Mandatory Internship Report

Hochschule Rhein-Waal

and

Siemens Healthineers Innovation Think Tank Mechatronic Products

Faculty of Technology and Bionics

Mechatronics Systems Engineering

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Syed Mustafa Mohiuddin (26293)

Supervised by:

Dr. Kerim Kara, Siemens Healthineers, ITT Global Head

Dr.-Ing. Stéphane Danjou, Hochschule Rhein-Waal

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Declaration of Authenticity

Declaration

I, Syed Mustafa Mohiuddin, declare that the research work presented here is from the best of my knowledge and belief, original and the result of my own investigations. The cooperation I got for this research work is clearly acknowledged. To the best of my knowledge, it does not contain any materials those are written by others or published already except mentioned with due references in the text as well as with the quotation marks. This work has not been published, submitted, either in part or whole intended for reward, degree at this or any other University.

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Internship Report Approval Page

I, the undersigned, confirm that I have reviewed and evaluated the internship report submitted by Syed Mustafa Mohiuddin for the completion of Internship at Siemens Healthineers AG. After a thorough examination of the report's content and quality, I am satisfied with the work presented. I acknowledge that the report accurately represents the work completed during the internship and fulfills the academic or professional requirements set forth for this internship program.

S*upervisor's Signature* ____

1 Foreword and Acknowledgements

This internship report was created describing the tasks performed during my internship at Innovation Think Tank Mechatronic Products (ITT MP) located at Siemens Healthineers (SHS), Kemnath. The internship lasted from April 2024 to August 2024 as a part of the mandatory internship requirement by Hochschule Rhein-Waal.

I would like to express my sincere gratitude to Siemens Healthineers AG for granting me the opportunity to work as an intern. The knowledge and skills I gained during my time there, including working with new technologies, creating physical prototypes, and managing projects, have been incredibly valuable. I want to extend a special thanks to Prof. Haider and Dr. Kerim Kara for giving me the chance to be part of their diverse team. I also want to acknowledge the constant support and assistance from the coordinators - Mr. Konstantinos Gkekas and Mr. Bernd Niklas Axer. Their willingness to share their knowledge and insights played a significant role in my professional growth. This internship at Siemens has given me real-world exposure to projects and has contributed greatly to my development as a professional. Moreover, I would also like to thank Dr.-Ing. Stéphane Danjou from Hochschule Rhein-Waal for being my supervisor and for providing me guidance and support at times of need, in addition I would like to thank my colleagues at ITT MP for such a warm welcome into the team and assisting me in projects.

2 Company

2.1 Profile

Siemens Healthineers AG, a pioneering global medical technology firm headquartered in Erlangen, Germany, is recognized globally for its transformative contributions to healthcare. With over 71,000 employees worldwide, the company is backed by an annual research and development investment of €1.5 billion and about 24,000 technical intellectual property rights, including more than 15,000 granted patents, constantly bring breakthrough innovations to market, SHS has more than 71,000 employees in over 70 countries that are shown in Fig. 1.1 to innovate and shape the future of healthcare [1]. Its strategic accomplishments underscore innovation and operational excellence. Siemens Healthineer's advanced medical imaging and diagnostic solutions make it an influential player in global healthcare. The company's diverse facilities are strategically distributed across continents, symbolizing its commitment to serving diverse markets. Through its unwavering dedication to innovation, Siemens Healthineers continues to redefine medical technology's impact on patient care and diagnostics.

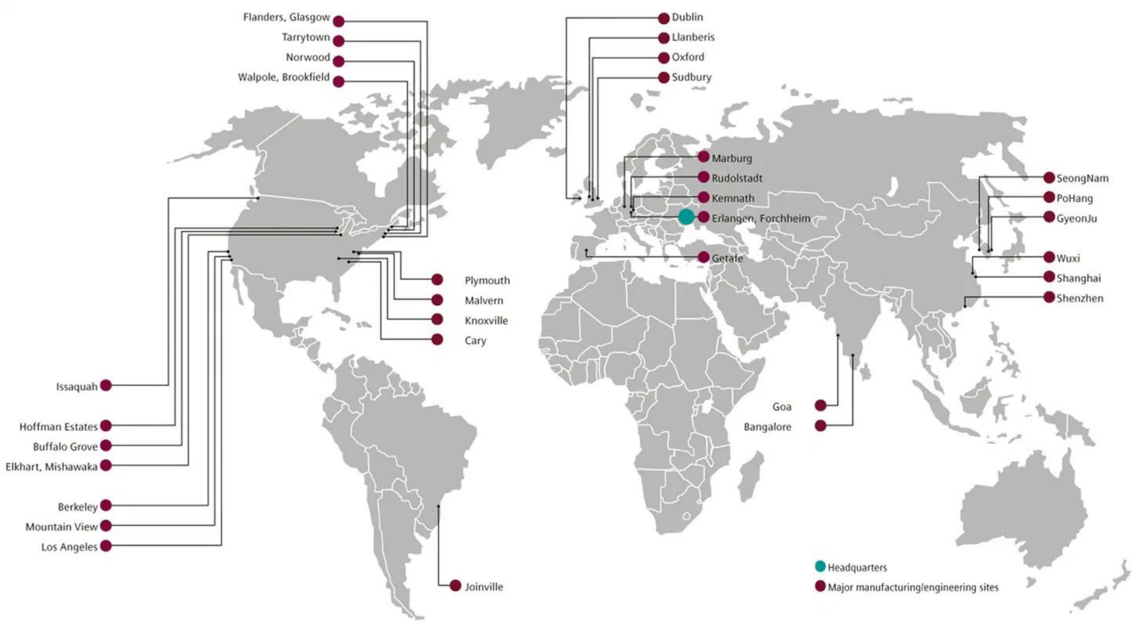

Figure 1.1: Geographical Distribution of Siemens Healthineers Facilities [1]

The plant facilities located in Kemnath which has now become the world's largest location for mechatronics in the field of imaging medical technology has dated back to early 1962. The site has a complete process and competence chain, beginning in innovation, development, production, assembly, and system testing to commissioning in the hospital. With the guiding principle of the Kemnath location, "Emotion in motion', the site was awarded with "Factory of the Year" in 2012 for "Outstanding Change Management" for successfully restructuring of technology production with close involvement of the employees.

Figure 1.2: Siemens Healthineers Location in Kemnath[2].

2.2 Innovation Think Tank at Siemens Healthineers

Established in 2005, Innovation Think Tank (ITT) is part of the Chief Technology Office of SHS. ITT is an interdisciplinary and self-sustaining infrastructure within the organization that focuses on innovation by implementing the ITT Framework and is accessible for the company founded and lead by Professor Sultan Haider [3]. As a global infrastructure, multiple innovation labs and Innovation Think Tank programs can be found across the globe addressing projects from within SHS and host institutions. ITT MP is one of the innovation labs located in the SHS facility in Kemnath. Comprised of a diverse and transdisciplinary team of designers and engineers from different fields, ITT MP has continuously contributed to defining, shaping, and the positing of the Product Management (PRM), Research and Development (R&D) and Supply Chain Management (SCM) through over 960 project modules with Siemens Healthineers Mechatronic Products (SHS MP) since 2010.

ITT aims to drive healthcare innovation to improve patient outcomes and experiences. By focusing on patient-centric solutions, ITT advances technologies that help healthcare providers deliver superior care. Their services include technology analysis, competitor insights, market trends, and solution development. ITT's skilled team uses data-driven methods to create transformative solutions in medical imaging, diagnostics, healthcare IT, and other areas.

