HASAN KALYONCU UNIVERSITY
Electrical-Electronics Engineering Department
EE 499 Project Proposal Form

Part I. Project Proposer

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Part II. Project Information

Title of the Project	Single Phase Pure Sine Wave Inverter Using Microcontroller				
Maximum Cost of implementation (TL)	5.000 TL	**Conceptual Design Dead Line**	**in 6 weeks**	**Prototype Production Deadline**	**in 13 weeks**
Standards and licenses to be used in the project. example; IP65, IEEE, APACHE, MIT, etc.	IEEE 519				

Project Description

The project involves designing a single-phase pure sine wave inverter using a microcontroller. The inverter will convert DC power from sources such as batteries or solar panels into a stable AC output with minimal harmonic distortion, making it ideal for sensitive electronic appliances. The project focuses on generating high-quality sine wave output using advanced pulse-width modulation (PWM) techniques controlled by the microcontroller.

Project Justification

Novelty	
New aspects	The use of a microcontroller to precisely control the inverter output using advanced PWM techniques to generate a clean sine wave with minimal distortion.
Complexity	
Challenging problem and issues	The project involves significant challenges in controlling the shape and stability of the sine wave output, managing harmonic distortion. Maintaining waveform quality at various loads. Synchronizing PWM signals to minimize harmonic distortion. Ensuring proper thermal management during high-power operation.
Related electrical-electronics science fields and subfields	Power Electronics, Embedded Systems, Control Systems, Renewable Energy Systems
Tools	Arduino/ESP32 or PIC microcontroller for PWM control MATLAB/Simulink for signal processing and control algorithm development (if required) Proteus for circuit simulation Ares for PCB layout
Risk involved	
Potential problems and alternative solutions	Overheating or malfunction due to poor thermal management Potential instability in the inverter output due to poorly tuned control algorithms
Minimum work required	20 hours per week for 14 weeks with 2 developers