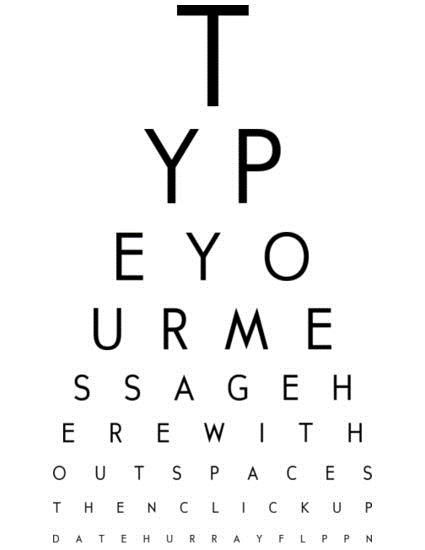
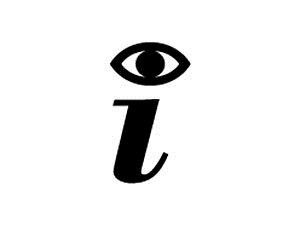
Projeto I

 EST

**Grupo 6:**

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Problem Statement

In today society mankind is constantly using digital devices, that are affecting, negatively, vision health. It's been a concern for the past years to fight this era’s side-effect. To get yourself diagnosed, you must go to a doctor, which in public healthcare means a long wait and sometimes may be costly.

The Project’s goal is to design a tool to help diagnose irregularities in human vision, such as astigmatism, near-sightedness, and colour blindness. With only one device the user will be able to self-diagnose in an interactive and fast way.

We will have a screen showing images, that the user must identify. The device will recognise the answer and evaluate it. In the end of the test it will give you a result of how good or not your vision is.

Market Study

There are already a lot of vision diagnostics devices. Although these devices are all equipment that should be handle by a professional technician, we found some that compare to our project.

***SPOT* Vision Screener:**

Professional, portable device. Unlike ours, the device diagnoses the patient through a camera, screening the eye directly. This equipment is extremely expensive.

***Medivision* Digital Acuity Chart:**

Similar to our project, it displays the test in a screen. Although the diagnostic must be made by a doctor/technician, as the device will not give any. The device, though cheaper than *SPOT*, is still very expensive.

Resuming there exists already good devices that perform the task, but they are very expensive and they all need an experienced technician to use them.

Constraints

* Budget must be minimal.
* Project developed by a team of two.

Technical Constraints

* STM32F4-DISCOVERY board
* Keil uVision MDK-ARM
* Digital Signal Processor (DSP)
* FreeRTOS
* C/C++ programming language
* Minimum of three sensors

Functional Requirements

* Diagnose User
* Display the vision test on the TFT screen.
* Detect user interaction.
* Measure the distance between the device and the patient.
* Check suitability of the ambient light.
* Recognise speech input data.
* Show malfunctions on the display.
* Give audio signals.

Non-Functional Requirements

* Low Cost and low power.
* User-friendly interface.
* Small and portable.
* The system must have low latency.
* Soft Real-time