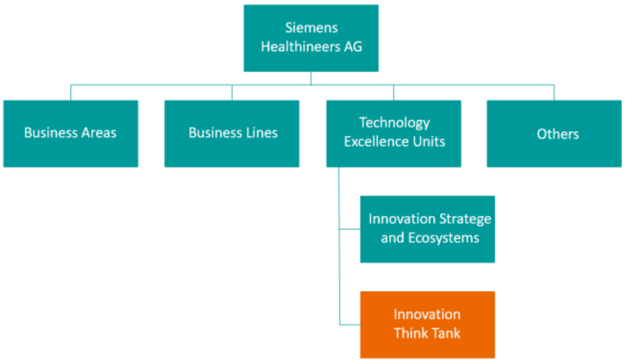

Figure 1.3: Organizational structure of Innovation Think Tank in Siemens Healthineers

2.3 Products and Market

Present in more than 70 countries around the globe, SHS portfolio is at the center of treatment pathways and clinical decision-making processes. The modalities provided are within the scope of

- **Imaging**: As a market leader in diagnostic imaging, SHS provides systems used for angiography, computed tomography (CT), fluoroscopy, magnetic resonance imaging (MRI), molecular imaging, x-ray, ultrasound and imaging software.

- **Laboratory and point of care Diagnosis:** SHS offers services that support the needs of laboratories and healthcare facilities in laboratory diagnostics in conjunction to automation, informatics, and services. The spectrum includes immunoassay, chemistry, hematology, molecular, and urinalysis testing.

- **Advanced Therapies:** Supporting advanced therapies, SHS provides high-end angiography systems, mobile C-arms and hybrid operating rooms to empower innovative therapy concepts and minimally invasive procedures.

- **Cancer Care: Varian Solutions**: SHS's Cancer Care segment, through Varian, provides advanced radiation therapy systems and treatment planning software. Key offerings include linear accelerators for precise radiation delivery, Eclipse planning software for optimal treatment design, and motion management systems to enhance accuracy. These solutions are essential for delivering effective, personalized cancer care.

- **Services:** In ensuring well performing systems, trained staff and optimized processes, SHS is a trusted partner to provide the customer's confidence in delivering the right diagnosis to patients.

3 Internship Description

3.1 Activities

During my internship at ITT MP, I was tasked with developing proof-of-concept solutions for healthcare challenges using ITT methodologies. My role involved contributing to multiple projects, including collision avoidance systems and angular detection for x ray-collimator. The internship provided a dynamic work environment, alternating between office-based tasks and remote work, facilitating a balance between collaboration and independent research.

3.2 Working Conditions and Functions

- Location: Siemens Healthineers AG, Kemnath, Germany
- Duration: 01. April.2024 – 16. August.2024 (20 Weeks)
- Working hours: 8:00 AM to 4:00 PM

The initial 2 weeks were dedicated to onboarding tasks and watching informative Learn4u videos. These videos offered detailed overview of medical procedures and Siemens-related offerings, providing a very productive understanding of the field. The work atmosphere was conducive to productivity and balanced work-life integration. Adjusting to this new work scenario was seamless, largely thanks to the supportive and welcoming team. Overcoming language and cultural differences was easier than anticipated, as my supervisors and coordinators readily provided guidance.

My internship encompassed a diverse range of impactful tasks, contributing significantly to my professional growth. Notably, I developed essential teamwork and communication skills. Working alongside colleagues from diverse backgrounds enhanced my collaboration abilities and effective communication across cultures.

This internship broadened my horizons and gave me practical skills for a global work environment. Following section goes into the projects.

4 Projects

4.1 Active Collision Avoidance System for Nexaris Angio-CT Sliding System

4.1.1 Project Description

The Active Collision Avoidance System (ACAS) for sliding CT gantries is a significant advancement in medical imaging productivity and safety. The smooth motion of the sliding CT gantry is crucial to the current diagnostic and interventional services, such as angiography or CT scans. However, these systems can be hazardous due to their dynamic nature. Accidents involving patients, staff, or equipment are a constant risk. These risks can cause potential equipment damage, higher maintenance costs, workflow disruptions, and safety issues.

Figure 1.4: Nexaris Angio-CT Sliding System [4]

The ACAS project was formed to provide a solution to these challenges by developing an advanced sensor-based system capable of real-time obstacle detection and response. The key concepts of this project were to create a solution that could comfortably coexist with today's Sliding CT gantry systems, improving safety, operational efficiency and bring down maintenance costs.

To address certain limits, the project focused on implementing an advanced sensor-based collision avoidance system that could detect and respond to obstacles in real-time. It aimed to revolutionize the safety, efficiency, and reliability of sliding CT gantry operations by incorporating cutting-edge sensor technology. This system was designed to maximize the safety of sliding CT gantries and provide a more secure and streamlined experience for medical personnel and patients.

4.1.2 Task Description

The project involved several key tasks. The project for Sliding CT gantry was already in development and a new collision avoidance feature was to be added. Initially analyze the medical imaging workflow environment to identify potential collision scenarios and safety risks, considering the movement of equipment and personnel. Then, develop detailed use cases to guide the design of the collision avoidance system, covering various room layouts, obstacles, and operator interactions. Select, program, and configure a suitable sensor, for real-time obstacle detection, and integrate it with the sliding CT gantry. Design a 3D model of the sensor mounting bracket using Siemens NX CAD software and 3D printing the designed part, including designing an electrical schematic and soldering for connecting the sensor to the indicator. Integrate the system and test the system to make sure the obstacle detection was accurate, and the system have minimal amount of false alarms. The final step of the study was to deploy the system in an operational medical imaging suite, gather operator feedback, refine the system, and introduce the intervention.

4.1.3 Tools / Methods Used

1. Sensors:
    - Nano Scan 3 Pro from SICK: 2D Lidar Sensor chosen for its accuracy and reliability in real-time obstacle detection for our developed use cases.

2. Configuration Software:
   - Safety Designer Software: Used for configuring the detection field and the electrical schematic and ensuring its effective integration with the CT gantry.
   - Siemens NX: Utilized for designing the 3D model of the sensor mounting bracket.
3. Tools:
   - Soldering wires
   - Ultimaker Cura for 3D Printing
4. Testing Methods:
   - Simulations: Tested the system under various scenarios to assess performance and reliability.
   - Field Testing: Deployed the system in real-world environments to validate its functionality and gather operator feedback.

4.1.4 Project Goals

The ACAS initiative was developed with a variety of primary objectives in mind, each of which were oriented towards optimizing safety, efficiency, and reliability in the context of medical imaging environments. The primary objective was to increase safety by operating to avoid potential collisions with the slider on the CT gantry or other obstructions that might be present in the Operating Room, thus ensuring a safe environment for both patients and staff This could only be achieved by developing and implementing a system capable of detecting obstacles in real-time, while providing the appropriate response to minimize potential uncertainties and prevent avoidable accidents and injuries.

One additional goal was aimed at the optimization of efficiency and reducing interferences to workflow due to false alarms notifying a change of the gantry system. There was a need to have an algorithm to determine immediately if an object was a barrier to continued operation.

The aims for reducing maintenance costs were very important. One-way to protect the equipment and have it operated for a long time without much need for maintenance is to avoid and prevent any potential bumping, wear, or distress on the equipment.

4.1.5 Project Approach

1. **Initial Analysis and Design:**
    - Conduct a thorough workflow analysis to identify potential collision scenarios and define system requirements.
    - Develop use cases to guide system design and functionality.

2. **Sensor Selection and Configuration:**
    - Researched and evaluated sensor technologies and selected the Nano Scan 3 Pro.
    - Configure the sensor using Safety Designer software and integrate it with the CT gantry.

3. **Design and Implementation Stack light of Mounting Bracket:**
    - Design and print a 3D model for the sensor mounting bracket using Siemens NX and Ultimaker Cura for 3d printing, ensuring flexibility and precision in sensor positioning.

4. **Integration and Testing:**
    - Soldering the sensor system with an indication stack light and performing simulations to test performance.
    - Conduct field testing in medical imaging environments to validate effectiveness and gather operator feedback.

