VTOL for the Masses

IPRO 318

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What is VTOL?

- Vertical Takeoff Landing Aircraft
  - Helicopter
  - Hovercraft
  - Flying Car
- VTOL for the Masses
  - Maneuverability of a helicopter
  - Usability of an automobile
  - Flight stability of a plane

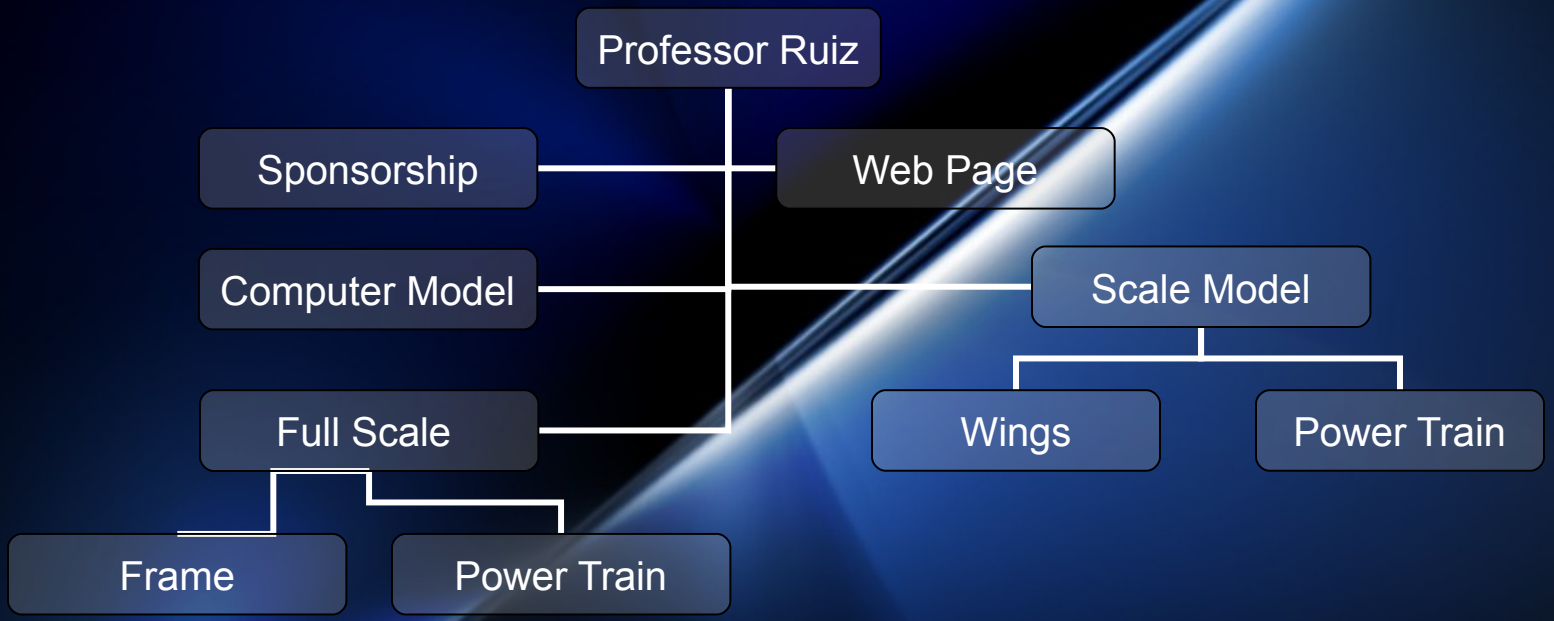
Why VTOL?

- Avoid Traffic Congestion
- Fast, Direct Transportation
- Avoid Lengthy Runways
- More Efficient Long Range Travel

Our Objective

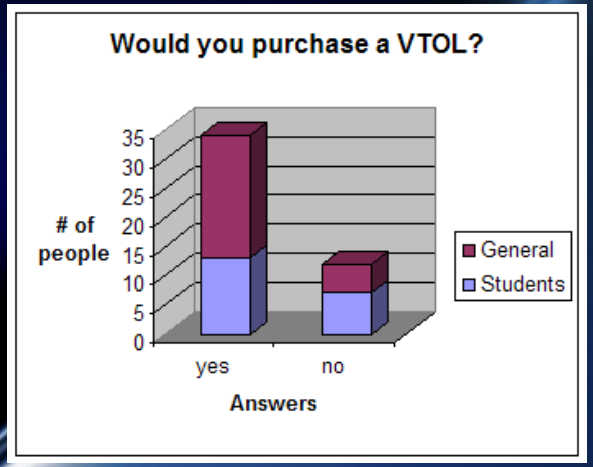
- Other Proposals
  - Skycar
    - Millions of Dollars and Decades of Time
    - No Working Proof of Skycar capability
- Design a VTOL aircraft for civilian use
  - Economic appeal
  - Durability
  - Ease of use
  - Availability

