





# FEASIBILITY STUDY

PFE: "Flight repeater for sailing ship"





## SUBJECT AND PROBLEMATIC (1)

#### Context:

- Continuity of my last year project
- improvement of the existing prototype to answer at the customer demand

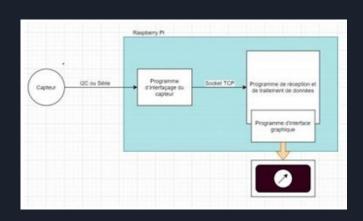
#### Subject:

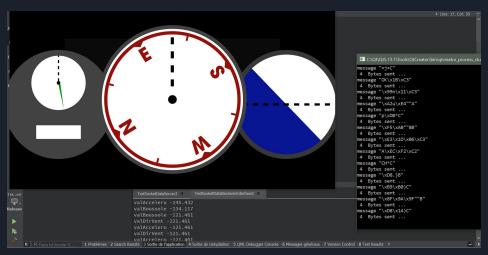
- Development of a graphic interface for Nacra 17
- Treatment of sensors datas
- Visualization of interesting datas in real-time
- Memorization of the datas

## SUBJECT AND PROBLEMATIC (2)

#### Last year project resume:

- Development of a data sensor simulator (C++/Qt)
- Development of a data treatment program(C++/Qt)
- Development of a dynamic graphic interface(QML/Qt)
- Beginning of the interface of the sensors (Python)
- Tests on Raspberry PI 3





## SUBJECT AND PROBLEMATIC (3)

#### This year project problematic:

- Create clear and detailed interface with interesting data for navigators
- Choose the differents interesting data and adapt the interface
  - Pitch / Roll : Artificial horizon + digital angles + angles trend (increase/decrease)
  - GPS Speed in knots: Digital value + speed trend + digital range and max value
- Memorize the datas in file in SD card and read it -> create an interface to visualize memorized data

### PLANNED DEVELOPMENT (1)

#### Already existing:

- automatic simulator
- data reading and treatment
- prototype of graphic interface

#### To do:

- Manual simulator: To be more precise with the comportement of the system with differents datasets
- Data memorization: To keep the differents datasets of the ship in the time
- Memorized data reading: Make the memorized data able to be read by the navigator after the training
- Development of a new graphic interface : More suited to the expectations of sailors
- Useable sensors interface
- Implementation in raspberry Pi

## PLANNED DEVELOPMENT (2)

#### Manual simulator (C++/Qt):

- Adaption of the automatic simulator
- Windows with slide bars (speed, roll, pitch)
- Recover values-> send them in TCPSocket at the good port

#### **Memorized data reading** (C++ and QML/Qt):

- Recover .txt memorization file
- Read the data with adapted reading protocole
- Create a reading interface (the same as real time graphic interface?)

#### Data memorization (C++/Qt):

- Create .txt memorization file
- Recover the readed value
- Write them in the .txt file
- Create a writing protocol for this file
- Be readable for sailors without reading interface

#### **Useable sensors interface** (Python):

- Inertial unit: make the drivers and send the data to the data treatment program
- GPS: same tasks

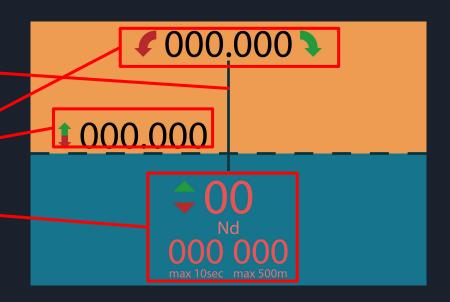
#### Implementation in Raspberry pi:

Adapt windows program to raspbian program

## PLANNED DEVELOPMENT (3)

#### New graphic interface (QML/Qt):

- Landmarks
- Artificial Horizon:
  - Up/Down -> Pitch, Turn Right/Left -> Roll
  - Color changing with differents data value
- Digital values:
  - Pitch : digital value + trend
  - o Roll: digital value + trend
  - Speed: digital value + unit + range in 500m + max in 10 sec + trend
- Training system:
  - Add start/stop training button
  - show training time
  - start memorization at this time



