

HEALTHDRONES

A PLATFORM



HealthDrones

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CNPq/573964/2008-4

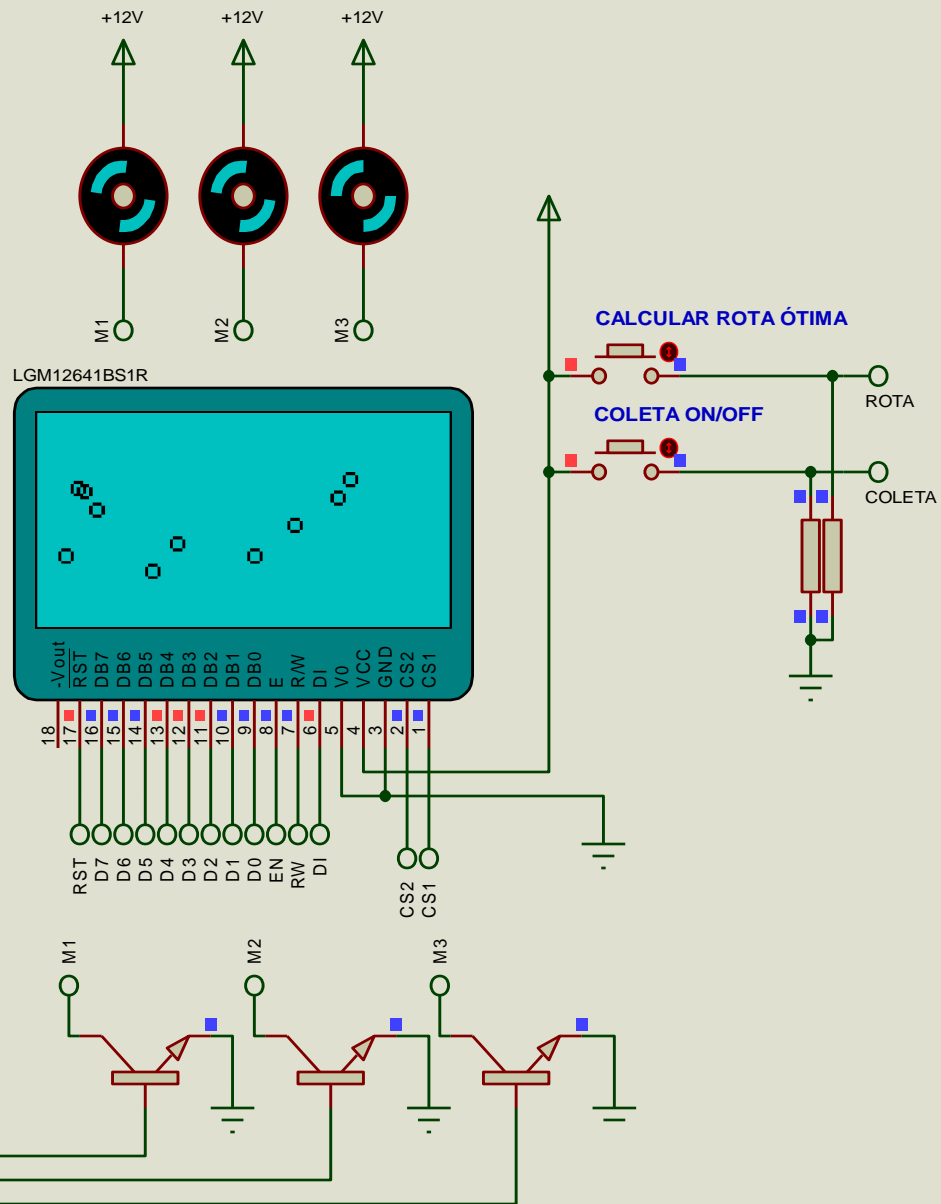
