

# Control Module/Interface for Service Robots

Senior Design Team 315

Department of Electrical and Computer Engineering



# Team Introduction



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Engineer



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Software  
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Software  
Engineer –  
Control Logic



Jossue Arzeta  
Software  
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Applications  
Engineer

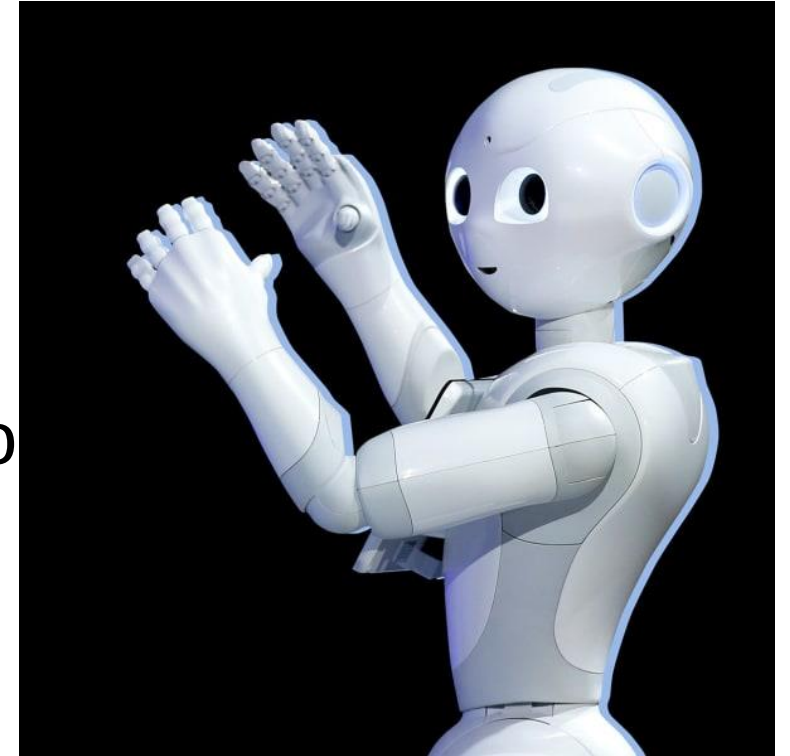
# Scope of Presentation

- Project Background
- Project Scope
- Requirements
- Functional Decomposition
- Project Management
- Project Plan



# Project Background (Part 1 of 2)

- A robot can follow you!
- Applications:
  - Grocery cart
  - Golf caddy
  - Cart to carry construction equipment/to



# Project Background (Part 2 of 2)

- Automation is the future
- Robotics and AI
- Increased productivity and efficiency
- Pursue more applications
- Apply what we are currently learning



# Project Scope (Part 1 of 3)

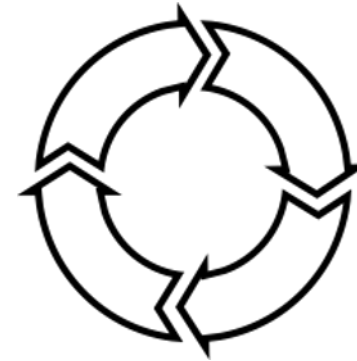
- Control module for a motorized system
- Follow a user as they move around in a safe manner
- Provide smooth transfer between semi-autonomous mode and manual mode





# Project Scope (Part 2 of 3)

- Decide how we want the user to interact with the control module
- Implement feedback system that will scan the environment for movement purposes
- Ensure it's easy to use for the everyday user



# Project Scope (Part 3 of 3)

- Warehouses
- Superstores
- Factories
- Construction sites
- Hospitals
- Restaurants





