic flow simulator to find out which personality behaves are best.

## Literature Review Assistant

Literature review is an essential part of a research process. A systematic literature review involves systematic acquisition and categorization of research articles already published in the area of interest. Usually literature review is performed to answer following questions: work done so far by research community, potential open areas and possible solution that could be applied. The ultimate goal of this project is to develop a web based tool which completely automates systematic literature review process. The project would involve development of following modules: research project creation, wizard for initial input for systematic literature review such as natural language key words related to research area, data acquisition from web based research repositories (web sites that hosts research papers) and processing, logging of relevant research material, result filtration, notifications upon finding new relevant research articles, admin dashboard, collaboration mechanism for researchers, advance query set support, visualization of research data, ranking of research articles, data and text mining services, visualization of current state of complete research repository.

## Literature Mining

Plain text of a research paper is usually can be found easily however reading a vast amount of research text in form of papers is difficult and time consuming. In this project, it is desired to develop text mining techniques which may harness available scientific literature. Techniques are required that may classify scientific literature in sub-domains. It is also required to learn the information need of the researcher by learning which articles are relevant for researcher and which are not using chunk of literature and help the researcher in filtration of vast amount of literature using that learned information need. It is also required to classify the literature on the basis of problem solved and solution adopted to solve the problem by the articles.

## Empirical Validation of Decision Making in Uncertain Environment

In the current postmodern socio-technical world when machines are everywhere a harmonious relationship between man and machine is essential. The harmony of this relation and survival of this socio-technical world can only be guaranteed if machines can understand the human state of mind and can act accordingly. For this, several computational models of human cognition have been presented in the literature while very few efforts have been made to validate them. In this project a model of trust based human decision making in dynamic environment would be taken from the literature and would be validated against the human decision traces generated through computer based experiments. The results of this experiment would be analyzed to validate that the model under study can be trusted as to be a computational representative of human decision making process with a satisfactory level. In this project evolutionary and exhaustive parameter tuning of model would also be performed.

## E-Voting

The project is a biometric thumb recognition device based voter registration, verification and balloting solution. In this project it would be identified that what kind of hardware infrastructure is required for such a system for voting booths as well as back-end server. Alternative flows would also be designed in case voter's verification is being failed repetitively, it is extremely important to make the system fault tolerant as much as possible. Security of the system would also be a major concern. However fault tolerance and security must not compromise scalability of the solution.

## E-Attendance

A biometric thumb recognition based attendance system is require to be deployed in PUCIT. The mobile thumb verification device must be able to log attendance in offline mode and upon availability of PUCIT intranet must sync all the attendance with CMS. The solution must be cost effective and hassle free. Along with technical solution the project would also provide complete alternative flows, protocols and SOPs how the solution must be used by students and teachers.

## PUCIT Library Management System

Existing PUCIT library management system is a conventional web based tool to manage all the library issues. However it lacks some very important features involving analytics of data. IT is rapidly evolving hence understating needs of students, generating effective help for students, maintaining relevant literature in library and an optimal buying strategy for most relevant and interesting books for library shelves are some but few of objectives. Developing an insight into book circulation data would enable us to develop a library management system capable of achieving some of these objectives..

## Easy Mobile

A suite of applications is required to be developed to make smart phone tasks automated and less human dependant. The suit comprises of five major themes i.e. carrier service manager, SMS based remote smart phone manager, scheduler, parental control and utilities. Carrier service manager provide seamless one click transition and maintenance of data packages. SMS based remote smart phone manager provides services to access and control a smartphone from a simple GPS mobile phone in secure manner so in case smartphone is missing or user don't want to carry their smartphone while going to walk they might access their smart phone and get important notification. Scheduler is responsible to execute tasks on user's behalf on scheduled time, these tasks are not limited to SMS. Parental control provide services to apply pass codes and restriction on application usage. Utilities includes automation of user's chores such as after scratching card users have to insert code, smartphone must scan and apply or store the code for future use as per user desire.

## Student Social Media Network

A social networkis required on which high school students and educators may interact with each other. The social network would allow users to make user profiles. As proposed social media network is for academic activity it would be required to identify appropriate roles and their privileges, the social media network would allow users to form groups, upload statuses with multimedia, chat through private messages, audio and video uploads, for public discussions and questionsa portal just like stack overflow, the social network should also provide sample exercises and sample papers for exam preparations.

classifying idle time and determining cognitive load with help of global behavior data comparison.

## Agile Project Management Tool – Scrum

A web based tool is required for agile project management which should be able to automate SCRUM. In this project, it would be required to explore state-of-the-art free and open source software solutions. Selection of solution must be systematic. After selection of the solution, the solution would be deployed locally to be used by AIMRL BS, MPhil and PhD projects. Solution would be modified according to local needs generated by AIMRL and PUCIT. As data logged in this solution would be very important to investigate life cycle of a particular project hence backup and restore protocols has huge significance. Development of flawless backup and restore protocols and routines would be carried out. For research and analysis purposes export tools would be developed to export project life cycle data. It would be extremely important to provide maintenance and technical support to all the projects that are using this solution.

## GIT Server

GIT is a protocol to collaboratively work on software development projects, though it could be used with any type of document if more than one person want to work on it collaboratively. Local hosting of GIT server with web based UI is required for AIMRL and PUCIT BS, MPhil and PhD projects. In this project, it would be required to explore state-of-the-art free and open source GIT servers (solution). Selection of solution must be systematic. After selection of the solution, the solution would be deployed locally to be used by AIMRL BS, MPhil and PhD projects. Solution would be modified according to local needs generated by AIMRL and PUCIT. As data logged (codes, documents, revision histories) in this solution would be very important for all the research and development projects hence backup and restore protocols has huge significance. For research and analysis purposes export tools would also be developed to export project activity data. It would be extremely important to provide maintenance and technical support to all the projects that are using this solution.

## Zotero server

A web based tool is required for collaborative research article writing. Zotero is desktop tool with a plugin for all major web browser, while researcher is searching an article, upon finding an article researcher can store all the important information (bibliography) in Zotero directly from web browser just pressing button. Later that important information can be used in a Word document (research paper) by a single click. However if two or more than two researcher are working on a same document sharing of bibliographies become very difficult. Zotero does come with a backend collaboration server however bibliographies related to an unpublished article are always sensitive hence that data could not be posted on that server. In this project, it would be required to explore state-of-the-art free and open source backend collaboration server. Selection of solution must be systematic. After selection of the solution, the solution would be deployed locally to be used by AIMRL BS, MPhil and PhD projects. Solution would be modified according to local needs generated by AIMRL and PUCIT. As data logged in this solution would be very important for all the research activities hence backup and restore protocols has huge significance. For research and analysis on research interests of PUCIT and AIMRL data export tools would be developed. It would be extremely important to provide maintenance and technical support to all the projects that are using this solution.