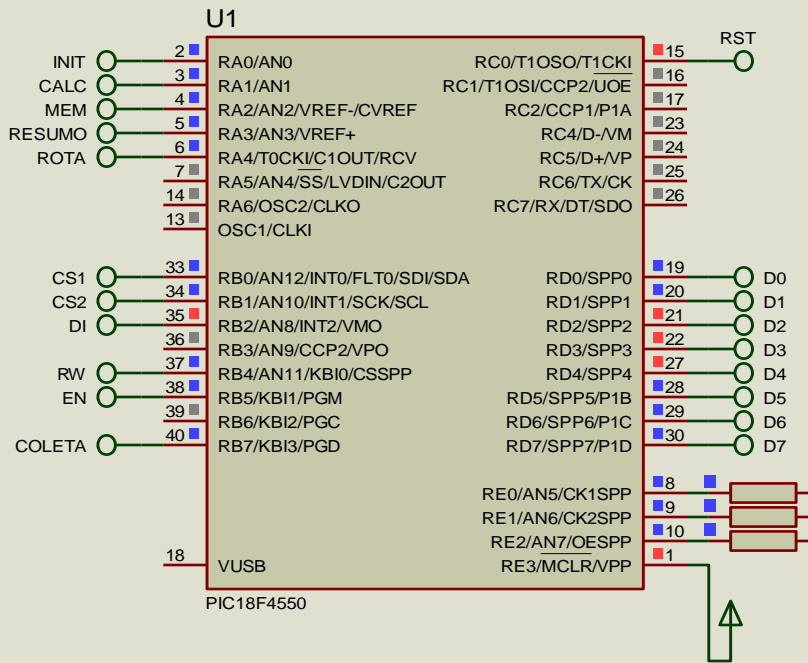
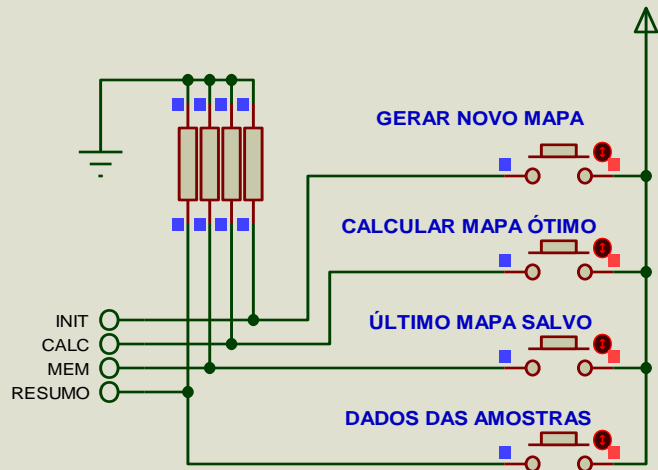
INSTITUTO SENAI
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TECNOLOGIA DA INFORMAÇÃO