5. **Refinement and Finalisation:**
    - Refine the system based on field test results and feedback.
    - Finalize the design and prepare for deployment.

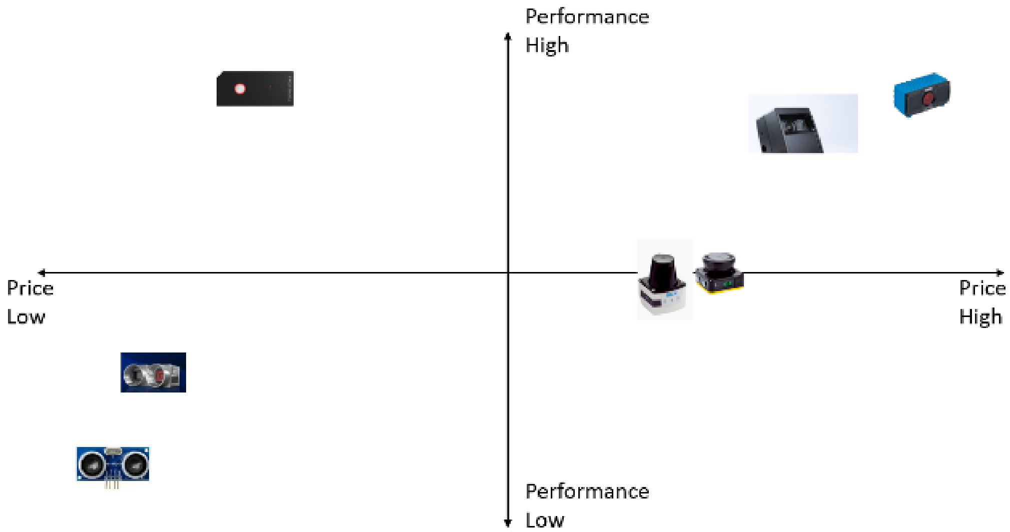

Figure 1.5: Sensor Selection Grid.

Detection Field	Possible Scenarios: Ceiling mounted equipment : • Ceiling monitors • Ceiling OT lights • Radiation shield	Floor mounted equipment : • Roller container • IV stand • Anestheisa Equipment • Radiation shield	Moving personel: • Gantry operator • Patient • Mediacal staff	Low lying / Fallen objects : • Gloves • Dust Bins • Tissues • Wires • Components in OR(sharp instriments,head rest)	Reverse Movement of going back to rotation area
3D Lidar #1 (with Brush)	✓	✓	✓	✓	✗
3D Lidar #2 (with Brush)	✓	✓	✗	✓	✓
3D Lidar #3 (with Brush)	✓	✓	✓	✓	✗
2D Lidar (with Brush)	✓	✓	✓	✓	✗

Figure 1.6: Sensor Selection Research.

The sensor I selected was nano Scan 3 pro from SICK. Once the sensor was selected, I configured it using Safety Designer software with a stack light and integrated with the sliding CT gantry. This phase required meticulous calibration to ensure optimal sensor coverage and accuracy.

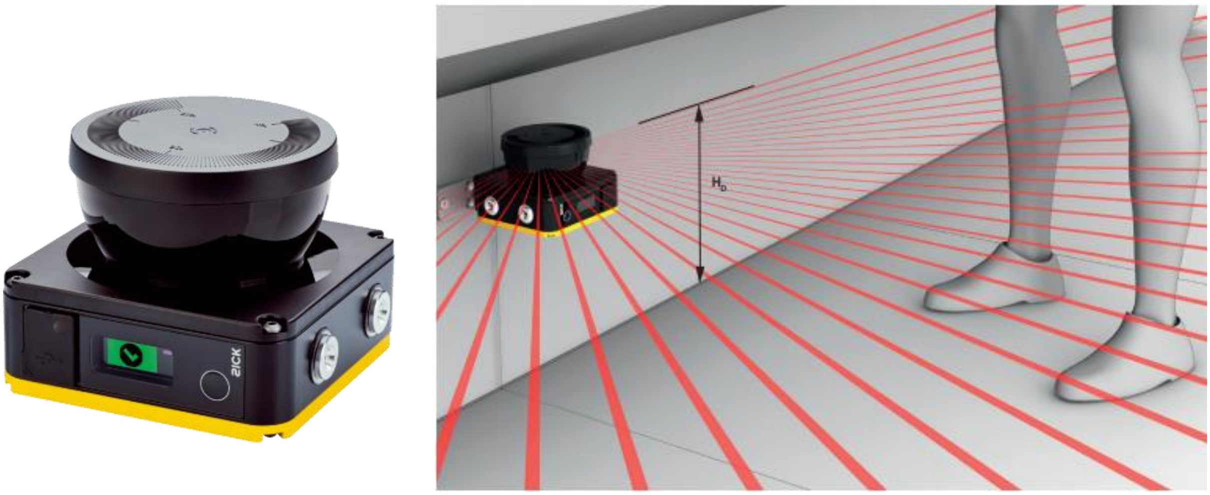

Figure 1.7: nano Scan 3 pro [5]

Extensive sensor testing followed by verifying the sensor's performance in accurately and reliably detecting obstacles. The tests included simulations of various scenarios outlined in the use cases, ensuring that the system could handle different obstacles and conditions without false alarms or missed detections .

Figure 1.8: Safety Designer Software logo.[6]

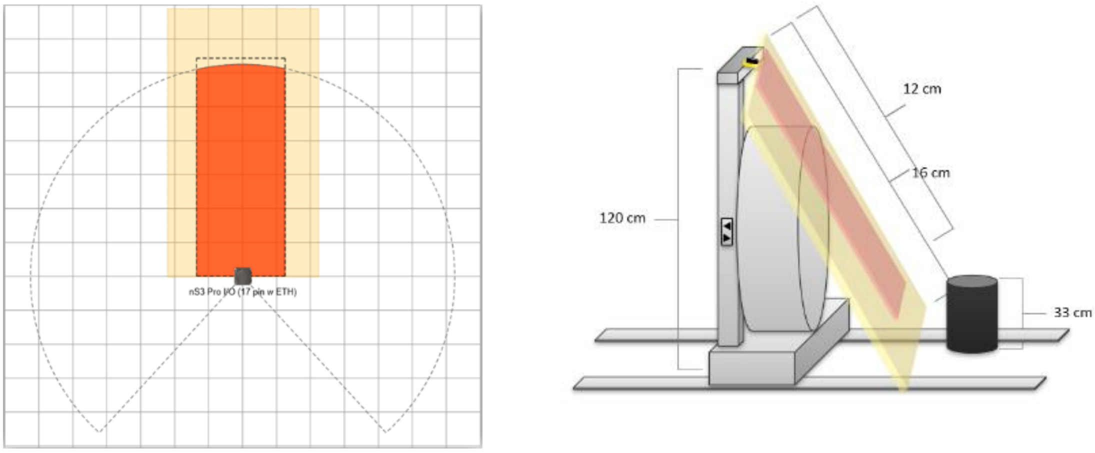

Figure 1.9: Detection field configuration on the gantry (not to scale).

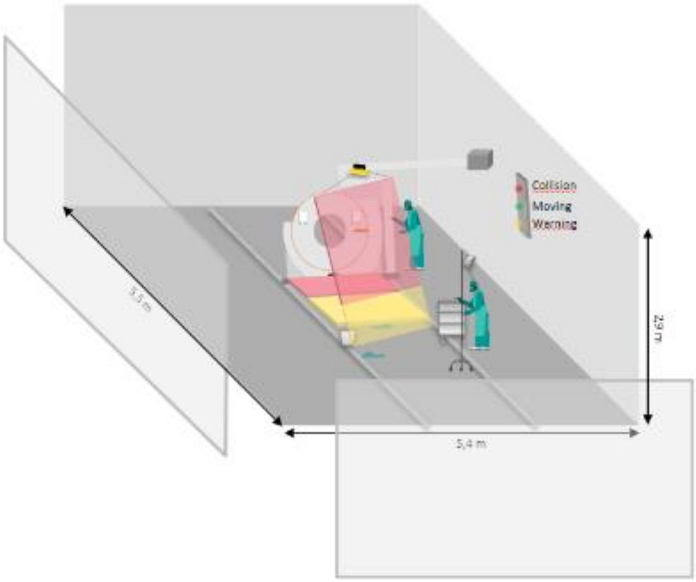

Figure 2.0: Operation Room layout with ACAS.

