**Ghulam Ishaq Khan Institute of Engineering Sciences and Technology**

**Faculty of Computer Science and Engineering**

**FINAL YEAR PROJECT REGISTRATION FORM**

# Group Members

***\*In the case of 4th Member, you need prior approval from FYP Coordinator.***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S# | Reg. No. | Name | Program  (BCE/BCS/BAI) | Signature |
| 1 | 2020414 | Saad Khan | BCE | SaadKhan |
| 2 | 2020487 | Syed Zaeem Shakir | BCE | ZaeemShakir |
| 3 | 2020217 | Mahnoor Maleeka | BCE | MahnoorMaleeka |

Project Title:

Intellera: A Hardware Based Acceleration of Matrix MAC Processor.

In this project, we aim to design and implement a RISC-V based processor on an FPGA with hardware accelerators for efficient matrix manipulation. The processor will feature a custom instruction set architecture (ISA) optimized for matrix operations such as multiplication and addition. Additionally, pipelining techniques will be employed to improve processor performance and speed.

The design will be implemented on a Field Programmable Gate Array (FPGA), which provides a flexible and cost-effective solution for hardware prototyping. The hardware accelerators will be designed to offload the heavy computation required for matrix manipulation from the processor, thereby improving performance and power efficiency.

We plan to conduct a thorough evaluation of the processor's performance by implementing several benchmarking tests, including matrix multiplication, addition, and subtraction. We will also evaluate the power consumption of the processor and compare it with other existing processors. The possibility of incorporating the developed processor towards a full SoC would also be evaluated at the later stages of the project.

Work Plan

|  |  |
| --- | --- |
| Term I (7th semester)    Getting the full functionality right in software including a baseline HW implementation | Term II (8th semester)    Getting the final design implemented and optimized on the HW along with a feasibility analysis of extending the design towards a full SoC development. |

|  |  |  |
| --- | --- | --- |
| S# | SDG | Mapped (Yes/No) |
| 1 | No poverty | NO |
| 2 | Zero hunger | NO |
| 3 | Good health/wellbeing | NO |
| 4 | Quality education | NO |
| 5 | Gender equality | NO |
| 6 | Clean water and sanitation | NO |
| 7 | Affordable and clean energy | NO |
| 8 | Decent work and economic growth | NO |
| 9 | Industry, innovation, and infrastructure | YES |
| 10 | Reduced Inequalities | NO |
| 11 | Sustainable Cities and Communities | NO |
| 12 | Responsible consumption and production | NO |
| 13 | Climate action | NO |
| 14 | Life below water | NO |
| 15 | Life on land | NO |
| 16 | Peace, Justice, and strong institutions | NO |
| 17 | Partnerships for the goals | NO |

Supervisor Name: \_\_\_Dr Fahad Bin Muslim\_\_\_\_\_\_\_\_\_\_\_ Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_

Co-Supervisor Name: \_\_\_\_\_Dr Taj Muhammad\_\_\_\_\_\_\_\_\_\_ Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Dean’s Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**FINAL YEAR PROJECT AS A COMPLEX ENGINEERING/COMPUTING PROBLEM**

It is to certify here that the final year design project (FYDP) entitled,

“Hardware Based Acceleration of Matrix MAC ……………………………………………………” is categorized as a complex engineering/computing problem (CEP) based on the preamble (in-depth engineering knowledge) and involvement of the following attributes.

|  |  |
| --- | --- |
| **Attribute** | **Involves Attribute (Yes/No)** |
| Involves wide-ranging or conflicting technical, computing/engineering and other issues. | YES |
| Have no obvious solution and require abstract thinking and originality in analysis to formulate suitable models | YES |
| Involve infrequently encountered issues. | YES |
| Outside problems encompassed by standards and codes of practice for professional engineering. | YES |
| Involve diverse groups of stakeholders with widely varying needs. | YES |
| High level problems including many component parts or sub-problems. | YES |



Supervisor Name: \_\_\_\_Dr Faha Bin Muslim\_\_\_\_ Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Co-Supervisor Name: \_\_\_Dr Taj Muhammad\_\_\_\_\_\_\_\_\_\_\_\_ Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_