

XBCAD7319
WORK INTEGRATED LEARNING
MOVEWITHME
SPRINT 1: CONCEPTUALISING AND PLANNING DOCUMENT

GitHub repo:

<https://github.com/chrisgteague/Wil-GR-2-KineticPulse-Innovations-Move-With-Me>

Group members:

ST10083450 – Christopher Gary Teague

ST10198049 – Ethan Swanepoel

ST10083397 – James Pollard

ST10219921 – Mishka Dewlok

ST10042220 – Tariq Barnabas

Supervisors:

Denzyl Govender

Sarina Till

Yusuf Paruk

Project Overview:

The goal of our project, MoveWithMe, is to develop innovative children's clothing embedded with sensors to track and promote movement. The smart clothing will utilize a combination of hardware and software components to provide real-time data on children's physical activity levels, encouraging healthier habits and facilitating parental monitoring. The project aims to enhance child development through active play while providing valuable insights for parents and caregivers.

Project Objectives:

1. Design and develop smart clothing prototypes with integrated movement tracking sensors.
2. Implement software algorithms to analyse movement data and provide actionable insights.
3. Ensure user-friendly interface for parents to monitor and track their child's activity levels.

4. Conduct rigorous testing and refinement to ensure accuracy and reliability of sensor data.
5. Establish partnership with neonatologists and occupational therapists and child development experts for validation and advice.
6. Develop a scalable manufacturing process for production of the smart clothing (at the end).

Project Scope:

The project scope encompasses the following key aspects:

- **Hardware Development:** Designing and integrating sensors (e.g., accelerometers, gyroscopes) into children's clothing.
- **Software Development:** Creating algorithms for real-time data analysis, user interface development for parents' monitoring, and mobile application integration.
- **Testing and Validation:** Conducting thorough testing to ensure accuracy, reliability, and safety of the smart clothing.
- **Regulatory Compliance:** Ensuring compliance with relevant safety and regulatory standards for children's products, as well as registering with the research council.

Project Team:

1. **Project Manager (Mishka)**
 - Plan and develop roles and responsibilities
 - Delegate tasks
 - Ensure efficiency of team members
 - Communicate with members and client
2. **Hardware Engineers (Chris, Tariq)**
 - Familiarise with hardware components
 - Ensure hardware is working as needed
 - Work with software engineers to integrate with software
3. **Software Engineers (James, Mishka, Ethan)**
 - Familiarise with software components
 - Ensure software is doing what we need
 - Work with hardware engineers to integrate with hardware
4. **Testers (Children)**
 - Test both hardware and software
 - Give feedback and improvements
 - Ensure prototype is working as needed

5. Researcher (All)

- Conduct extra research into components and software needed
- Give valuable insights and information that may help with the project
- Assist members with information around a topic that is needed

Communication:

The team is mainly communicating by in-person group meetings held on campus. We also use channels like WhatsApp groups and Microsoft Teams to pass on information. Our GitHub repo is our central source for project information. Minutes are being taken and progress is being continuously documented.

Decision making:

As this is a team effort, we'd like to try and keep most decision making interactive and give everyone the opportunity to voice their opinions equally, as a group. The option with most votes will be taken, with due diligence and advice considered from our supervisors. As the main point of contact and decision making, Mishka will be contacted.

Workload distribution:

The workload is distributed according to our roles and responsibilities outlined above. Since this is a big group project, all members will be involved in all tasks.

Project Timeline:

Phase 1: Research and Planning (2 months)

- Conduct research and identify target audience.
- Define technical requirements and specifications.

Phase 2: Design and Development (6 months)

- Develop hardware prototypes with integrated sensors.
- Brainstorm clothing ideas
- Develop working hardware skills
- Design software algorithms for data analysis and user interface.
- Conduct iterative testing and refinement.

Phase 3: Testing and Validation (2 months)

- Conduct comprehensive testing to ensure accuracy and reliability.

