

Smart Glasses

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Master 2 : MSR 2025-2026

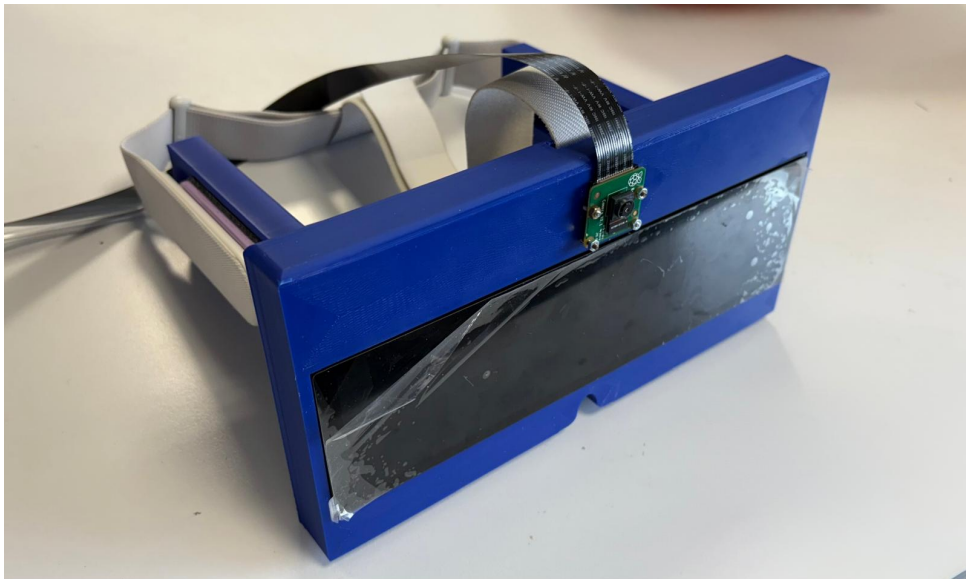


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0.1 Introduction

0.1.1 Project Context

With the rise of wearable technology, smart glasses are undergoing significant development. Companies such as Meta, with their Ray-Ban Meta glasses, are now offering devices capable of capturing images and video, interacting via voice commands, and accessing AI-based assistants.

At the same time, within the field of assistive technology, several research projects and commercial products aim to support visually impaired or blind individuals specifically through obstacle detection, scene description, and the reading of visual information. Furthermore, recent breakthroughs in artificial intelligence, particularly in natural language processing (NLP) and computer vision, are opening up new possibilities to enhance visual assistance tools.

0.1.2 Objectives

In this context, our project follows a similar path, but with a specific focus on social interaction and assistance. The objective is to design smart glasses capable of detecting both the emotions of the person facing the user and any obstacles within the environment.

However, to ensure reliable operation and straightforward interaction, these two features do not run simultaneously. The system is organized into different operating modes, accessible through an interface of physical buttons integrated into the glasses. This allows the user to switch between "obstacle detection" and "emotion detection" modes, depending on their immediate needs.

This approach simplifies data processing, improves the clarity of haptic feedback, and provides the user with greater control over the device's behavior.

0.2 Materials Used

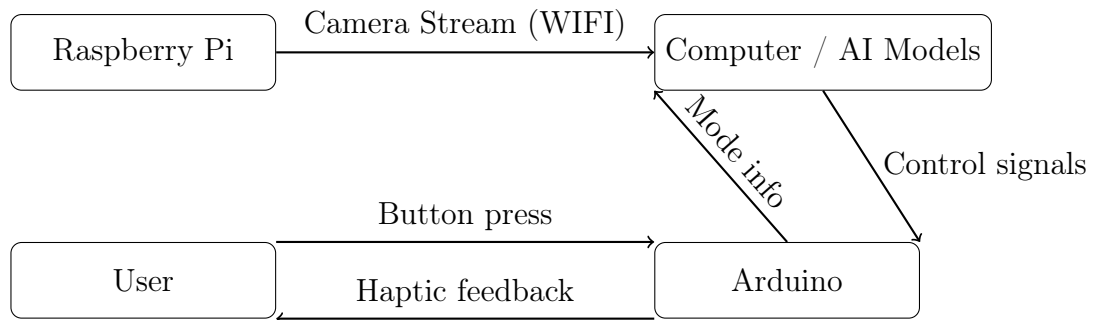
Component	Number	Reference / Model	Description / Role
Camera	1	Camera Raspberry module 2	Sony IMX219 8-megapixel sensor
Raspberry Pi	1	Raspberry Pi 3B+	Used to process image data and send it to the computer
Arduino	1	Arduino Uno	Used to control the haptic feedback system (ie pneumatic actuators...)
Differential Pressure sensor	2	DFRobot SEN0343	Used to detect pressure into balloons
Motor driver	3	L298N	Used to control 2 motors per driver
Valves	2	DFR0866	Used to switch between inflate and deflate

Component	Number	Reference / Model	Description / Role
Pumps	4	DFRobot 370 Mini Vacuum Pump	2 used to inflate and 2 to deflate balloons
Balloons	2	Standard party balloons	Used to do haptic feedback
Push buttons	2	Standard push buttons	Used to switch between modes
Computer	1	PC linux	Used to run the AI models for emotion and obstacle detection
Battery 12V	1	lead acid battery 12V	Used to power the pumps
Battery 5V and <2.5A	2	Standard Power bank 5V	Used to power the Raspberry Pi and Arduino

TABLE 1: Main hardware components used in the project

0.3 Implementation

0.3.1 Overall Architecture



0.3.2 Camera and Raspberry pi

0.3.3 Pneumatic/haptic system

0.3.4 Computer and AI models

0.3.5 User Interface

0.4 Fonctionnalités

0.5 Objectifs initiaux et limites du projet

0.6 Pistes d'amélioration