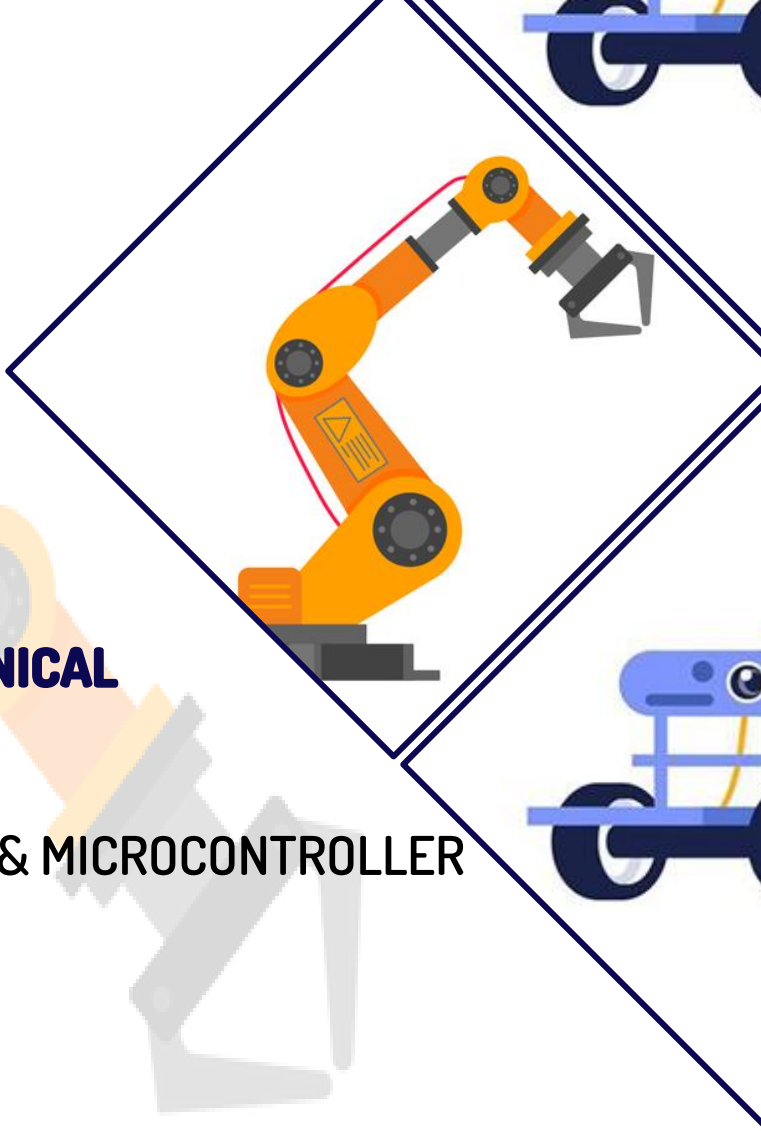
শিক্ষা নিয়ে গড়বো দেশ ,তথ্য-প্রযুক্তির বাংলাদেশ

Bangabandhu Sheikh Mujibur Rahman Digital University



PROJECT PROPOSAL

BLUETOOTH CONTROLLED MECHANICAL ARM VEHICLE

COURSE CODE: IRE 206

COURSE TITLE: MICROPROCESSOR & MICROCONTROLLER SYSTEM DESIGN SESSIONAL

SUBMITTED TO:

FAHMIDA AHMED ANTARA
LECTURER
DEPARTMENT OF IRE, BDU

DATE:28 January ,2024

OUR GROUP

1.MOBASHIRA MEHAJABIN ARPITA
ID:2101008
DEPARTMENT OF IRE, BDU

2.MD.WALID HASAN
ID:2101009
DEPARTMENT OF IRE, BDU

3.MEHRIN FARZANA
ID:2101013
DEPARTMENT OF IRE, BDU

4.IFTY IMAM BIN RAZZAK
ID:2101014
DEPARTMENT OF IRE, BDU

5.MD. ZUNAID HOSSAIN
ID:2101017
DEPARTMENT OF IRE, BDU

6.MD.ABDULLAH AL MAMUN
ID:2101020
DEPARTMENT OF IRE, BDU

7.MARIA JAHAN MIM
ID:2101022
DEPARTMENT OF IRE, BDU

Table of Contents

BANGABANDHU SHEIKH MUJIBUR RAHMAN DIGITAL UNIVERSITY, BANGLADESH
DEPARTMENT OF INTERNET OF THINGS AND ROBOTICS ENGINEERING
FACULTY OF CYBER PHYSICAL SYSTEMS
BDU, BANGLADESH

IRE 206- MICROPROCESSOR & MICROCONTROLLER SYSTEM DESIGN SESSIONAL
TENTATIVE TITLE- BLUETOOTH CONTROLLED MECHANICAL ARM VEHICLE

Chapter 1: Background:

In the fast-paced landscape of modern technology, microcontrollers have become pivotal components in various applications, from embedded systems to robotics. The integration of microcontrollers with mechanical systems offers a realm of possibilities for creating intelligent and controllable devices. This project is grounded in the exploration of microcontroller applications within the context of a Bluetooth-controlled robotic arm vehicle, blending theoretical knowledge with practical implementation.