- Validate sensor data with neonatologists and occupational therapists

Phase 4: Deliver and Present (1 month)

- A fully planned presentation demonstrating and marketing our project to supervisors, lecturers and other student individuals

Progress as of 2 April 2024:

We have already met and discussed with 2 of our supervisors regarding the project. Under the wing of Sarina for hardware, and Yusuf for software. We have been given different hardware components such as sensors, accelerometers, gyroscopes, speakers and Arduino boards to work with. These components will work with Arduino code in the Arduino IDE. We have also been advised for the development of a software API to communicate with the sensors, using Kotlin in android studio. Our team has already started meeting and expanding our knowledge by experimenting with the hardware components and successfully getting them working. We are in the process of developing a prototype by incorporating all the hardware into fabric, which we will take to the research council and get approval. During the course of our development phase, we have been advised that we will go on guided trips to the midlands rural area with our supervisor, in order to test the prototype on children and get feedback and advice from their mothers. Our advice will also come from working with registered neonatologists and occupational therapists to further guide and structure our development process.

Definition of Ready(DOR):

Purpose:

The Definition of Ready (DoR) ensures that all necessary preparations have been made before initiating work on the MoveWithMe project for Sprint 1: Conceptualising and Planning Document. It serves as a guideline to ensure clarity, alignment, and readiness before starting the sprint.

Criteria:

1. Project Overview and Objectives:
 - The project overview, including goals, objectives, and scope, has been clearly defined and understood by all team members.

- Specific project objectives, such as designing smart clothing prototypes and implementing software algorithms, have been identified and documented.

2. Project Resources and Roles:

- The project team members and their respective roles and responsibilities have been identified and documented.
- Project manager and supervisors have been appointed and are aware of their roles in guiding the project.

3. Project Timeline and Phases:

- The project timeline, including phases and milestones, has been established and communicated to all team members.
- Sprint 1 objectives, focusing on conceptualizing and planning the project, have been clearly defined and understood.

4. Communication Channels:

- Communication channels, including in-person meetings, WhatsApp groups, Microsoft Teams, and GitHub repository, have been set up and are operational.
- Minutes of meetings are being taken and progress is being continuously documented for transparency and accountability.

5. Decision Making and Conflict Resolution:

- Decision-making processes, emphasizing collaboration and equal participation, have been established.
- Conflict resolution strategies, including open communication channels, defined roles and responsibilities, and escalation procedures, have been documented.

6. Project Budget and Risk Strategies:

- The project budget has been allocated across various phases, and detailed budgeting will be done during the development phase.
- Risk strategies, including addressing technical and ethical challenges, have been identified and documented.

7. Regulatory Compliance and Ethical Considerations:

- Regulatory compliance, including safety standards and ethics council approval, has been considered and planned for.
- Ethical considerations, such as maintaining confidentiality and obtaining informed consent, have been addressed in project planning.

Verification:

Project manager confirms that all criteria outlined in the DoR have been met before initiating work on Sprint 1.

Definition of Done(DOD):

The Definition of Done is a concept that is mainly used within Agile Software Development methodologies. It is basically the requirements that the project must meet in order to be considered complete or done.

For our Project to be completed the following Objectives must be done:

Cape Working:

All the Components of the cape are working as intended.

- The power source for the components is working.
- The power source is providing the Arduino with enough power to power all the components.
- There is communication between the Accelerometer and the Arduino.
- There is communication between the LEDs and the Arduino.
- There is communication between the WIFI board and the Arduino.
- There is communication between the Arduino and the SD card reader/DFPlayer.

App Working:

All the components of the App are working as intended.

- The App must be able to communicate an API that sends and receives requests to and from the Arduino.

- The App must have all the features that have been requested by the client.
- The App must match up to what the client was expecting.

Cape Tested:

- The Cape must be able to determine the direction the movement was made and then light up depending on the movement and it must be able to communicate with the API and tell it what movement was made.

App Tested:

- The App must be able to communicate with the API to send requests to the Arduino.

Budget:

The budget for the project will be allocated across various phases including research, development, testing, resources, and field trips including meal allowances. Detailed budgeting will be done during the development phase to ensure efficient utilization of resources. As it stands, we have been allocated roughly ZAR 186 000.

Risk Strategies:

- Technical Challenges: Regular communication and collaboration among team members, conducting thorough testing at each stage, and maintaining flexibility to adapt to unforeseen technical challenges.
- Ethical Challenges: Regular meetings with supervisors to guide the development process as well as getting approval from the ethics council prior to development

Conflict resolution:

As a group it is normal and natural to expect conflict. The strategy outlined below is the approach that would be taken to resolve it:

1. Establish Open Communication Channels:

- Foster an environment where team members feel comfortable expressing concerns and conflicts.
- Encourage regular check-ins and open-door policies for team members to discuss issues as they arise.