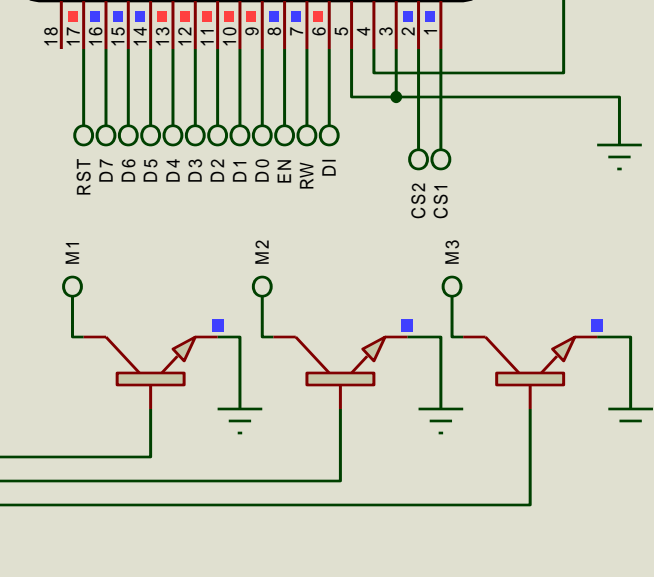
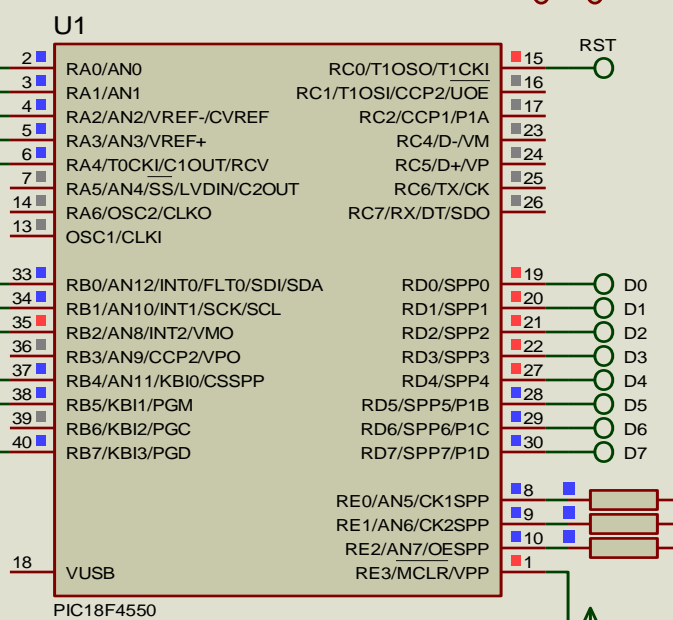
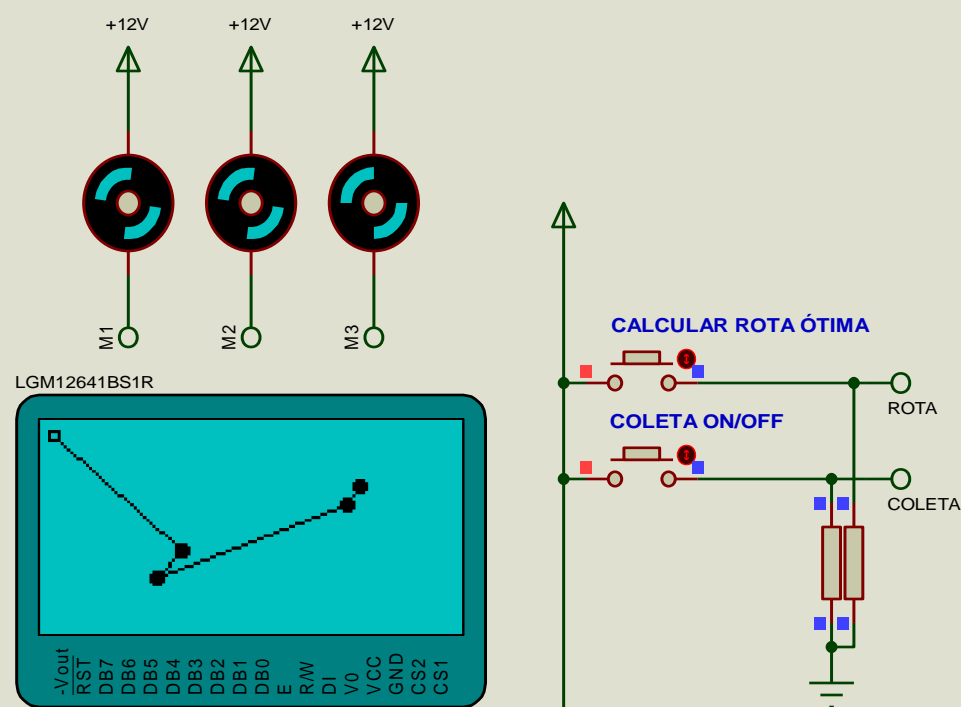
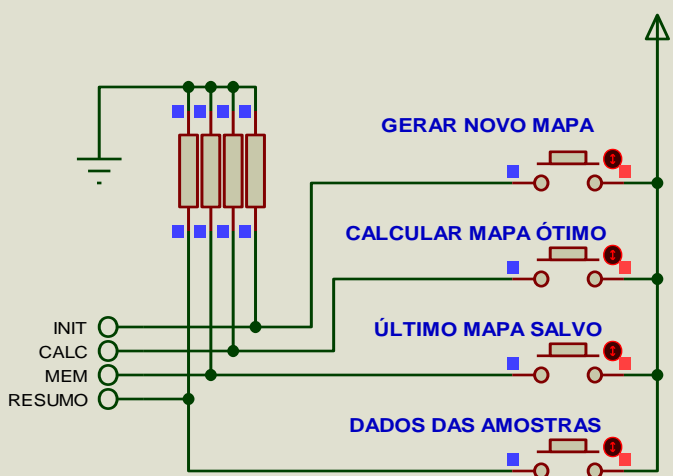