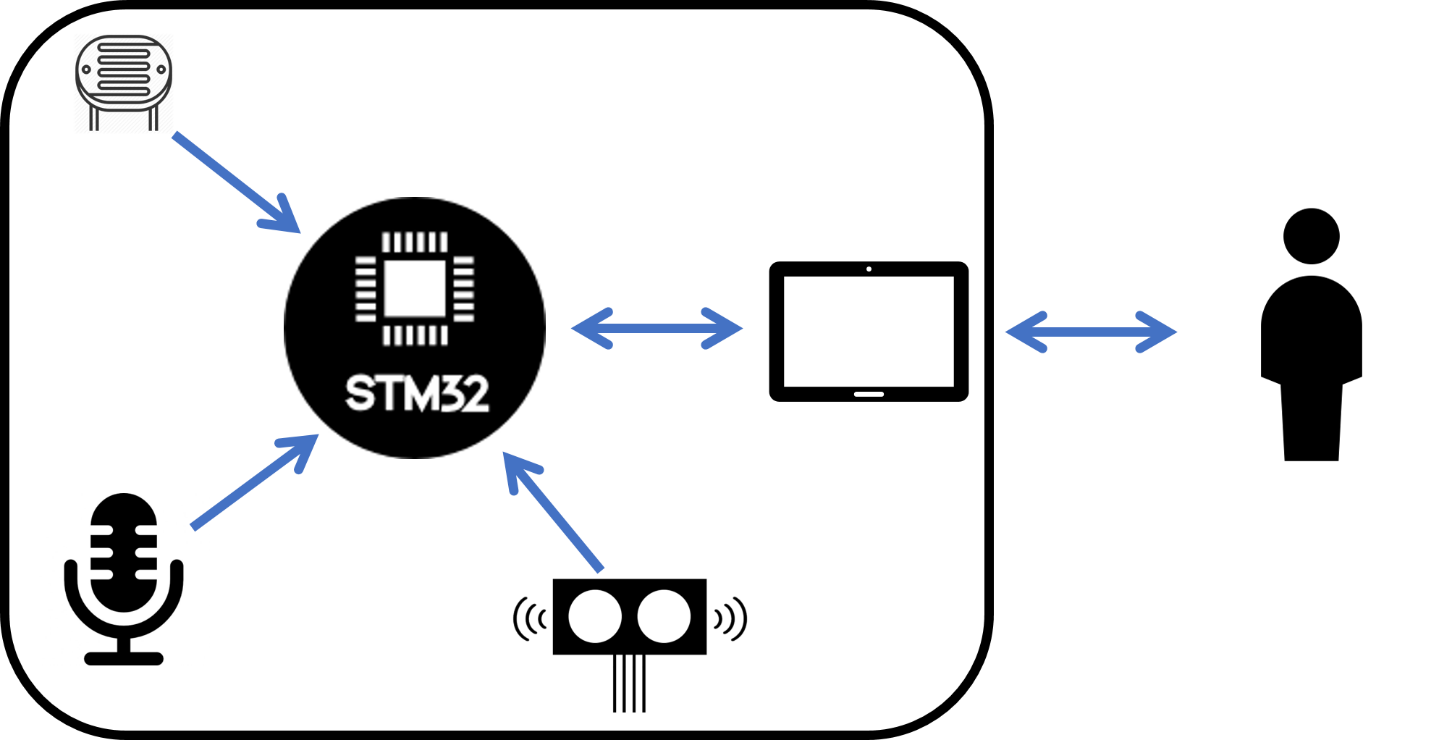
Hardware Specifications

* Stm32f4 discovery
  + Core: ARM®32-bit Cortex-M4
  + 1 Mbyte of Flash memory
  + 192+4 Kbytes SRAM
  + 16-stream DMA controller with FIFOs and burst support
  + 17 timers
  + 140 I/O ports
  + 3 ADCs
* **Light Dependent Resistor as light sensor**
* Ultrasonic distance measurement
* ST MP45DT02 MEMS(incorporated in STM32f4-DISCOVERY)
* TFT w/touchscreen