2. Define Roles and Responsibilities Clearly:

- Ensure that each team member understands their role and responsibilities within the project.

3. Promote Collaboration and Teamwork:

- Emphasize the importance of teamwork and encourage collaboration among team members.

4. Address Conflict Early:

- Encourage team members to address conflicts as soon as they arise, rather than allowing them to escalate.
- Actively listen to both sides of the conflict to understand underlying issues and perspectives.

5. Use Constructive Communication Techniques:

- Foster constructive communication by promoting active listening, empathy, and respect for differing viewpoints.
- Encourage "I" statements to express thoughts and feelings without assigning blame.

6. Be the middle person if necessary:

- If conflicts cannot be resolved independently, act as a mediator to facilitate a productive discussion.
- Remain neutral while guiding the conversation toward a resolution.

7. Seek Compromises:

- Encourage team members to seek compromise and identify win-win solutions that address the needs and concerns of all parties involved.

8. Document Agreements and Action Plans:

- Document resolutions reached during conflict resolution meetings to ensure clarity and accountability.
- Outline action plans with specific steps and timelines to address any outstanding issues.

9. Follow Up:

- Follow up with team members to ensure that resolutions are implemented effectively.
- Monitor progress and address any recurring issues promptly to prevent further conflict.

10. Learn from Conflict:

- Encourage team members to view conflict as an opportunity for growth and learning.

- Reflect on the root causes of conflicts and identify strategies to prevent similar issues in the future.

11. Confidentiality:

- Respect the privacy of individuals involved in the conflict and maintain confidentiality regarding sensitive information shared during resolution discussions.

12. Involve Denzyl:

- If conflicts persist or escalate beyond the capacity of the team leader to resolve, involve higher authorities or supervisors to provide additional support and guidance.

In the event a team member is not working to their expectations, warnings would need to be issued to the member in the following strategy:

1. Document Performance Issues:

- Keep records of specific instances where the team member's performance or contribution has fallen short.
- Document missed deadlines, incomplete tasks, or instances of low productivity.

2. Schedule a Private Meeting:

- Arrange a private meeting with the team member to discuss their performance issues.
- Choose a neutral and private location to maintain confidentiality and avoid embarrassment.

3. Provide Specific Feedback:

- Clearly communicate the areas where the team member's performance is lacking, and provide proof.

4. Express Concern and Expectations:

- Express concern about the impact of their performance on the team's goals and project outcomes, as well as emphasize the importance of their work in the team

5. Listen to all Perspectives:

- Allow the team member to share their perspective and any challenges they may be facing.

6. Set Clear Improvement Goals:

- Collaboratively establish clear and measurable improvement goals with the team member.

- Ensure that the goals are realistic, achievable, and aligned with the team's objectives.

7. Outline Consequences of Continued Underperformance:

- Clearly communicate the consequences of continued underperformance, including potential disciplinary actions.
- Emphasize the importance of meeting expectations and contributing effectively to the team's success.

8. Follow Up Regularly:

- Schedule regular follow-up meetings to monitor the team member's progress.
- Provide ongoing feedback and support to help them stay on track toward improvement.

9. Document the Warning:

- Document the details of the warning conversation, including the issues discussed, goals established, and any agreements reached.
- Keep a record of the warning in the team member's personnel file for future reference.

10. Escalate if Necessary:

- If the team member's performance does not improve despite warnings and support, escalate the issue to Denzyl.

Conclusion:

The development of children's smart clothing with movement tracking sensors represents an innovative approach to promoting active lifestyles and enhancing child development. By combining hardware and software technologies, this project aims to provide parents with valuable insights into their child's physical activity levels while encouraging healthy habits and active play. Through diligent planning, execution, and collaboration, we aim to deliver a high-quality product that meets the needs of both children and parents, ultimately contributing to the well-being and development of future generations.

Signatures of group members:



Mishka Dewlok

ST10219921

Team leader

Signed in Durban, on 15 April.



Christopher Gary Teague

ST10083450

Signed in Durban, on 15 April.



Ethan Swanepoel

ST10198049

Signed in Durban, on 15 April.



James Pollard

ST10083397

Signed in Durban, on 15 April.



Tariq Barnabas

ST10042220

Signed in Durban, on 15 April.