PROGRAMAÇÃO LINEAR

- Coletar as melhores amostras consumindo o mínimo de recursos;
- Otimização para apoiar a tomada de decisão de forma autônoma;
- Sistema que possa ser usado de forma embarcada;





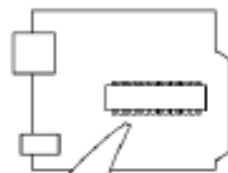




Text message
with new coordinates



Drone coupled with
GPRS shield on the
Arduino board



Arduino board



Genetic algorithm
calculating new
orientation

100101011001110

001101110001110



Orientation for new
target available to the
drone

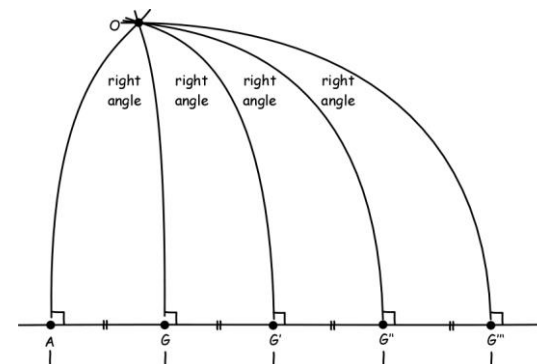
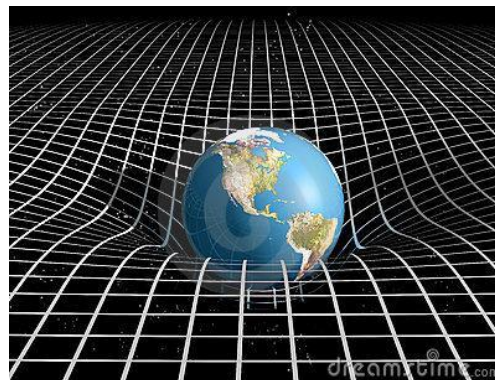
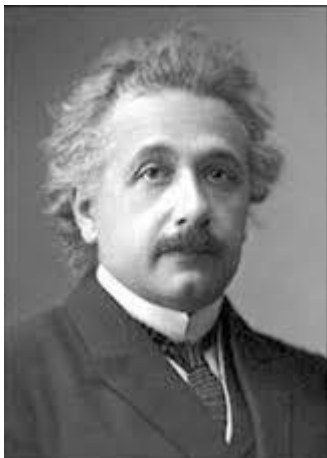
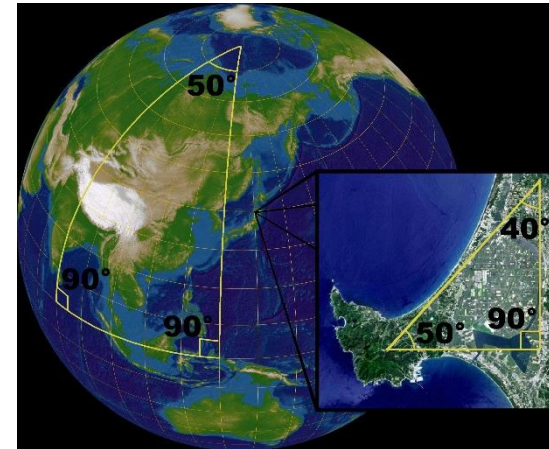


