



CMR ENGINEERING COLLEGE

(Affiliated to JNTU-Hyderabad, Accredited by NBA & NAAC)
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Department of Electronics & Communication Engineering

Industrial Oriented Major Project

(A.Y 2024-25)

TITLE: IOT FACE RECOGNITION AI ROBOT USING EMBEDDED SYSTEM

Batch No: D11

Internal Guide

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ABSTRACT

In the burgeoning field of robotics and artificial intelligence, integrating face recognition technology with embedded systems offers a promising avenue for advancing human-robot interaction and security applications. This paper presents a novel approach to developing an IoT-based face recognition AI robot utilizing embedded systems. The core objective is to design and implement a compact, efficient, and cost-effective robotic system capable of real-time face detection and recognition.

The proposed system leverages an embedded platform, such as a Raspberry Pi or an Arduino with a dedicated AI accelerator, to handle the processing of facial recognition algorithms. The robot incorporates a high-resolution camera for image capture, which feeds data into the embedded system where facial recognition is performed using pre-trained deep learning models. The results are then used to drive robotic actions or decisions through a connected IoT framework, enabling functionalities like user identification, access control, and personalized interactions.

Key components of the system include the integration of a lightweight convolutional neural network (CNN) for face recognition, optimization techniques for real-time performance, and a robust communication protocol to interface with cloud services or other IoT devices. The embedded system's role is critical in managing the computational load while maintaining power efficiency and system responsiveness.

Experimental results demonstrate the effectiveness of the proposed system in diverse environments and varying lighting conditions, highlighting its potential for practical deployment in security, healthcare, and personal assistant applications. The paper concludes with an analysis of performance metrics, system scalability, and future enhancements to further refine the integration of face recognition and embedded systems within the IoT landscape.

CIRCUIT DIAGRAM

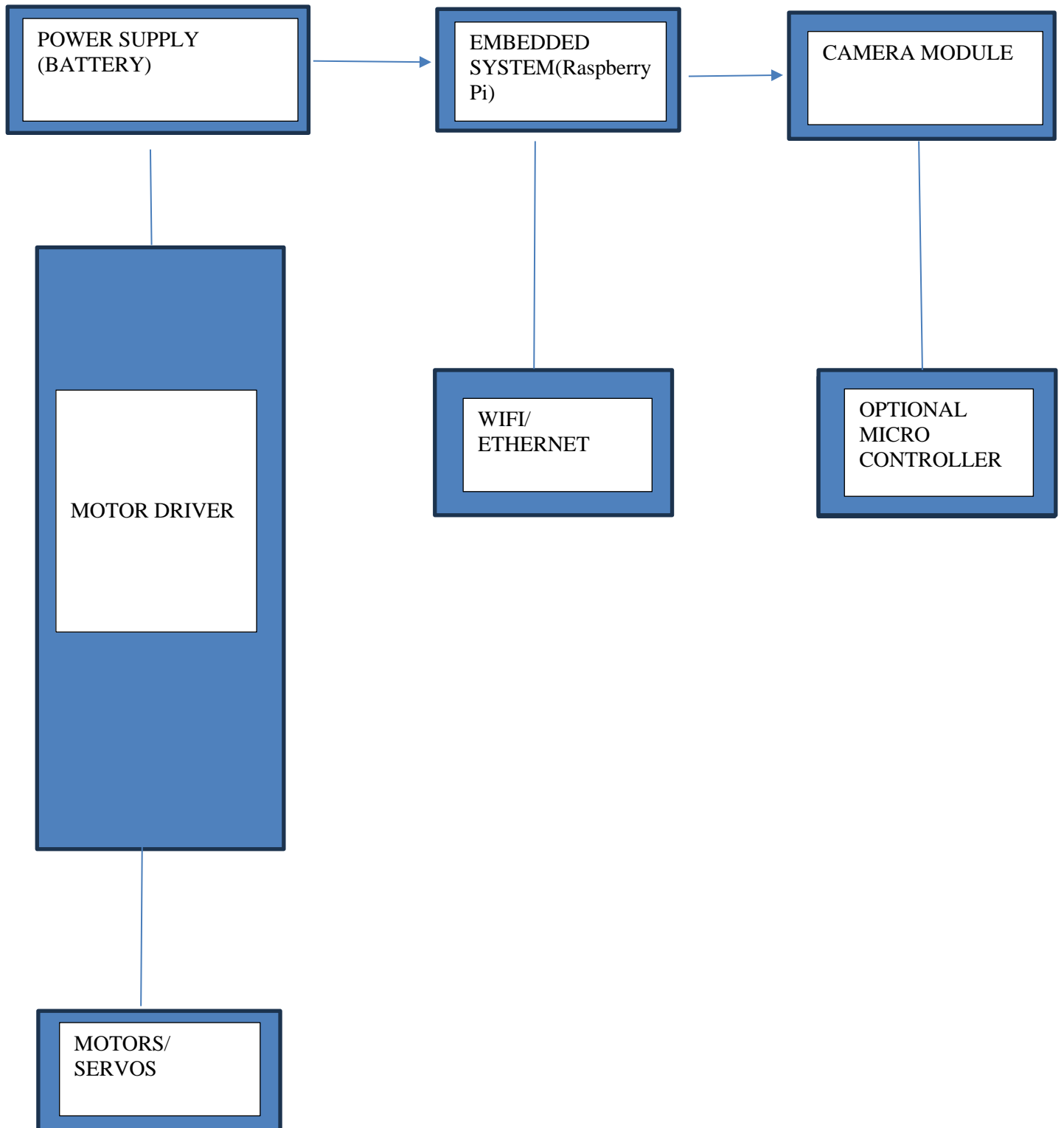


Fig: SYSTEM DESIGN

Hardware requirements:

- 1) Embedded system
- 2) Camera module
- 3) Power supply
- 4) sensors
- 5) Communication module

Software requirements:

- 1) Raspberry Pi OS
- 2) **Ubuntu** for NVIDIA Jetson Nano (JetPack SDK).
- 3) opencv