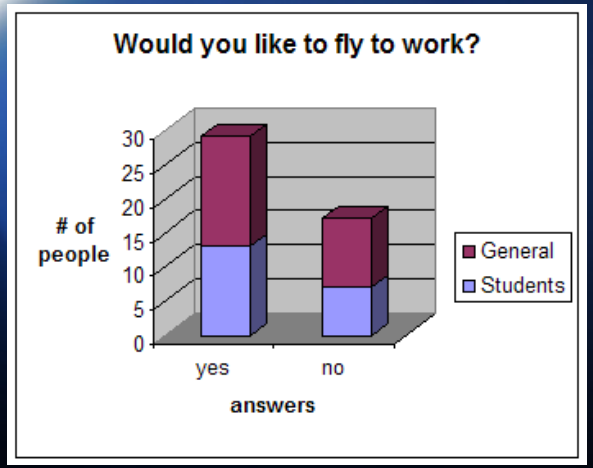
Organizational Chart



Market Survey

- Revised survey from previous semester
- Students and Staff surveyed
  - $10,000 to $ 20,000 for the price of the aircraft
  - 150 mile range
  - Majority was confident in safety of product as well its ability to sell





Features of VTOL Aircraft

- Based on a helicopter design
- Wings
- No tail rotor
- 2 counter-rotating rotors
- 2-3 passengers
- Maximum speed of 120mph

X-Plane

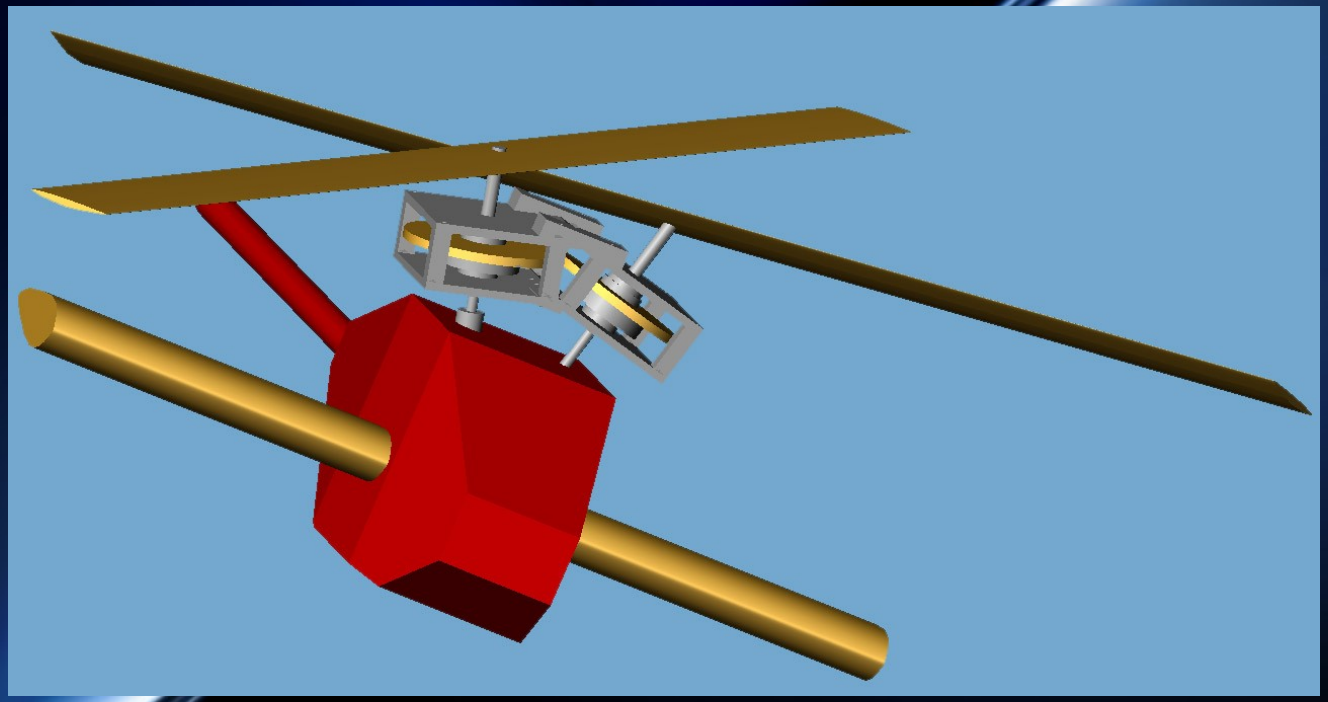
- Simulation of model in X-Plane
  - FAA Approved
- Flying VTOL in X-Plane
  - Forward Flight Only