Innovation? 300 BC!! 😊

$$\phi = \text{Atan2} \left(-r_{31}, \sqrt{r_{11}^2 + r_{21}^2} \right)$$

$$\psi = -\text{Atan2} \left(\frac{r_{21}}{\cos(\phi)}, \frac{r_{11}}{\cos(\phi)} \right)$$

$$\theta = \text{Atan2} \left(\frac{r_{32}}{\cos(\phi)}, \frac{r_{33}}{\cos(\phi)} \right)$$



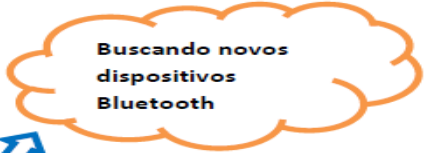
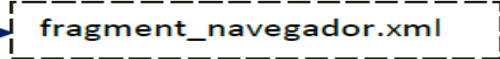
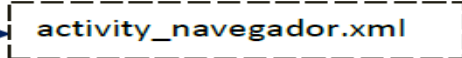
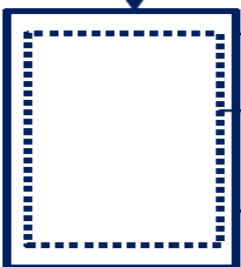
PROGRAMAÇÃO APLICADA

- Módulo de navegação via Android®, por **geometria euclidiana**, para controlar mecanismos automatizados;
 - Operar dispositivos microcontrolados por meio de smartphones Android.
 - Realizar controle remoto local e em qualquer parte do globo.
 - Possibilitar a indivíduos portadores de necessidades especiais (PNE), condições de operarem mecanismos.

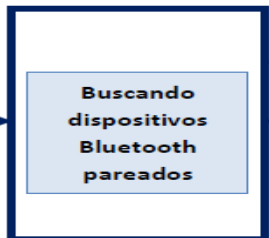
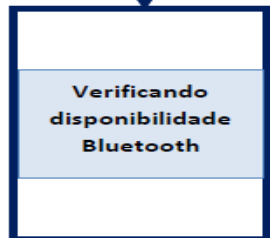




Navegador



cntBluetooth



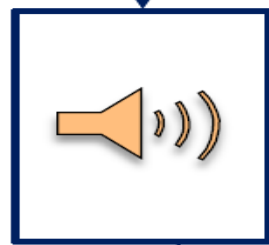
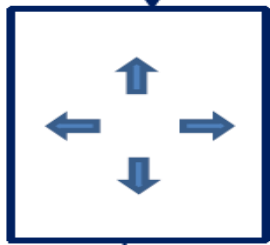
DispositivosPareados



DispositivosBT

AppControles

DialogFragment

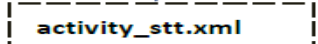
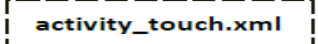
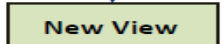
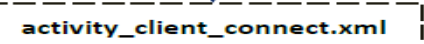