## GANTT CHART

|                                                    | Year  |                            | 2020 |   |   |         |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |              |                | 2000     |   |   |   |         | 2021 |     |   |   |
|----------------------------------------------------|-------|----------------------------|------|---|---|---------|---|---|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|----------------|----------|---|---|---|---------|------|-----|---|---|
|                                                    | Month | September                  |      |   |   | October |   |   |   | Nov                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | November |              |                | Décember |   |   |   | January |      |     |   |   |
| Nom des taches                                     | Week  | 2                          | 3    | 4 | 1 | 2       | 3 | 4 | 1 | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 3        | 4            | 1              | 2        | 3 | 4 | 1 | 2       | 3    | 4   | 1 | 2 |
|                                                    |       | Préparation of the project |      |   |   |         |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |              |                |          |   |   |   |         |      |     |   |   |
| Preparation of project start-up presentation       |       |                            |      |   |   |         |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |              |                |          |   |   |   |         |      |     |   |   |
| Preparing the Raspberry Pi                         |       |                            |      |   |   |         |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |              |                |          |   |   |   |         |      |     |   |   |
| Porting of the existing program to rasberry        |       |                            |      |   |   |         |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |              |                |          |   |   |   |         |      |     |   |   |
| Preparation for meeting with oustomers at CEM      |       |                            |      |   |   |         |   |   |   | A CONTRACTOR OF THE PROPERTY O |          |              |                |          |   |   |   |         |      |     |   |   |
|                                                    |       | Development                |      |   |   |         |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |              |                |          |   |   |   |         |      |     |   |   |
| Manual simulator                                   |       |                            |      |   |   |         |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          | 5-9-9-50-50  |                |          |   |   |   |         |      |     |   |   |
| Development of the new graphical interface         |       |                            |      |   |   |         |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          | 2            |                |          |   |   |   |         |      |     |   |   |
| Averaging system for speed values                  |       |                            |      |   |   |         |   | - |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |              |                |          |   |   |   |         |      |     |   |   |
| Memorization of data                               |       |                            |      |   |   |         |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |              |                |          |   |   |   |         |      |     |   |   |
| Memorized data reading                             |       |                            |      |   |   |         |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |              |                |          |   |   |   |         |      |     |   |   |
| Creation of a graphical interface for reading data |       |                            |      |   |   |         |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |              |                | - 1      |   |   |   |         |      |     |   |   |
|                                                    |       | Porting on the support     |      |   |   |         |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |              |                |          |   |   |   |         |      |     |   |   |
| Interfacing of sensors                             |       |                            |      |   |   |         |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |              |                |          |   |   |   |         |      |     |   |   |
| Porting version V1.0 to raspberry                  |       |                            |      |   |   |         |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |              |                |          |   |   |   |         |      |     |   |   |
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| Testing and correcting general operating errors    |       |                            |      |   |   |         |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |              |                |          |   |   |   |         |      |     |   |   |
| Preparation of the project defense / Report        |       |                            |      |   |   |         |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |              |                |          |   |   |   |         |      | 100 |   |   |
|                                                    |       |                            |      |   |   |         |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |              |                |          |   |   |   |         |      |     |   |   |
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## COSTED DELIVERABLES

| Tasks                       | Sub-Tasks                                                                                      | Points /2 | 0   |
|-----------------------------|------------------------------------------------------------------------------------------------|-----------|-----|
| Manual simulator            |                                                                                                |           | 2   |
|                             | Creation of a control window with the various modifiable parameters                            |           | 1   |
|                             | Retrieval of values and processing                                                             |           | 0,5 |
|                             | Sends data over sockets                                                                        |           | 0,5 |
| Memorization of data        |                                                                                                |           | 2   |
|                             | Automatic creation of a storage file                                                           |           | 0,5 |
|                             | Retrieving read data and writing to the file                                                   |           | 0,5 |
|                             | Creation of a write (and read) protocol                                                        |           | 0,5 |
|                             | Protocol allowing data to be read directly from the text file without a graphical interface    |           | 0,5 |
| Memorized data reading      |                                                                                                |           | 4   |
|                             | Retrieving storage files                                                                       |           | 1   |
|                             | Reading data                                                                                   |           | 1   |
|                             | Creation of an interface for reading recorded data                                             |           | 2   |
| Interfacing of sensors      |                                                                                                |           | 2   |
|                             | Interfacing of the inertial cetral                                                             |           | 1   |
|                             | GPS interfacing                                                                                |           | 1   |
| New graphic interface       |                                                                                                | -         | 6   |
|                             | Artificial horizon                                                                             |           | 1   |
|                             | Numerical values of heel and pitch                                                             |           | 0,5 |
|                             | numerical values of the GPS speed                                                              |           | 0,5 |
|                             | display of trends (list, speed, pitch)                                                         |           | 0,5 |
|                             | numerical values of the average speed (creation of a system for averaging values)              |           | 1   |
|                             | numerical values of the maximum speed                                                          |           | 1   |
|                             | creation of a training system (start / stop button, memorization at this moment, time display) |           | 1   |
|                             | Adaptation of the color according to the values recovered                                      |           | 0,5 |
| Implementation on raspberry |                                                                                                |           | 1   |
|                             | Adaptation of the program for Raspbian                                                         |           |     |
| Manual                      | Section 1997                                                                                   |           | 1   |
|                             | Writing of a system operating manual                                                           |           |     |
| Project report              |                                                                                                |           | 2   |
|                             | Project report and program comments for a potential resumption of the project                  |           |     |
|                             |                                                                                                |           |     |
|                             |                                                                                                | Total     |     |
|                             |                                                                                                |           | 20  |





# Thank you for your attention!



Oscar PRÊCHEUR