Software Specifications

* Keil uVison MDK-V5
* FreeRTOS
* C Language
* Matlab for speech recognition

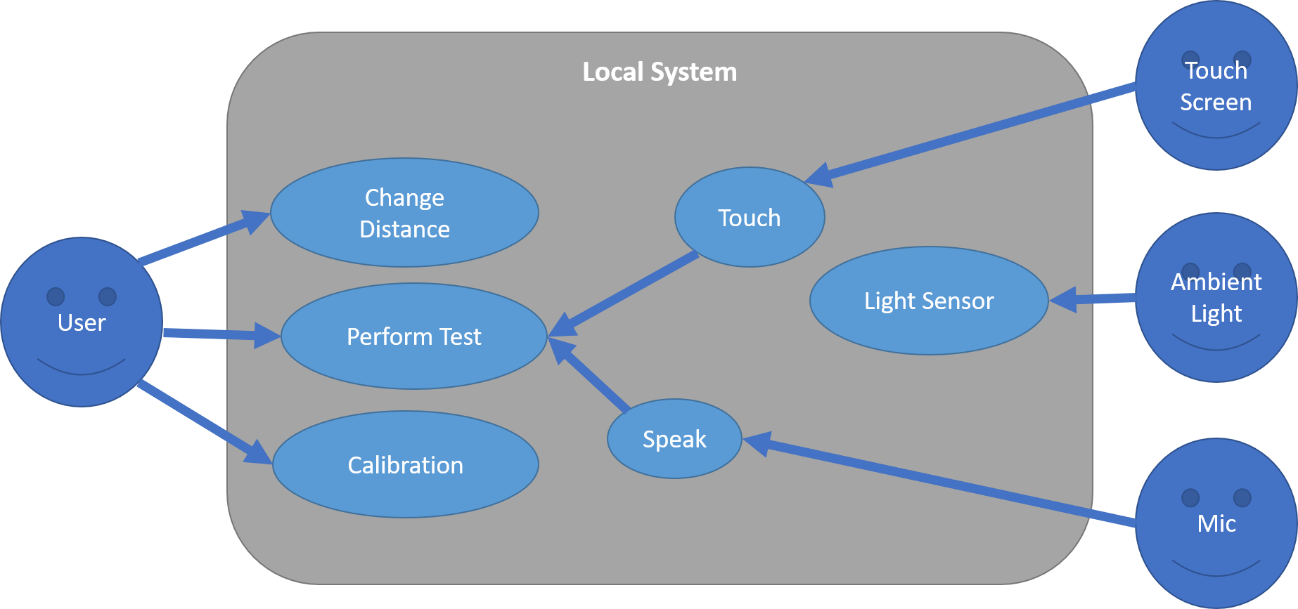
System Overview



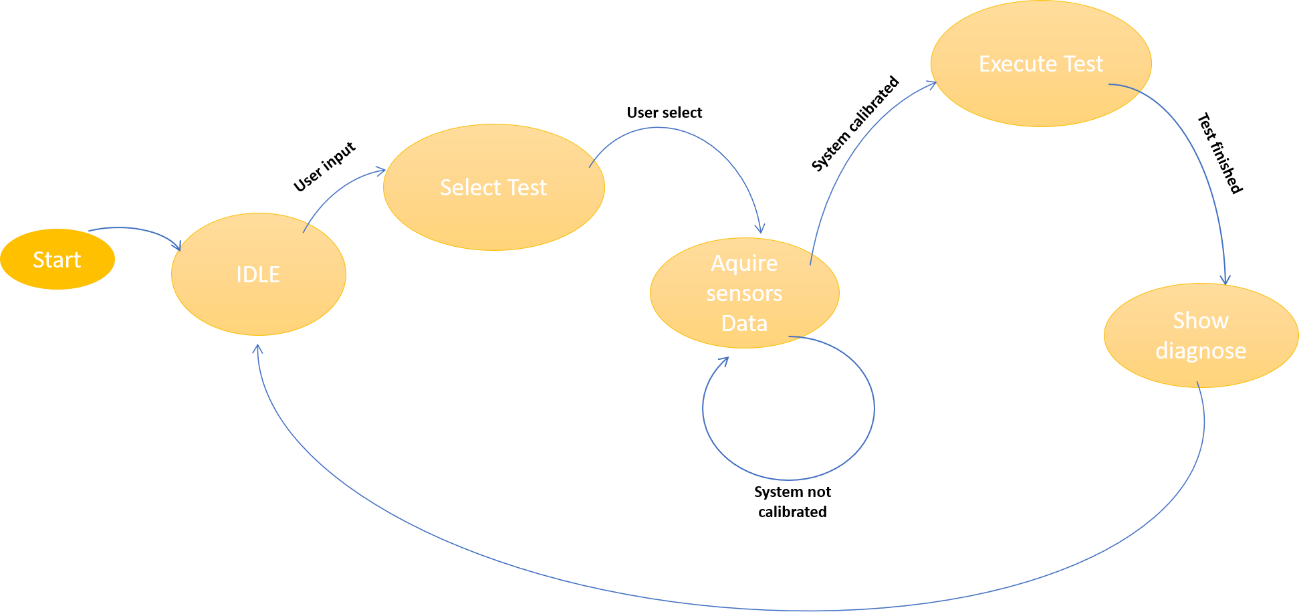
Events

|  |  |  |  |
| --- | --- | --- | --- |
| Event | System Response | Source | Type |
| On/Off | Turn System On/Off | User | Async |
| Read Light | Reads ADC and processes data | Local Sys | Async |
| Read Distance | Gets distance value | Local Sys | Async |
| Display | Changes display data | Local Sys | Sync |
| Get voice | Gets and recognises voice input | User | Async |
|  |  |  |  |