BluetoothClientActivity

BTAccelControlActivity

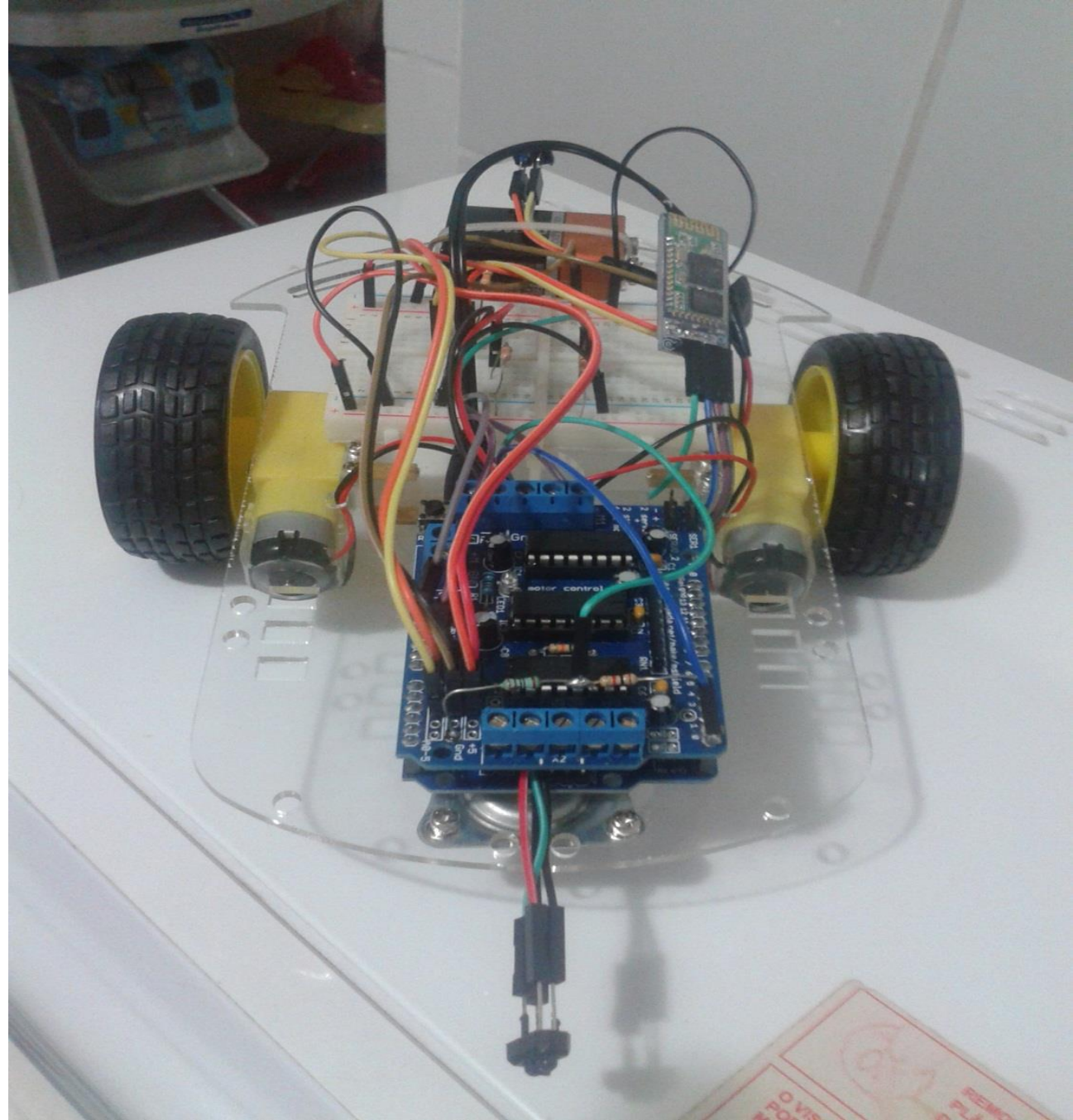
TouchControlActivity

ControleVozActivity



Projeto MAX PLANC I

<http://bit.ly/VideosPlanc>



PROJETO CHANNON

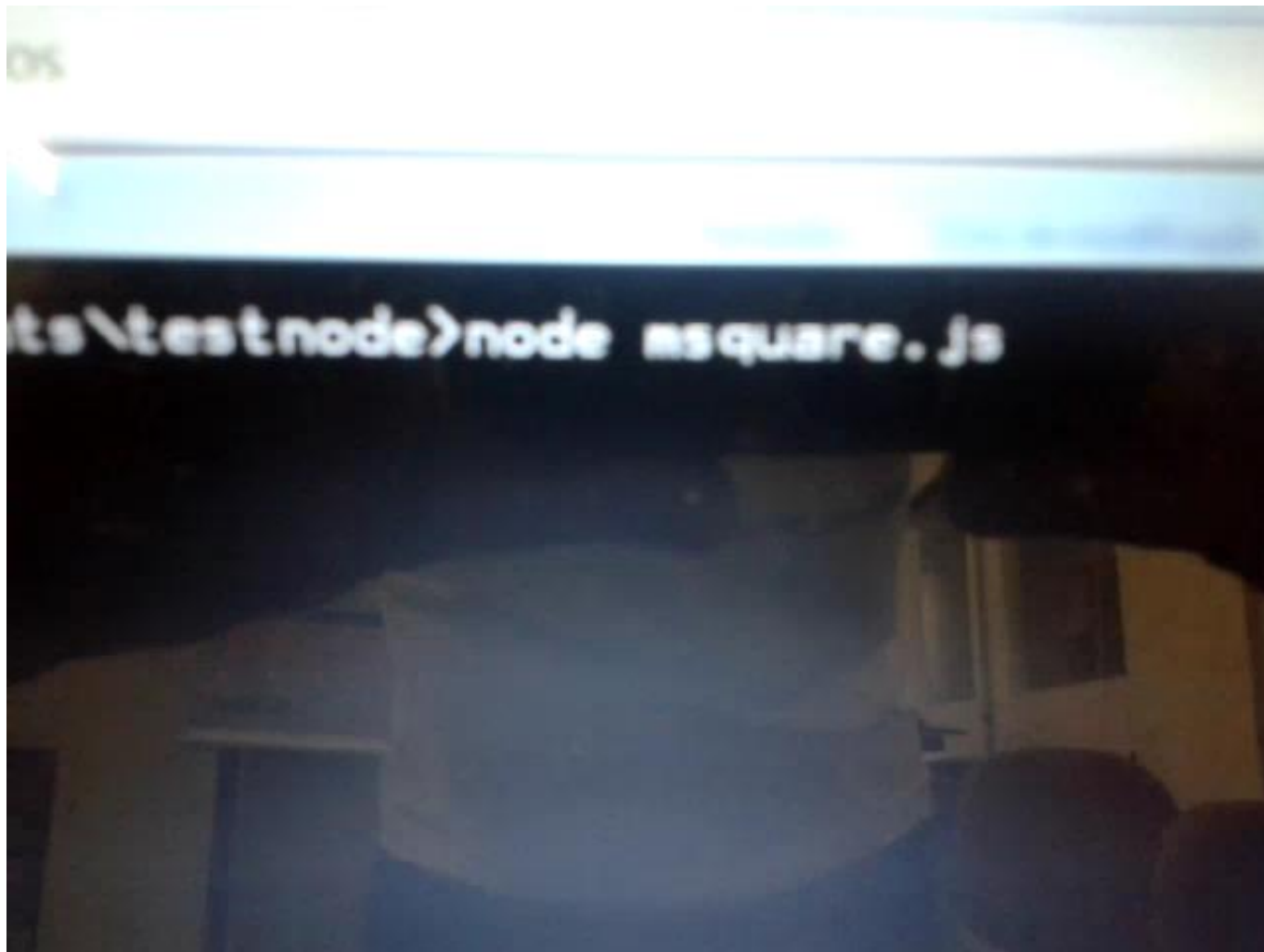
- Planejamento de trajetória e controle autônomo de missão para drones;
- Abordagem evolucionária (NSGA-II);
- Modelo de estudo: Parrot Ar Drone 2.0:



- Plataformas: YaDrone, AutoFlight , Node-JS



QUADRADO OK!



STATUS

- Master thesis (dec)
- Reports (jan)
- Startup (CPRH) 😊

The image shows two pages of a PDF document. The top page is the title page and abstract, while the bottom page contains a flowchart, a diagram of drone control, and a diagram of drone orientation.