4.1.6 Testing stage:

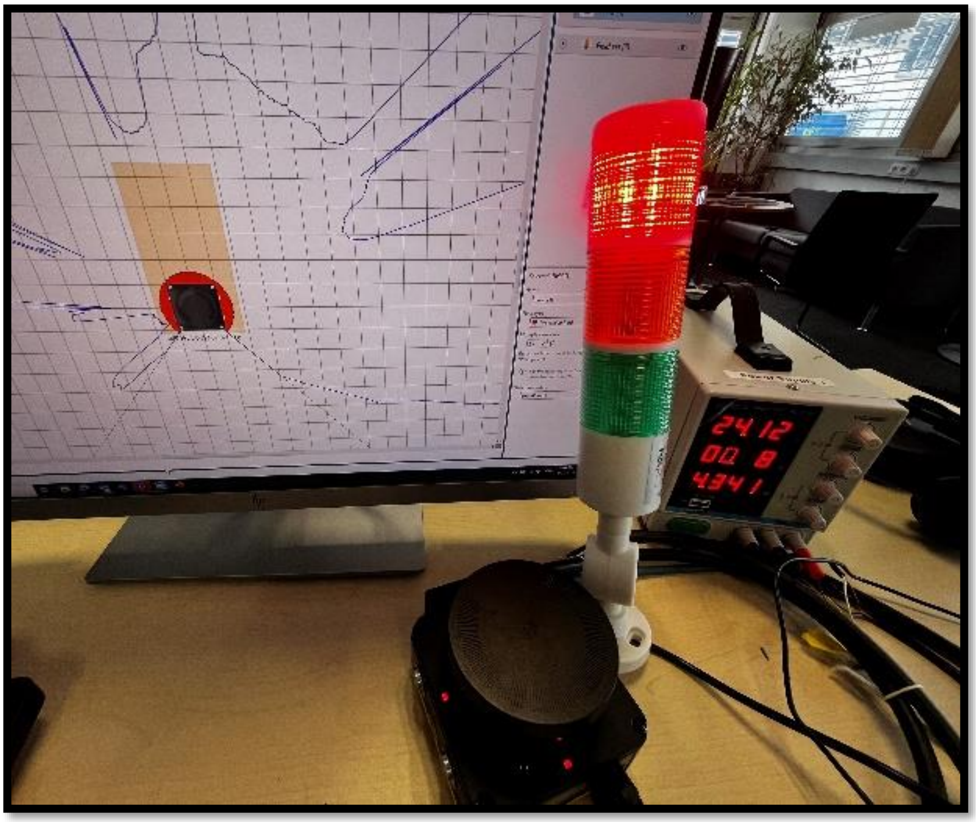

Figure 2.1: nanoScan3 configuration with stack light

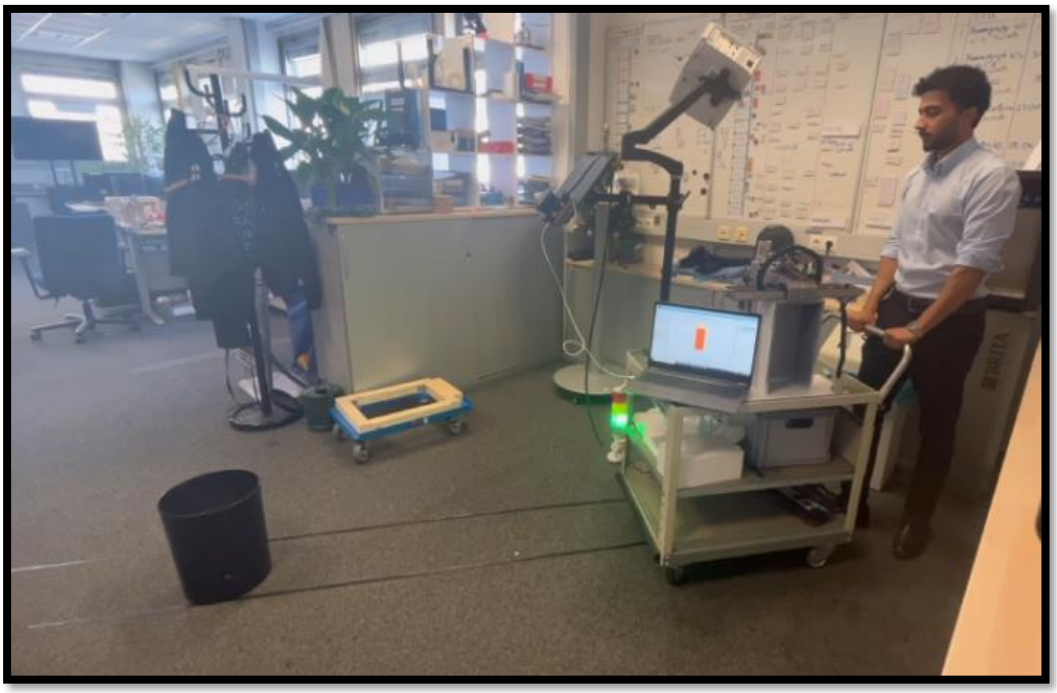

Figure 2.2: Testing Setup with an obstacle and indication stack lights.

An important part of this integration involved the design and development of a 3D model for a mounting bracket for the sensors using Siemens NX an advance CAD software, then printed a 3D model that allows the bracket to support three degrees of freedom (3 DOF). This construction ensures the alignment and the sensor location to make sure they were able to capture the necessary data, even at different angles. The 3D model makes it easier to install and adjust in the field and allows for a variety of gantry configurations, aiding in the adaptability of the system.

Figure 2.3: Siemens NX Logo.

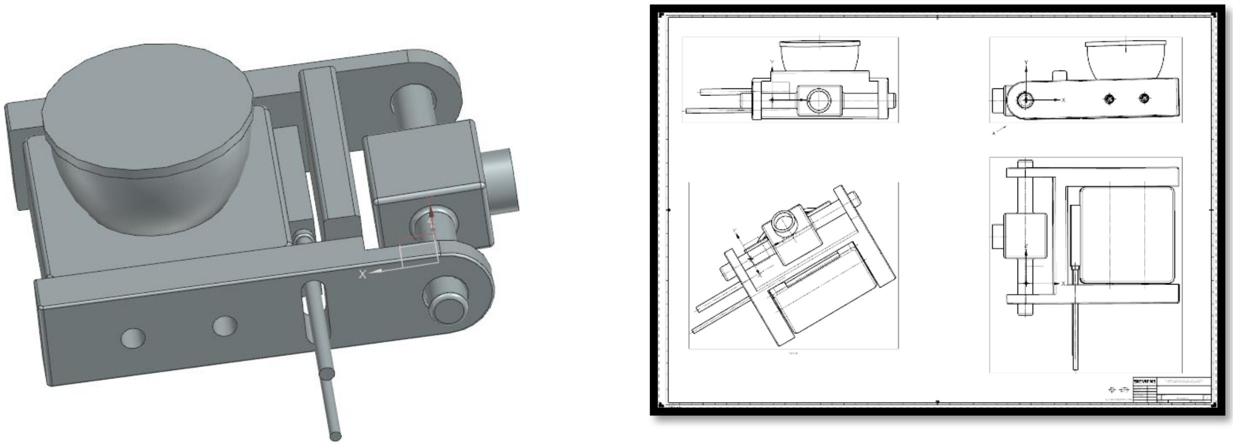

Figure 2.4: Mounting Bracket CAD model.