Computer Model

- Testing
  - Wings
  - Rotors
  - Center of Mass
- Finalized prototype design
  - Two intermeshed rotors
  - Large wings
    - Slightly Smaller than the rotors.

Scale Model

- Scale model based on Kyosho Nexus 30 model helicopter

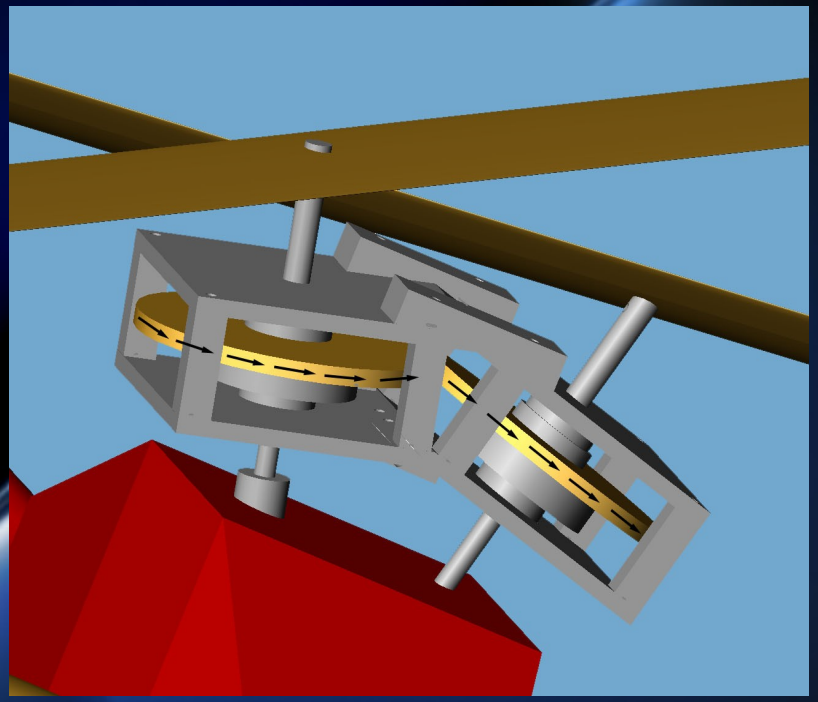


Scale Model Wings

- Generate lift in forward flight and increase stability of aircraft
- Capable of rotation to reduce downwash
- Reduce weight of aircraft on rotor because maximum weight is on the wings (reduce cost of rotor)
- Built using Styrofoam coated with fibre glass and carbon fibre through a vacuum bagging process