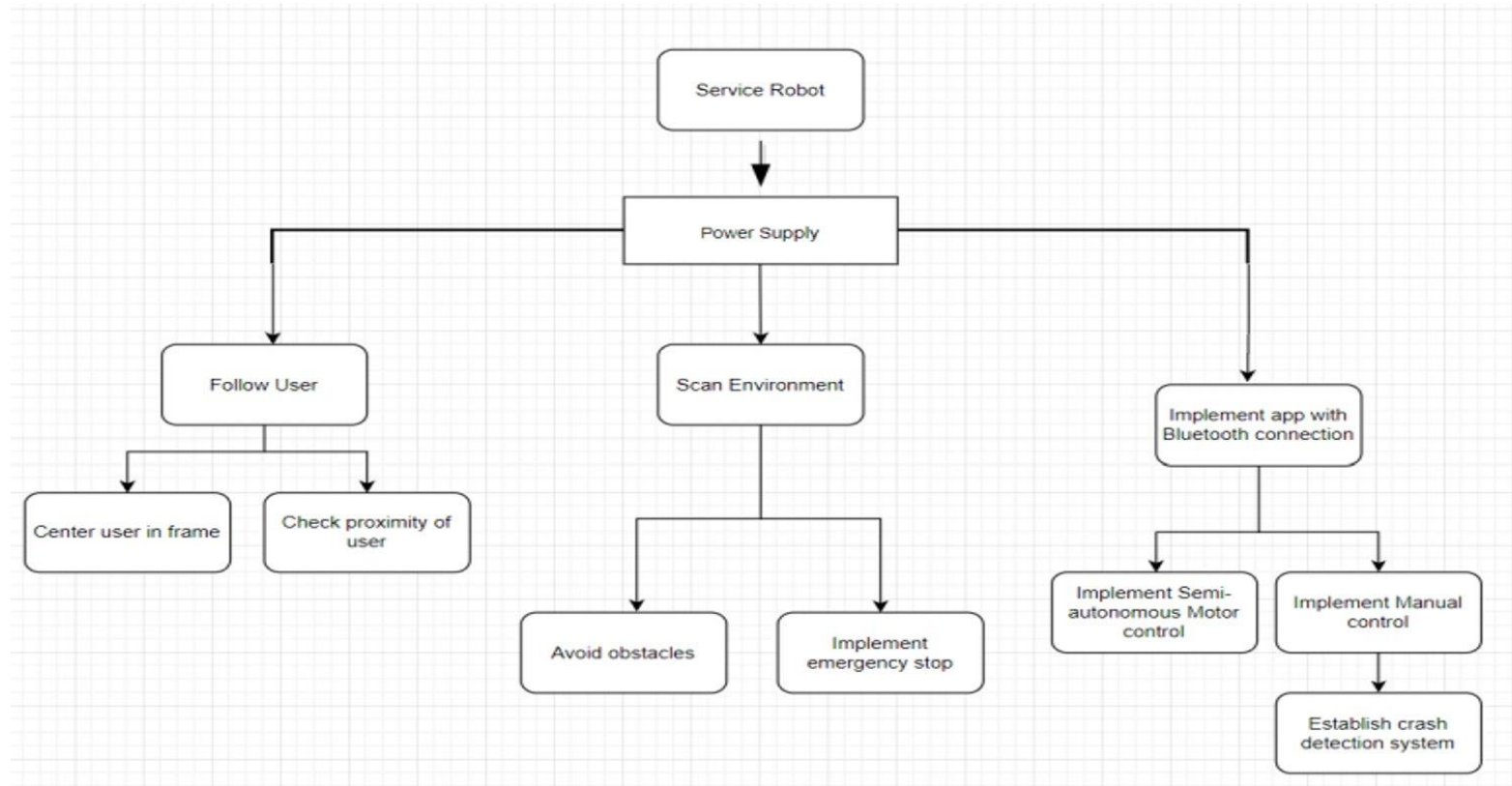
# Requirements (Part 1 of 2)

- Design control module 
- Integrates into a pre-built existing robot 
- Dynamic and allows usage with multiple robots 
- Detect obstacles 
- Interact with different types of cameras 

