Skull, Face & Mouth Design + 3D Printing Plan

Overview

As part of our subgroup's responsibility, we aim to design and 3D print the upper head (skull) of the humanoid robot, including the jaw, eye sockets, and mounts for facial components. This module focuses on the mechanical structure required to support AI-driven interaction including movable eyes, lips, and facial expression mechanisms.

Design Scope and Responsibilities

1. Create CAD model of the full skull with detachable top section for internal access.
2. Design motor mounts for eye movement (horizontal + vertical).
3. Jaw design with rotational hinge support (for basic mouth movement).
4. Facial expression slots and shell flexibility to support smile/frown actions.
5. Space allocation for internal components: cameras, mic, servos, PCB, wires.
6. Lightweight but stable print structure using FDM printing (PLA/ABS material).

Software & Tools Used

1. Fusion 360 / SolidWorks (CAD Modelling)
2. Ultimaker Cura / PrusaSlicer (Slicing for FDM)
3. FDM 3D Printer (Creality Ender 3 or Prusa Mk3)
4. PLA/ABS Filament – strong, lightweight, easy to print
5. Digital calipers (for real part dimensioning and fit verification)

Workflow Process

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1. Research reference skull models online (e.g., Thingiverse, Sketchfab).
2. Start with rough sketch (paper or digital).
3. Create CAD model (split into printable parts if required).
4. Test fit and placement of motors, brackets, and sensors.
5. Slice model and export G-code.
6. Print prototype using PLA.
7. Post-process (support removal, light sanding).
8. Assembly and real-world fit test.
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