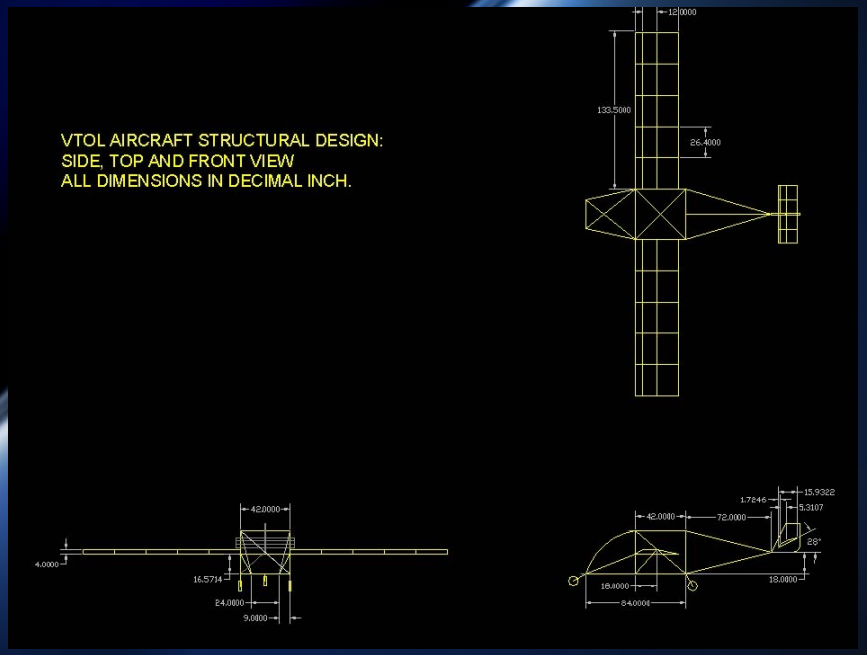
Scale Model Power Train

- Function
  - Transmits power from the main shaft to the rotors
- Model is maneuvered by
  - Moving the Rotors
  - Changing the center of mass



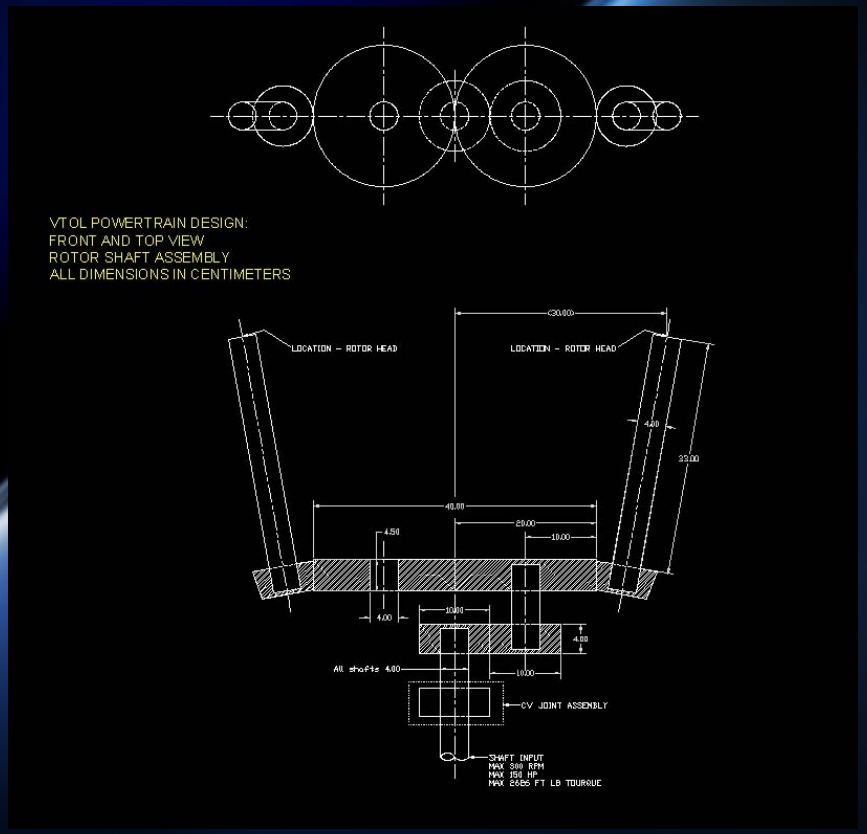
Full Scale Prototype - Frame

- Pipe cage model
- Increased strength and reduced weight
- Cromoly 4130, aluminum
- Based on the model of the light-weight Robinson 22 and the Schweizer 300C aircrafts



Full Scale Prototype – Drive Train

- 150 Hp Mazda 13b car engine
- Modified gearing system
- Selected because of relatively easy modification for aircraft use



Budget Research

- To gain financial support for project
- Full Scale Prototype - $10,000
  - Materials needed
  - Supplies and Labor
  - Research and development
- Scale Model - $1,500
  - Model Kit
  - Modifications
  - Testing

Web Page

- Purpose
  - Keep group members up to date
  - Keep public informed
- Features
  - Message board and survey results
  - Project outline
  - Pictures of computer model
- www.iit.edu/~ipro318

Laws and Regulations

- Government Regulations on aircraft
- Noise and air pollution restrictions
- September 11 Impact
  - Air space restrictions
  - Licensing procedures

Future Needs

- Stronger market research
- Keep web page up to date
- Finalize budget and gain financial support
- Computer model research
- Test scale model
- Build full scale prototype
- Research laws and regulations

Conclusion

- Most objectives met
- Optimistic outlook

Thanks To Our Group Members

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