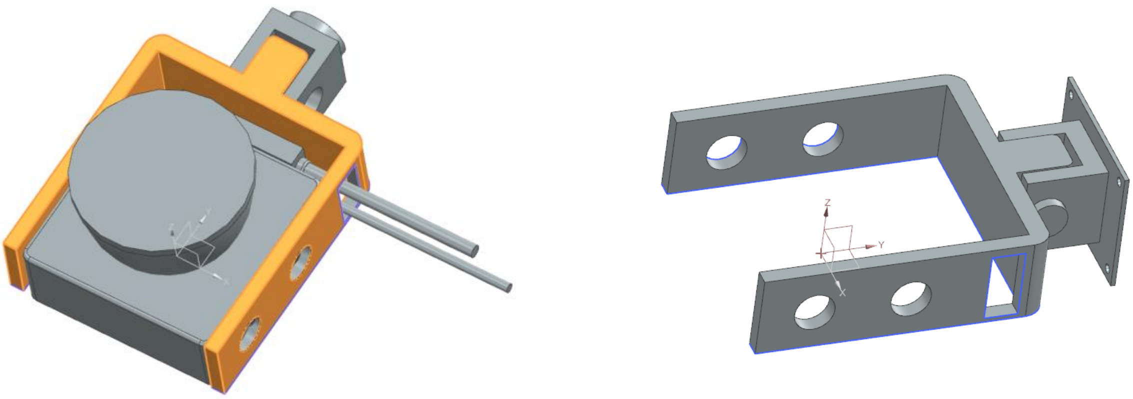

Figure 2.5: Second Mounting Bracket CAD model.

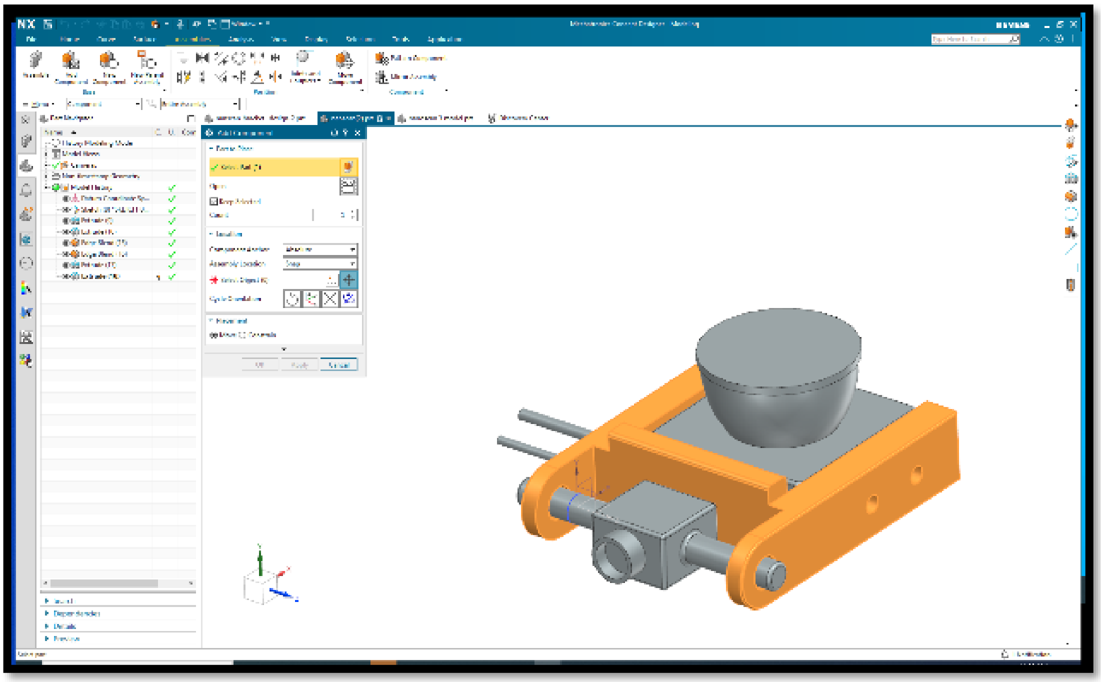

Figure 2.6: Mount Design on NX.

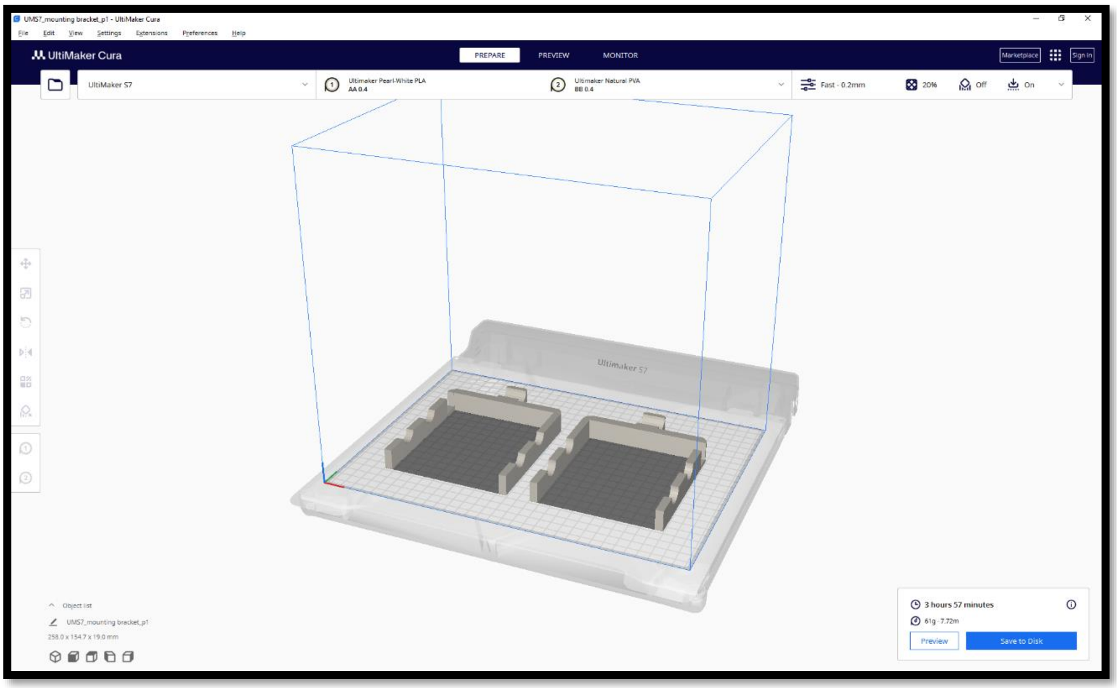

Figure 2.7: Ultimaker Cura 3D Print.

Throughout the testing to analyze the system in a real-world environment, specifically, deploying the system in an actual medical imaging setting to validate the system's performance in an actual environment was the final phase of the project. The results of the testing phase provided a valuable understanding of the system's effectiveness and usability, as well as getting feedback from operators and stakeholders that has allowed me to make further refinements and adjustments.

4.1.7 Conclusion

The Active Collision Avoidance System for Nexaris Angio- CT Sliding project successfully addressed critical safety and efficiency concerns in medical imaging environments. The project achieved its goals by enhancing safety, reducing maintenance costs, and improving workflow efficiency through advanced sensor technology and intelligent system design. The structured approach, including thorough analysis, precise sensor selection, and extensive testing, ensured that the ACAS met the demands of modern medical facilities. The integration of the Nano Scan 3 Pro sensor and the design of a customizable mounting bracket demonstrated the potential of advanced technologies in transforming healthcare environments.

