Design - Part 1

Sddec24-01

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Project Overview:

- Create a project with a balloon that flies high up to collect data and record videos from near space.
- Work together with H.A.B.E.T. and other groups.
- Our aim is to get clear videos from up to 30,000 meters using software defined radios.
- We need to keep an eye on power use and how heavy the payload is.

Ideation:

- Pin Modulation
  - attached a larger pin for greater modulation power
- Binary Encoding
  - Pulse Code Modulation
- Monopole Transmission
  - Frequency Agility
- Chirp Signal Modulation
  - Frequency Calibration

Promising Potential Solution:

- Utilize lightweight, high-resolution cameras and sensors for high-altitude data collection.
- Implement software-defined radios (SDRs) for real-time communication and control.
- Collaborate with H.A.B.E.T. and other relevant groups for expertise and resources. Incorporate efficient power management and payload weight optimization measures.

Market Research:

- MATLAB
  - Unique Value Proposition
    - They have a platform called ‘Simulink’ that can be used for code generation for the SDR
    - They have active customer service for user issues, which other sdr gui companies do not offer.
  - Company Advantages
    - It will run faster for larger quantities for data due to a closer relation to machine code
    - This software is more widely used, so it provides a lesser learning curve for users in HABET
  - Company Disadvantages
    - This software requires a base 850 dollars per year to use plus specific toolbox licensing fees
    - Do to the high cost of the software, there is less public documentation that is a valuable resource for debugging models.

Conclusion:

- Despite its advantages in computational analysis, MATLAB's complexity posed implementation challenges.
- One standout idea involved integrating GPS tracking with atmospheric sensors for precise data collection.
- Market research informed our project direction by studying existing products and user needs.
- Our approach involved ideation, MATLAB analysis, innovative solution exploration, and market research for informed decision-making.