**IAV - Design**

Roles

* Lead: Jake Billings
* Support: Erast Davidjuk
* Support: Jeremy Goldman

Features

Complete

In Progress

Blocked

Major Issue

|  |  |  |
| --- | --- | --- |
| Practice Board  Member(s): Erast, hopefully other team  Status: In progress | Recreate field C from the COTSA document    At least to start, create a 2D version of the board using a large paper or cloth and electrical tape. The dimensions and tracking line must be accurate, and field features must be labeled. | THIS NEEDS TO GET DONE |
| Initial RedBot  Status: Ready | Control RedBot chassis using Arduino Uno.   * Move forward * Move backward * Rotate 360 degrees clockwise and counterclockwise |  |
| Line following  Status: Awaiting parts and practice board | Create line following algorithm using   * Arduino Uno/Sparkfun RedBot * Redbot Chassis * Pololu sensor array * PD Control |  |
| NRF24L01 Communication  Status: Completed by Jake | Establish Serial communication between two Arduino Unos utilizing the NRF24L01 boards.   * Must be able to send commands for motors for future manual control |  |
| Manual Control  Member(s): Jake | Establish a method of control for the IAV utilizing communication through NRF24L01.   * The speed of both motors must be controlled in order to allow for steering of the robot. * Commands will be sent via NRF24L01 | Waiting on new Joy Sticks;  Otherwise complete |
| Create H-Bridge from transistors  Assigned: Jeremy Goldman | Create an H-Bridge to go on top of the Arduino/ATMega controller  [https://123d.circuits.io/circuits/1089194-h-bridge-try-1](https://123d.circuits.io/circuits/1089194-h-bridge-try-1*) | Breadboard version complete. |
| Chassis Redesign/Payload retrieval method  Member(s): All, Jake  Status: | * Chassis must be redesigned using cheap/free materials. * New chassis will be capable of acquiring payload. * Draft drawings will be sketched * CAD will be completed |  |
| Build Chassis and Redesign  Members: All, Jake | * Build the designed chassis and make improvements as necessary * Test, Test, Test * Document! | Waiting on laser engraving |
| Develop Autonomous Program  Member(s): Jake  Status: | * Abstract PID * Abstract Line following * Abstract Receiver * Create central program * Positioning   + Color-based? * Vehicle will be able to complete course autonomously and as quickly as possible * Vehicle will be able to retrieve payload and deliver it to target at the end of the course. * Document | Waiting on Chassis prototype and practice mat |
| Increase Speed and Optimize  Member(s): All, Jake | * The score decreases over time, so our vehicle has to be the fastest     DOCUMENT! | Waiting on Develop Autonomous Program |
| Run blink on ATMEGA328  Member(s): Jeremy | * Run blink off of an ATMEGA (use a multimeter instead of LED) | Done. |
| Build custom boards  Member(s): Jake/Jeremy  Status: | * Flash the 328 using an Uno, and connect to the robot. Everything should function nominally for a fraction of the price. * Solder circuit onto perfboard |  |
| Documentation  Member(s): All, Jeremy, Jake  Status: Waiting on more info | B. Every team shall submit a standard three ring 8.5” x 11” engineering binder which captures the design process. The notebook shall contain:     * A title page with the event title, state conference information, including date of the conference and the team ID number. * Minimum two (2) page typewritten description of the vehicle including the building system/components used. This description should include a brief discussion of the design problem, the engineering design process, and the final solution. Include a discussion of any data, calculations, and iterations taken during the design process. * Bill of Materials (BOM) / Budget: A complete list of all parts, materials, and components used on the vehicle. Additional bonuses will be awarded to teams that use readily available materials and low-cost solutions. * Data Tables and Calculations: Tables of original experimental data illustrating the iterations, trials and calculations should be included and properly documented with dates and times of the experiments. * Complete mechanical engineering drawings of the vehicle shall be provided.   i. Drawings may be done by hand or using computer-aided design (CAD).  ii. The drawings should include at a minimum an orthographic or isometric sketch and three section views illustrating the front, top and side profiles of the vehicle with appropriate geometric dimensioning and tolerancing.     * Schematic drawings of the wiring, power system and sensors shall be provided. * Use color coding and labels on your schematic where appropriate. * Pseudo-code / algorithm. Contestants should include a flow chart, diagram or illustration of their program and program flow. * Print-out of the complete source code of the program shall be included. Your program should be well documented and commented to allow judges to interpret your algorithm and program flow. |  |
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Work Log

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| --- | --- | --- | --- |
| Date | Time | Member(s) | Work |
| 09/12/2015 | 65 Minutes | Jake Billings | * Design document created * Sensors and microcontrollers researched * Concept plans drawn * Rough plan of work including main features created |
| 10/01/2015 | 100 minutes | Jeremy Goldman, Erast Davidjuk, and Jake Billings | * Begin assembly of practice track |
| 10/06/2015 | 100 minutes | Jeremy Goldman, Erast Davidjuk, and Jake Billings | * Planning * Code review * H-Bridge research |
| Next |  |  | Remote controlled redbot with ardumoto WORKING |

Bill of Materials (Working Copy and Log)

*Put all purchased and used materials on this log. This is not the final log, so do not delete anything. Do not include materials used to build practice tracks.*

|  |  |  |  |
| --- | --- | --- | --- |
| Material | Purpose | Current Use/Status | Price and Source |
| Pololu QTR-8RC Reflectance Sensor Array  (Line following sensor) | Used to determine the vehicle’s position relative to the tracking line. | Attached | $9.95  <https://www.pololu.com/product/961> |
| Arduino Breadboard Basic Kit - ATMEGA328P-PU With Bootloader 16MHz Crystal G36 | Microcontroller | In main  *Non critical but could reduce price of robot* | $7.49  <http://www.ebay.com/itm/151744703049> |
| NRF24L01 | Transmitter/Receiver | In use. | $3.99  <http://www.ebay.com/itm/like/191542825497?ul_noapp=true&chn=ps&lpid=82> |
| Ardumoto | Motor driver | In use. | $24.99  <https://www.sparkfun.com/products/9815?gclid=Cj0KEQiAkIWzBRDK1ayo-Yjt38wBEiQAi7NnP_iKWsE5muHVlLb-0NxwpatBMUkDVohHlg76SdWnypoaAmEb8P8HAQ> |
| RedBot Chasis | Chasis | In use. | ~$15.00 (from school)  <https://www.sparkfun.com/products/retired/10825> |
|  |  |  |  |

Obsolete Planning

Possible Members

On Team

Tentative

Not on Team

Candidate

* Jake Billings - Lead
* Scott McIntyre - Support/Notebook
* Jeremy Goldman - Support/Notebook
* Erast Davidjuk - Support/Notebook
* Simone Ong - Support/Notebook
* Sebastian del Barco - Support
* Lauren Martin - Notebook