Overall, the ACAS project exemplifies the effectiveness of combining cutting-edge sensor solutions with thoughtful system design to enhance safety and operational efficiency in critical medical imaging applications.

4.2 Collimator Rotation Angulation Detection

4.2.1 Project Description

The primary objective of the project was to develop a system for detecting and visualizing the rotation angulation of an x-ray collimator. Collimators are essential in various fields, particularly in medical imaging and radiation therapy, where precise alignment is crucial for accurate results. For this project, the Bosch Cross Domain Development Kit 110 (XDK) sensor kit was used to monitor the orientation of the collimator. The goal was to create a reliable system that not only measures the rotation but also integrates multiple sensors to enhance accuracy and visualization of the data.

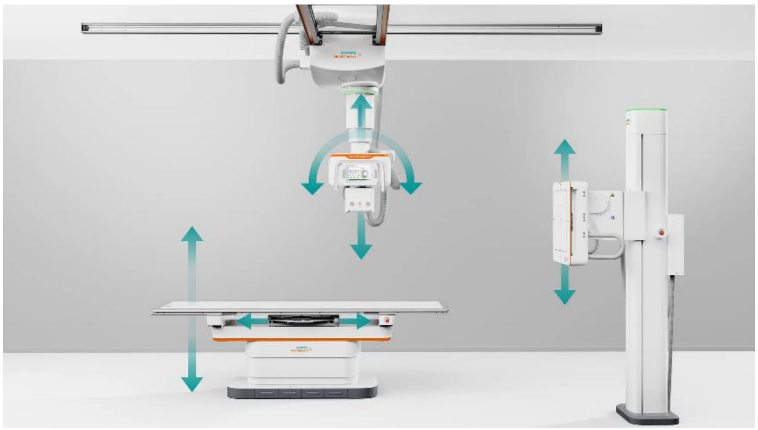

Figure 2.9: x-ray collimator movement. [7]

Figure 3.0: x-ray collimator setup. [7]

4.2.2 Task Description

The project was divided into several key phases:

1. **Understanding the Infrastructure and Sensor Familiarization:**
    - Understand the concept of why we need and angulation detection for x-ray collimator and develop its use cases.
    - Acquired detailed knowledge of the Bosch XDK110 sensor kit, including its technical specifications and operational principles.
    - Set up the sensor and familiarized myself with its software environment and communication protocols.

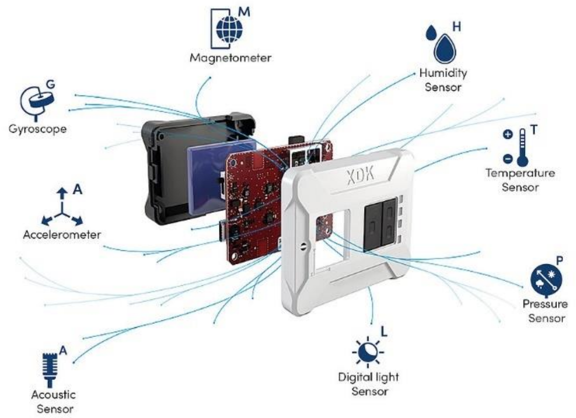

Figure 3.1: XDK 110 capabilities. [8]

2. **Code Development for Orientation Visualization:**
    - Develope a code to process sensor data and visualize the orientation of the collimator using a combination of Gyroscope, Accelerometer and Magnetometer. This involved interpreting raw data from the sensor to determine rotational angles.
    - Implemented algorithms to convert sensor readings into meaningful orientation information.

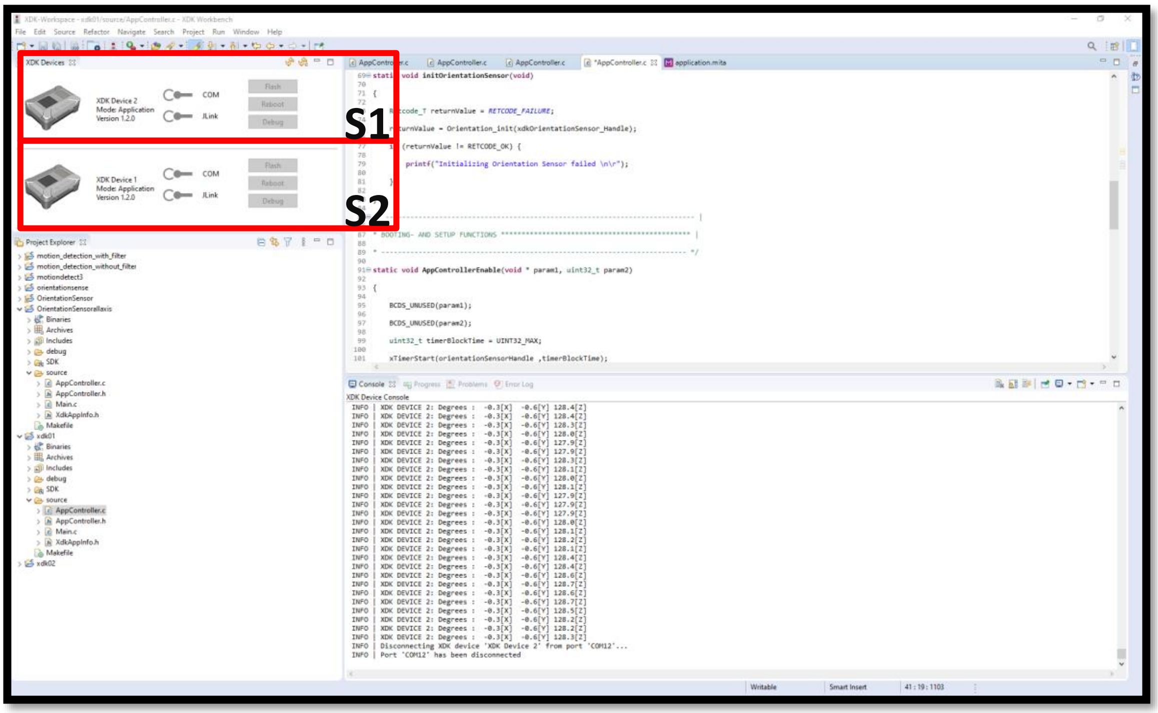

Figure 3.2: XDK Workbench

3. **Integration of Dual Sensors:**
    - Integrated two XDK110 sensors S1 and S2 into the system, one for monitoring the collimator and another for environmental calibration.
    - Designed and implemented a method to combine data from both sensors to accurately determine the orientation of the collimator.
4. **Testing:**
    - A wooden replica of x ray collimator and its system was constructed for testing using wooden beams and angle connectors.