I. Significance of Microcontrollers:

Microcontrollers serve as the brains of electronic systems, providing the ability to control and manipulate hardware. Their compact size, low power consumption, and versatility make them ideal for a myriad of applications. In the realm of robotics, microcontrollers are fundamental in orchestrating the movement and actions of robotic limbs, enhancing precision and control.

II. Integration of Robotics and Microcontrollers:

The fusion of robotics with microcontroller technology has paved the way for innovative solutions in automation, manufacturing, and exploration. Robotics, once confined to controlled environments, has expanded its horizons, thanks to the intelligent control afforded by microcontrollers. This project capitalizes on this synergy, aiming to create a dynamic and controllable robotic arm vehicle through the application of microcontroller programming.

III. Bluetooth Communication in Robotics:

Wireless communication plays a pivotal role in modern robotics, enabling remote control and real-time data exchange. Bluetooth technology, with its widespread adoption and compatibility, offers an efficient means of communication between a user interface (such as a smartphone) and a microcontroller-powered robotic system. The project leverages Bluetooth connectivity to provide users with a seamless and wireless control experience.

Chapter 2: Project Overview:

1. Design and construct a mobile vehicle chassis capable of carrying a mechanical arm.
2. Implement a Bluetooth communication module for remote control.
3. Develop a user-friendly mobile application for controlling the vehicle.
4. Integrate a mechanical arm capable of basic movements (e.g., picking up objects, moving in multiple directions).
5. Ensure safety features to prevent collisions or damage during operation

Chapter 3: Required Components and Materials:

1. Arduino Uno,
2. Robotic Gripper,
3. MG995 Servo motor x 6,
4. 12v DC gear motor x 2,
5. DC to DC buck converter,
6. hc-05 Bluetooth module,
7. Battery 7.4v to 12v,
8. Power on off switch

Chapter 4: Methodology:

1. **Chassis and Vehicle Movement:**
   - Assemble the mobile vehicle chassis and install motor drivers for basic movement (forward, backward, left, right).
   - Integrate a power supply system suitable for the vehicle.
2. **Mechanical Arm Design:**
   - Design a mechanical arm that is lightweight, yet capable of performing basic tasks.
   - Choose and install servo motors for each joint of the arm.
3. **Bluetooth Communication:**
   - Connect the Bluetooth module to the microcontroller.
   - Develop a simple communication protocol for controlling the vehicle through Bluetooth.
4. **Mobile Application:**
   - Design and implement a user-friendly mobile application for remote control.
   - Ensure the application can send signals to the microcontroller to control the vehicle and arm movements.
5. **Integration and Testing:**
   - Integrate the mechanical arm with the mobile chassis.
   - Conduct thorough testing of each component and the overall system.
   - Address any issues related to communication, movement, or functionality.

Chapter 5: Expected Output:

The completion of the Bluetooth-controlled robotic arm project is anticipated to yield several tangible and educational outcomes, showcasing the successful integration of microcontroller technology with robotics. The expected outputs are as follows:

1. Fully Functional Robotic System:

- A Bluetooth-controlled robotic arm mounted on a mobile vehicle chassis.
- Precise control of the vehicle's movements in multiple directions, allowing for smooth navigation.
- The robotic arm capable of executing basic actions, such as picking up and manipulating objects.

2. Microcontroller Codebase:
- Well-documented and modular microcontroller firmware.
- Code optimized for efficiency, responsiveness, and ease of maintenance.
- Clear implementation of control algorithms for both the vehicle and the robotic arm.

3. Sensor Integration and Feedback:
- Successful integration of selected sensors for real-time feedback.
- Accurate interpretation of sensor data, enhancing the robotic system's interaction with the environment.
- Demonstrated capability of the system to respond dynamically to changes in the surroundings.

4. Bluetooth Communication:
- A reliable Bluetooth communication module integrated with the microcontroller.
- A mobile application providing an intuitive interface for remote control.
- Secure and efficient bidirectional communication between the mobile device and the robotic system.

5. Educational Documentation:
- Comprehensive documentation, including circuit diagrams, source code documentation, and user manuals.
- A detailed methodology outlining the steps taken in the project's execution.
- Documentation of challenges faced, solutions implemented, and lessons learned during the development process.

6. System Optimization:
- A thoroughly tested and optimized robotic system, ensuring smooth functionality.
- Addressed and resolved bugs or errors identified during testing.
- Codebase optimized for performance, responsiveness, and reliability.

7. Presentation and Demonstration:
- A visually engaging and informative presentation outlining the project's objectives, methodology, and outcomes.
- Live demonstrations showcasing the Bluetooth-controlled robotic arm vehicle in action.
- Engaging discussions highlighting the educational and practical aspects of the project.

8. Future Implications and Learning:
- Enhanced understanding of microcontroller programming and its applications in robotics.
- Acquisition of practical skills in sensor integration, Bluetooth communication, and control algorithm design.
- A foundation for participants to explore further developments in robotics, automation, and embedded systems.

The expected outputs aim to not only demonstrate the successful implementation of the Bluetooth-controlled robotic arm project but also provide valuable educational content for participants. The documentation and presentation components ensure that the knowledge gained from this project can be shared and utilized for future projects and educational purposes.