**Project SYNOPSIS**

**On**

**Optimal Scheduling of Automated Diagnostic Self-Tests in an MRI Scanner System**

**SUBMITTED BY**

**BHARATKUMAR M 1MS12CS017**



**M. S. Ramaiah Institute of Technology**

**(Autonomous Institute, Affiliated to VTU)**

**BANGALORE-560054**

**Department of Computer Science & Engineering**

***Under the guidance of***

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| **Sameer N. Navaratna**  **Software Architect**  **MR Serviceability**  **PIC ADI Magnetic Resonance 2**  **Philips Innovation Campus**  **Bangalore** | **&** | **Mrs. A. Parkavi**  **Assistant Professor**  **Department of Computer Science & Engineering** |

**Details of the organization**

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| **Details of the organization**  **(with postal address):** | **Philips Innovation Campus  Manyata Tech Park,  Nagavara,  Bangalore - 560045  India** |
| **Name of Guide with contact details and email address:** | **Sameer N. Navaratna**  **+91 9480609330**  **Sameer.NarayanNavaratna@philips.com** |
| **Date of commencement of the project:** | **12th January, 2016** |

1. **Introduction**

Magnetic Resonance Imaging (MRI) is one of the youngest and most innovative imaging technologies and is growing in applications but also in complexity of the system. MR has a large software presence in the Philips Innovation Campus, Bangalore, producing state of the art software driving MR workflow, post-processing, reconstruction and serviceability. This project concerns itself with the serviceability aspect of the complex MR system.

1. **Need for the project**

MR Imaging System contains certain Automated Diagnostic Self-Tests which diagnose the functioning of the system, and provides the information about any malfunctions within the system components (hardware and software) which can potentially hinder the proper operation of the system. These diagnostic self-tests are currently scheduled at a preconfigured fixed time every day and also there will be additional tests running at the beginning of every month (at a preconfigured time). These Self-tests acquire many of the MR system resources, some of which are required for scanning of patients (the primary objective of the MRI scanner). As a result, when these pre-configured tests are executing, the system cannot be operated for clinical use leading to patient inconvenience (especially emergency scans), and dissatisfaction of the customers (hospitals) due to the unavailability of the system for its primary intended purpose. My project provides a unique solution to optimally schedule these predefined automated diagnostic self-tests.

1. **Objective**

**Goal**: Develop one or more independent or hybrid mechanisms described below to optimally schedule the automated diagnostic self-tests on the MR System.:

* Develop and Enhance the existing User Interface to indicate the impending start of the diagnostic self-tests.
* Developing a User Interface for the clinical user to postpone the self-tests.
* Developing a User Interface for the clinical user to configure the timing at which the diagnostic self-tests can be scheduled to be executed.
* Developing an automated scheduling algorithm which continually analyses the system usage pattern and based on this, automatically/dynamically schedules the diagnostic self-tests.
* Developing an automated scheduling algorithm which schedules the diagnostic self-tests based on the clinical use schedule for a particular day.
* Implementing a hybrid approach combining elements of each of the above.

1. **Methodology**

The project shall be carried out as follows:

* Understanding how Windows tasks are scheduled, controlled, and how they can be manipulated. Learning the ways of programmatically controlling the scheduled tasks.
* Understanding how nightly & monthly self-tests are scheduled on the MR scanner.
* Understanding how the tests are scheduled, which are the scripts used, how they are invoked, what are the operations performed by these self-tests, and how long they run
* Understanding the scripting mechanism used in the scheduling of these self-tests and creating a list of these scripts with details of the operations performed by these self-tests.
* Learning how to to optimally schedule these predefined automated diagnostic self-tests.
* Developing design alternatives to address the identified objectives.
* Selecting the appropriate design alternative, and finally implementing the chosen solution.
* Verification and Validation of the developed solution.