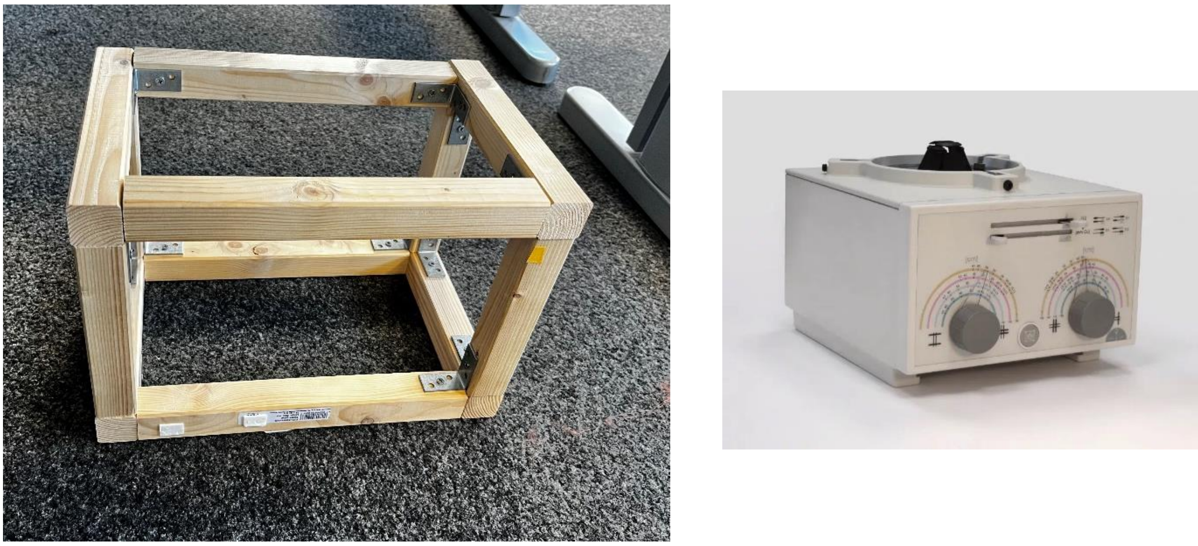

Figure 3.3 x-ray collimator replica for testing. [9]

5. **Visualisation and Error Analysis:**
    - Created a Python-based visualization tool to display the orientation data in real-time, facilitating easier interpretation of results.
    - Documented and analyzed the degree of error associated with the sensor measurements to assess the system's accuracy and reliability.

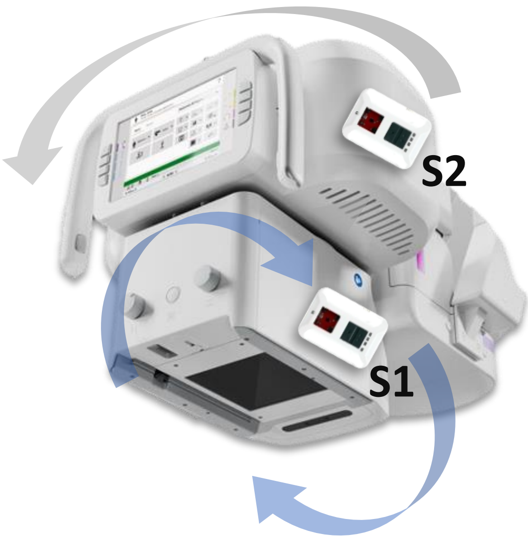

Figure 3.4: Collimator Rotation Principal [7]

4.2.3 Tools / Methods Used

1. **Bosch XDK110 Sensor:**
    - Utilized for its capability to measure orientation. The sensor's built-in gyroscope and accelerometer were central to the project.
2. **Programming Languages:**
    - **C/C++:** For initial code development and integration with the XDK110 sensor.
    - **Python:** For developing the visualization tool and performing data analysis.
3. **Development Environment:**
    - Bosch XDK workbench compatible with Bosch's XDK for sensor programming.
    - Python libraries such as Matplotlib and NumPy for data visualization and analysis.
4. **Data Analysis Techniques:**
    - Statistical methods to analyze the accuracy and error margins of sensor data.
    - Algorithmic approaches for sensor fusion to combine data from multiple sensors.

Figure3.5: Tools Used.[8]

4.2.4 Project Goals

The primary goal of this project was to design and implement a robust system for detecting and visualizing the rotation angulation of an x-ray collimator. Collimators are critical components in medical imaging and radiation therapy, where precise alignment directly impacts the accuracy and effectiveness of diagnostic and therapeutic procedures.

To achieve this objective, the project utilized the Bosch XDK110 sensor, a versatile device known for its precision in motion detection. The specific Goals were to:

1. Develop a Measurement System: Create a system capable of accurately measuring the rotation angulation of the collimator using the Bosch XDK110 sensor. This includes calibrating the sensor to ensure precise data collection and integrating it into the collimator setup.
2. Enhance Accuracy: Implement additional sensors and data fusion techniques to improve the accuracy and reliability of the rotation measurements. This involves integrating multiple sensor inputs to cross-verify and enhance the precision of the system.
3. Visualization and User Interface: Design an intuitive visualization platform that effectively displays the rotation angulation data in real-time. The goal is to provide users with clear, actionable insights into the collimator's orientation, aiding in adjustments and alignment tasks.
4. System Integration and Testing: Ensure seamless integration of the measurement system with existing collimator setups and thoroughly test the system under various conditions to validate its performance and robustness.

4.2.5 Project Approach

1. **Initial Setup and Familiarisation:**
   - Gain a comprehensive understanding of the Bosch XDK110 sensor.
   - Set up the sensor in a controlled environment to assess its functionality.
2. **Development of Orientation Visualisation:**
   - Write and test code to convert raw sensor data into angular orientation.
   - Develop initial visualization tools to display orientation data.
3. **Dual Sensor Integration:**
   - Implement integration of two sensors into the system.
   - Develop and test algorithms for data fusion to improve accuracy.
4. **Visualisation and Error Analysis:**
   - Create advanced visualization features in Python.
   - Perform extensive testing to document and analyze sensor error margins.
   - Generate comprehensive reports on system performance and accuracy.

4.2.6 Testing Stage

Figure 3.6: Test Setup of collimator angulation rotation.

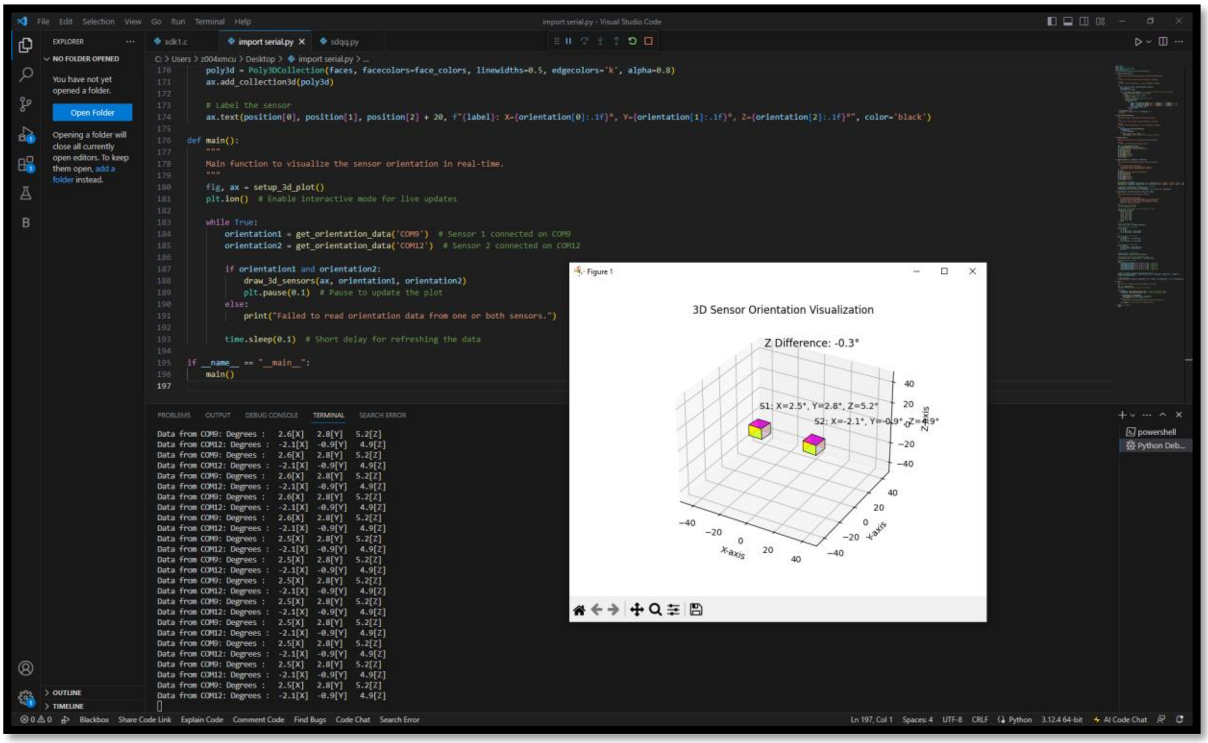

Figure 3.7: Visualization on 3D plot.