Use Cases



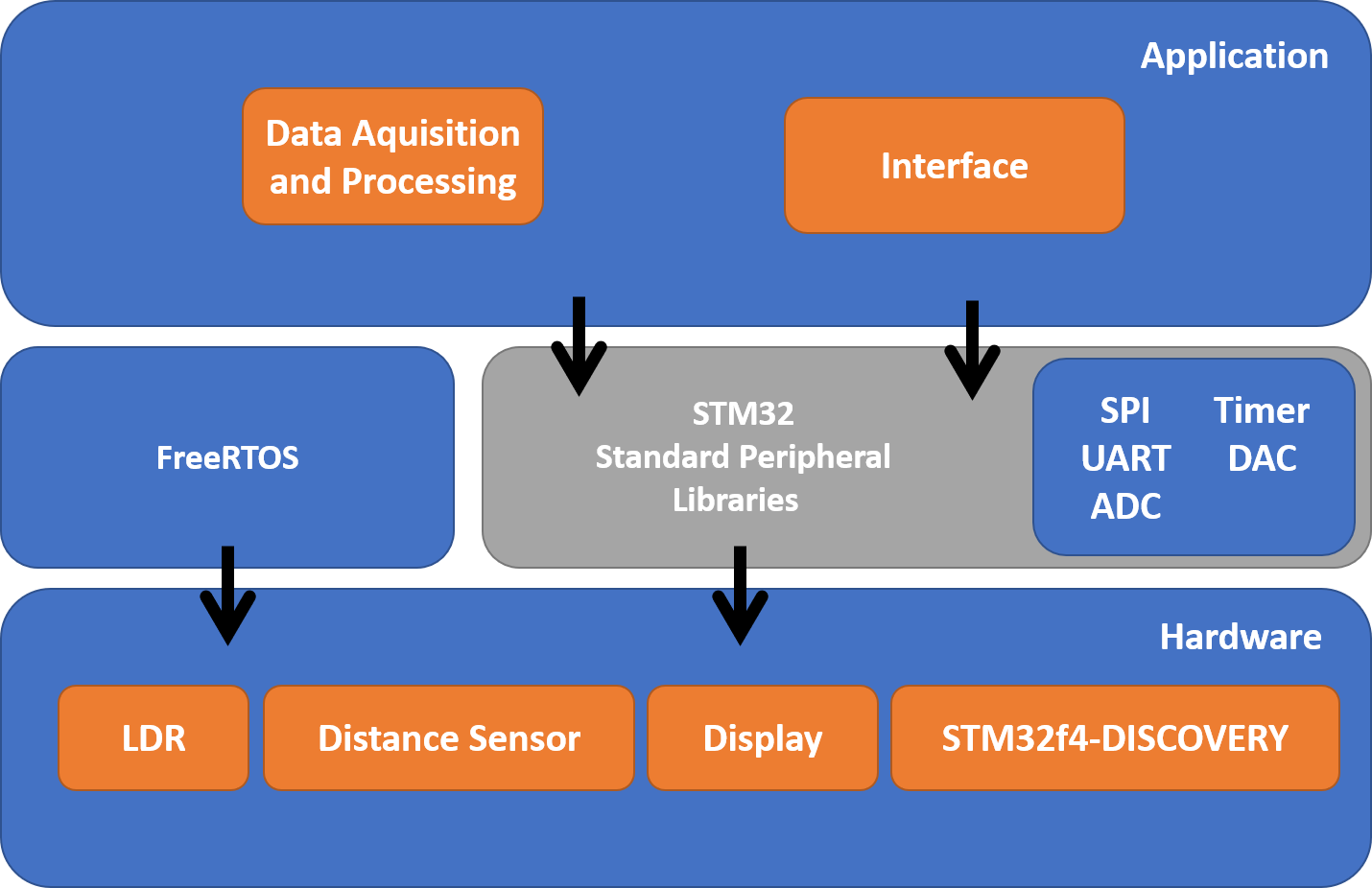
State Chart

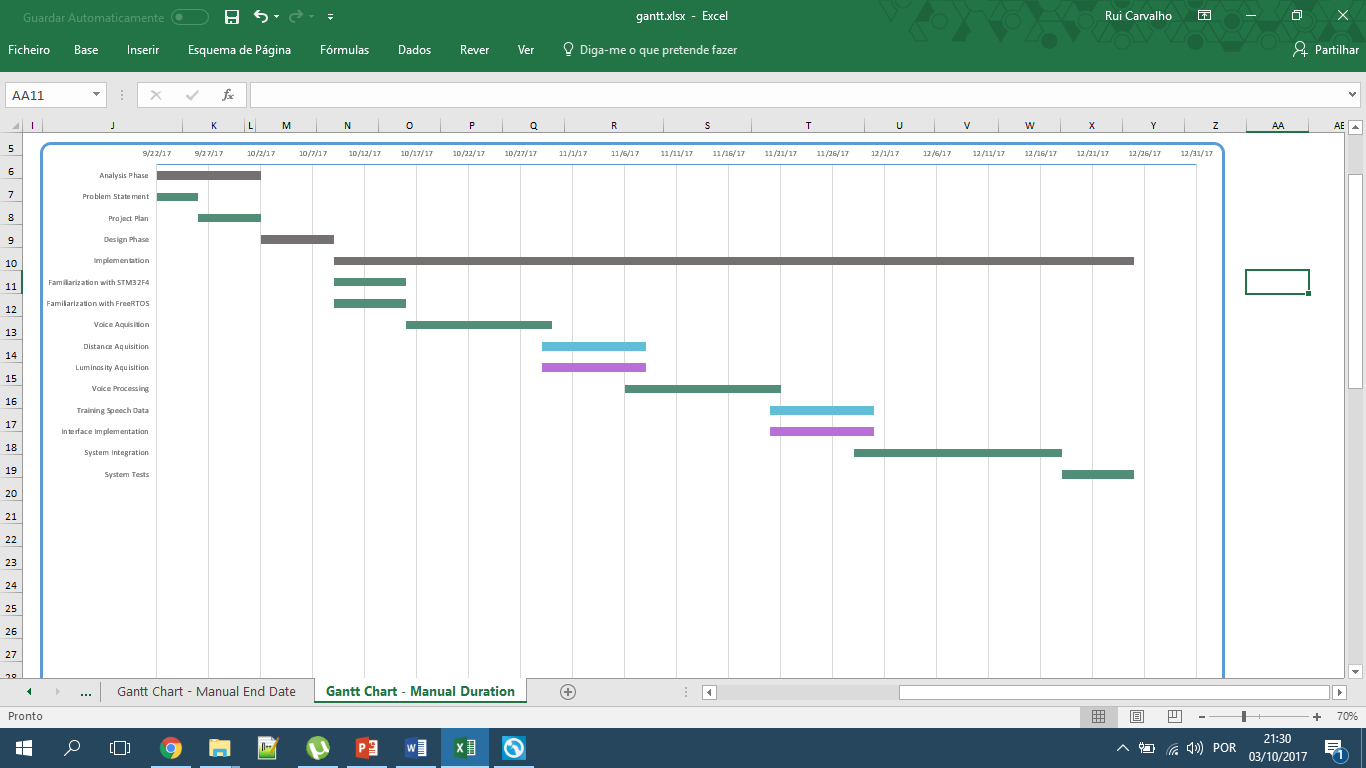


Sequence Diagram

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Calibration | Test | Show Diagnose |
| User | Start Test | Change Distance | Perform Test |  |
| Ambient Light |  | Get Light Value |  |  |
| Touch Screen |  |  | Get Touch Position |  |
| Microphone |  |  | Get Speech Input |  |

Software Stack



Gantt Chart