Performance and Feasibility Model for Drones as Air Guides in Public Spaces Controlled by Genetic Algorithm

ABSTRACT
This paper discusses the use of drones, small unmanned aerial vehicles, with the functionality of our guides in public places, with trajectory control based on genetic algorithms. The analysis of the performance and viability of the approach is verified by modeling and simulation of typical and atypical conditions of scenarios that may be subject to the process elements employing the Aravis software. Merits relating to modeling based on behavioral analysis are obtained taking into account the dynamics of the evolution of people guided by a drone in a given experimental facilities featuring different environments that can be accessed by way of simulation or simple search. From that time the best state, data, and information are plotted in order to evaluate the various circumstances which may affect the path chosen. development. An initial trajectory control is done on-line in the drone itself through coordinates passed to it by phone. Such coordinated leading a genetic algorithm running on an Arduino Uno generating the new orientation of the drone. Are also observed in the model, critical points that may contribute to the formation of groups in different parts of the building, thus providing an important reference to aid decision making at organizational and retrieval level.

Categories and Subject Descriptors
[Electronic and electrical engineering]: Simulation operations; [Evolutionary algorithms]; [Motion—Computer study, performance measures]

Keywords
Drones, modeling and simulation, Aravis, evolutionary computation, genetic algorithms

1. INTRODUCTION
Unmanned aerial vehicles (UAV) are being increasingly used in more diverse roles, both military and civilian applications, as industrial, commercial and domestic. In any of the operations in which such vehicles are involved, it is important that models be created to describe, predict and evaluate exceptional situations of flight and the steps to facilitate the desired trajectory are developed [1]. Small UAV, equipped with small engines and low altitudes, are known as drones, and have attracted great interest in trade, enabling real-time monitoring of regions and areas of difficult access or hostile. Incorporating, research high-resolution cameras and allowing the exchange of information wirelessly, these devices can reach altitudes with great latency (the which can usually vary from a few minutes).

It is also checked here, if it is necessary to perform a new exchange or adjust in the drone. The groups are finally broken and continue targeted for leaving the scene.

3. PATH CONTROL
The proposed path control presented here is the use of an evolutionary mechanism based on the Aravis platform and capable of running a genetic algorithm [2] in real time. This algorithm takes the position and angular orientation of origin and destination coordinates, and presents a solution for the incorporation of drone. The figure below illustrates how the control is established.

Figure 6: Viability code.

Figure 7: Drone Control Model.
All the computational apparatus to run the algorithm comes from a microcontroller kit based on Arduino platform (Arduino Uno R3), with implementation using a generation of classes source code (C++ library) as presented in [3]. Through our mobile phone, a text message is sent to target coordinates. Through a GPRS module connected to the Arduino board, the message is received, interpreted and subjected to genetic algorithm (ten weeks a solution, to fix the angular orientation of the drone so as to align it with the target).

Figure 8: Drone orientation.
The table below shows the calculated orientation angle found by the genetic algorithm for different initial states of the drone. It is assumed that the population consists of 50 individuals with varying fitness of 20 generations. The algorithm should receive the target and drone coordinates (X, Y), and calculating what should be the new guidelines that the drone will need to rotate to align with the target. It is calculated how the drone is oriented in the various directions.

Figure 9: Drone orientation.

Operating Voltage 5V

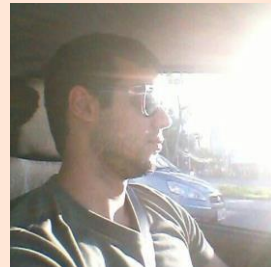
- I/O Pin Digital: 14
- I/O Pin Analog: 6
- DC current (pin GND): 50mA
- Flash Memory (EEPROM): 1KB (used just for bootloading)
- SRAM: 2KB (ATmega328)
- EEPROM: 1KB (ATmega328)
- Clock Speed: 16MHz

As specified in [1], some considerations should be checked (due to certain restrictions) such as processing capabilities, such as limited size of the population at 100 individuals, techniques employed for diversification [3] and fitness measured in the range 0 and 100. To obtain the new dimensions of displacement of the drone, the calculation of drone as shown in [5] was adapted to the problem discussed here. The figure below outlines the angular correction.

TEAM



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