# Requirements (Part 2 of 2)

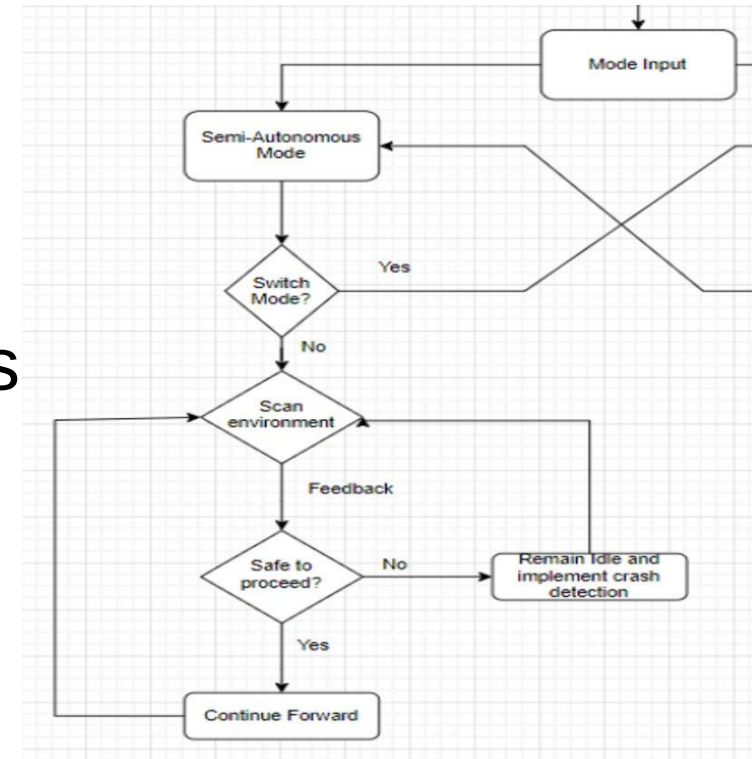
- Follow user via mobile app 
- Powered by battery 

# Functional Decomposition (Part 1 of 5)



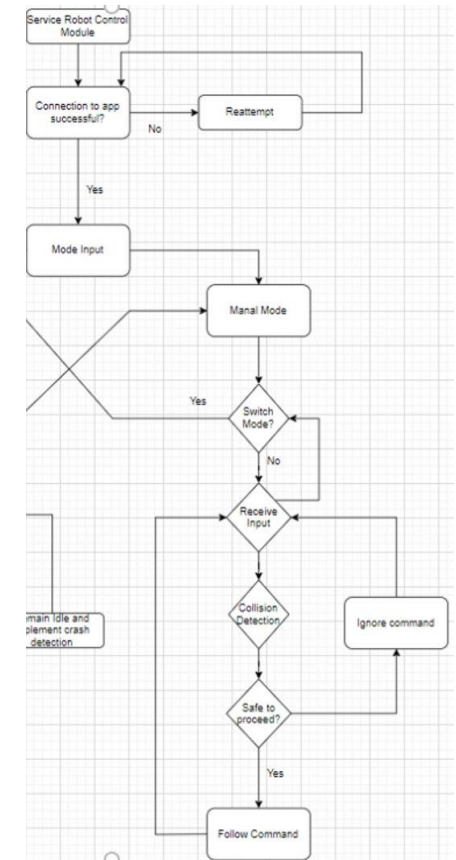
# Functional Decomposition (Part 2 of 5)

- Semi-autonomous
  - Follow user
  - Scan environment
  - Switch between manual and autonomous
  - Crash detection