4.2.6 Conclusion

The internship project on Collimator Rotation Angulation Detection was a successful experience, showcasing the effective application of the Bosch XDK110 sensor in a practical scenario. The project involved a comprehensive understanding of sensor technology, development of innovative software solutions, and integration of multiple sensors for enhanced accuracy.

4.2.7 Key Achievements include:

- **Effective Sensor Utilization:** Gained hands-on experience with the Bosch XDK110 sensor and utilized it for precise orientation measurement.
- **Functional Visualization Tools:** Developed a Python-based tool for real-time data visualization, significantly aiding in the interpretation of sensor readings.
- **Enhanced Accuracy:** Successfully integrated two sensors to improve the accuracy of orientation detection, with detailed documentation of error margins.

This project not only demonstrated technical proficiency in sensor integration and data visualization but also underscored the importance of accuracy in critical applications such as collimator alignment. The experience gained through this internship has provided valuable insights into both theoretical and practical aspects of sensor technology and data analysis.

5 Professional Insights

Internship Evaluation Involvement in various projects and activities throughout the internship period at ITT MP has provided an abundant of knowledge and insights in both technical and professional aspects.

5.1 Technical and Practical Knowledge

Technical requirements, in terms of knowledge in the topic and skillset for applications and software used, for each project vary. Through involvements in different types of projects such as Collision Avoidance System, product design and development, and prototype development for proof of concept and use-case testing, I am constantly challenged to learn and use different tools and technologies in a short span of time. With the continuous addition of technology, the ability to grasp a topic and implement it as part of your work in a timely manner is an important skill to have in a workplace. This is a very good starting point, through this internship into a professional career, I have learned and gained experience in new technologies and tools that are beneficial for my professional career as a mechatronics engineer. Finally, entrusted with several different project challenges me with both my time and project management skills. The ability to prioritize and portion the amount of effort and work given to each project to ensure that every project is moving forward and ready to be presented by the next update meeting. In addition, communication within the project team is key to make certain that each task is handled and delegated accordingly.

5.2 Non-technical outcomes

At Siemens Healthineers AG, preparing documentation adheres to established standards, while collaboration within an internationally diverse team is crucial. Understanding workplace conduct and safety regulations is essential for maintaining a productive office environment. Efficiently managing multiple tasks and meeting deadlines are key responsibilities, alongside participating in tests and learning opportunities through ITT Certification Programs. Gaining insight into corporate working methods and the ability to learn and collaborate on various projects with teammates are also vital components of the role.

5.3 Conclusion

When I think about my time at Siemens Healthineers AG, I remember the friendly atmosphere and how everyone worked together. My colleagues were welcoming, and we worked as a team to make our projects successful. One important thing I learned was how important communication is. This helped me make progress and taught me that good communication means both speaking and listening. This internship also showed me that learning never stops. Whether I watched my colleagues in meetings or learned to use new tools, each experience made me better. I realized that being open to new things and adapting to change is important for growing. Reflecting on my internship journey at Siemens Healthineers AG, I am filled with a deep sense of accomplishment and gratitude. This chapter of my professional life has been a remarkable blend of learning, growth, and meaningful experiences. As I conclude this phase, I want to express my sincere appreciation for the invaluable lessons and opportunities I've been fortunate to receive.

Moreover, my abilities in programming, prototyping, managing projects and tasks, and collaborating within teams have significantly expanded. Additionally, I had the chance to put into practice the knowledge I gained in the university, particularly in areas such as Hardware Engineering, programming, design and printing. Working closely with colleagues, engaging in open discussions, and adapting to changing scenarios have not only enhanced my teamwork skills but have also instilled in me the importance of a growth mindset.

6 Certificates at ITT MP

Innovation Think Tank Certification Program (ITTCP), India

July 22-31, 2024

Innovate

Challenge!

Solve

Create

Ideate

Brainstorm

Think

Innovation Think Tank

Participant

Syed Mustafa Mohiuddin

Hochschule Rhein Waal

In recognition of your successful completion of the hybrid workshop organized by Innovation Think Tank, India and hosted by Siemens Healthineers Development Center, Bengaluru.

Kalavathi GV
Executive Director and
Head of Development Center,
Siemens Healthineers

Sultan Haider
Founder and Head of Innovation Think Tank
Siemens Healthineers

SIEMENS Healthineers

Innovation Think Tank Certification Program (ITTCP), India

July 22-31, 2024

Innovation Think Tank

Winner - 3

Syed Mustafa Mohiuddin

Hochschule Rhein Waal

In recognition of your team's winning contribution at the hybrid workshop organized by Innovation Think Tank, India and hosted by Siemens Healthineers Development Center, Bengaluru.

Congratulations!

Kalavathi GV
Executive Director and
Head of Development Center,
Siemens Healthineers

Sultan Haider
Founder and Head of Innovation Think Tank
Siemens Healthineers

SIEMENS Healthineers

7 Internship Certificate

Innovation Think Tank Fellowship

Letter of Award

Innovation Think Tank

Innovation Think Tank (ITT) is part of the Chief Technology Office of Siemens Healthineers. Driven by the need of the interdisciplinary and self-sustaining infrastructures which are accessible for the entire departments, ITT was established in 2005.

Through its Fellowship Program, the ITT is welcoming more than 200 fellows annually who are becoming part of a global infrastructure all over the world.

Mohiuddin, Syed Mustafa

successfully completed the **Siemens Healthineers Innovation Think Tank Fellowship**.

Duration: 01.04.2024 - 16.08.2024.

We hereby express our sincere appreciation for contributing to the Innovation Think Tank teams.

With best regards

S. Haider

Prof. Sultan Haider
Founder and Head – Innovation Think Tank
Siemens Healthineers
Erlangen, Germany

SIEMENS
Healthineers

Innovation Think Tank

SIEMENS Healthineers

Siemens Healthineers GmbH, SHS TE ISE ITT, Henri-Dunant-Str. 50, 91058 Erlangen, Germany

Name: Tim Hoffmann
Department: SHS TE ISE ITT C

Mr. Mohiuddin, Syed Mustafa

Telephone: +49 (9131) 84-3233
E-mail: Innovationthinktank.team@siemens-healthineers.com

Date: 14.08.2024

Confirmation of an internship position at the Innovation Think Tank at Siemens Healthineers

Dear Ladies and Gentlemen,

Mr. Mohiuddin, Syed Mustafa born on 20.05.1998, was employed at the Siemens Healthineers Innovation Think Tank from the 01.04.2024 until 16.08.2024

Mr. Mohiuddin completed a fulltime internship position at the Innovation Think Tank in Kemnath, Germany.

Mr. Mohiuddin's tasks consisted mainly of the following:

- Participation in several projects in the field of medical technology
- Carrying out research tasks
- Support for the development and construction of project models
- Carrying out market analyses
- Product and concept development

It was a pleasure having Mr. Mohiuddin with us and we would like to thank him for his contribution to the team.

T. Hoffmann

Tim Hoffmann
SHS TE ISE ITT C

Siemens Healthcare GmbH
Henkestr. 127 - Telefon (09131) 84-0
Postfach 3260
91050 Erlangen

Siemens Healthineers GmbH
Management: Dr. Montag, Bernd, Chairman;
Dr. Jochen, Schmitz; Dr. Zindel, Christoph

Henkestr. 127
Erlangen, 91052
Germany

Tel.: +49 (9131) 84-4670
www.siemens.com/healthineers

Sitz der Gesellschaft: München, Deutschland
Handelsregister bei den Amtsgerichten: München, HRB 213821

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