# Functional Decomposition (Part 3 of 5)

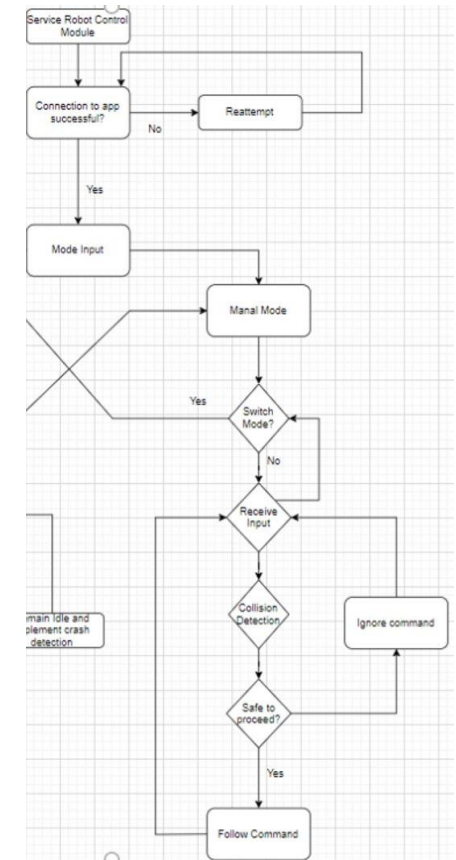
- Connect via Bluetooth through mobile app
- Ability to select manual mode
- Input commands through the app
  - Select autonomous mode
  - Can move 360 degrees





# Functional Decomposition (Part 4 of 5)

- Collision detection
  - Runs in background
  - Ignores dangerous commands
  - Applies emergency brakes if necessary



# Functional Decomposition (Part 5 of 5)

| Functions                               | Systems     |                  |                                         |
|-----------------------------------------|-------------|------------------|-----------------------------------------|
|                                         | Follow User | Scan Environment | Implement App with Bluetooth connection |
| Center user in frame                    | +           | +                |                                         |
| Check proximity                         | +           | +                |                                         |
| Avoid Obstacles                         | +           | +                |                                         |
| Implement Emergency Stop                | +           | +                |                                         |
| Implement semi-autonomous motor control | +           | +                | +                                       |
| Implement manual control                |             | +                | +                                       |
| Establish manual crash detection system |             | +                | +                                       |



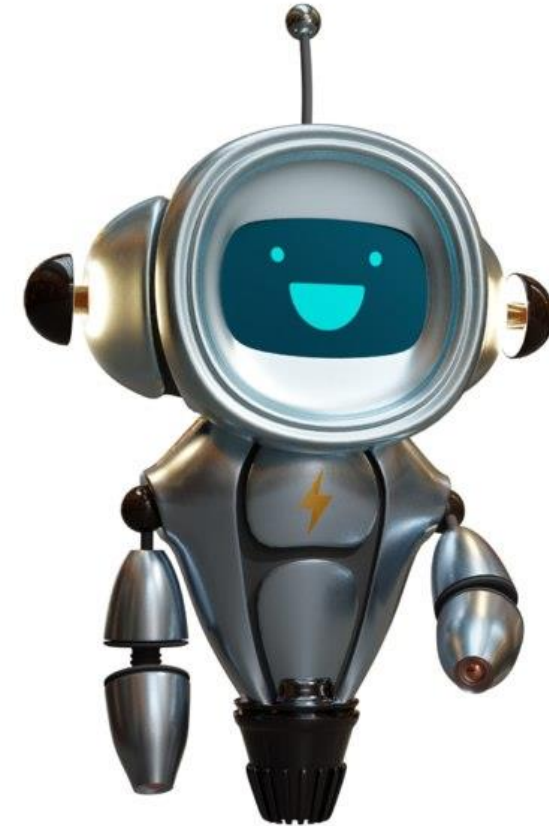
# Project Management

- Ideas are encouraged
- Committed to success of the project
- Meeting biweekly
- Weekly progress reports sent to advisor
- Decisions are made by group consensus



# Project Plan

- Seamless and user-friendly robot
- Be efficient and cost-effective
- A product people want to use



# Presentation Recap

- Project motivation
- Scope
- Needs and requirements
- Function of the project
- Plan



# Questions

