Problem Statement and Goals
Software Engineering

Team 11, technically functional
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Table 1: Revision History

Date	Developer(s)	Change
September 16th, 2025	Maham	Added preliminary stakeholder information
September 17th, 2025	Matthew	Added 1.1, 1.2 and References
September 17th, 2025	Vaisnavi	Added onto 1.2 and Reflection
September 18th, 2025	All members	TA meeting and feedback
September 19th, 2025	Maham	Edits
...	...	...

1 Problem Statement

1.1 Problem

According to the Global Burden of Diseases, Injuries and Risk Factors study performed in 2019, individuals that would benefit from physical rehabilitation at least once in their lifetime is upwards of 2.41 billion globally (**?**). Those with access to a physiotherapist experienced a disconnect with performing a required movement with proper time-under-tension (TUT) and correct form (**?**). While a physiotherapist can advise these individuals during their assessments and proceeding follow-up appointments, the efficacy of rehabilitation depends heavily on the individual's correct performance of the exercise. In turn, this creates a need for a tool that can ensure users correctly perform the exercise without supervision. This project aims to develop a tool that can provide feedback and corrections for the prescribed physical rehabilitation exercise.

1.2 Inputs and Outputs

Inputs: A recording of the user performing their physical rehabilitation exercise, captured through a smartphone, webcam, or any other device.
Outputs: Feedback or corrections of the demonstrated movement, along with highlighting targeted adjustments to the form as needed.

1.3 Stakeholders

1.3.1 Primary Stakeholders

End users/Patients:
The main audience for this application will be users who have been undergoing physiotherapy treatment for their right leg, and have been given a home exercise plan which outlines (exercise 1).

1.3.2 Secondary Stakeholders

Physiotherapists:
The application can be used as an adjunct tool for physiotherapists, allowing them to evaluate the patient's performance and provide appropriate feedback.

1.3.3 Tertiary Stakeholders

Regulatory authorities: They will be ensuring and assessing that the application is working properly and providing accurate feedback.
Other healthcare providers: Specialists such as physiatrists and registered massage therapists may benefit from the information provided by the application about their patients.

1.4 Environment

1.4.1 Software

The application will be built using a Python environment, with the use of OpenCV and MediaPipe.

1.4.2 Hardware

The application will run on an iOS device with a camera recording ability.

2 Goals

3 Stretch Goals

4 Extras

[For CAS 741: State whether the project is a research project. This designation, with the approval (or request) of the instructor, can be modified over the course of the term. —SS]

[For SE Capstone: List your extras. Potential extras include usability testing, code walkthroughs, user documentation, formal proof, GenderMag personas, Design Thinking, etc. (The full list is on the course outline and in Lecture 02.) Normally the number of extras will be two. Approval of the extras will be part of the discussion with the instructor for approving the project. The extras, with the approval (or request) of the instructor, can be modified over the course of the term. —SS]

Appendix — Reflection

The purpose of reflection questions is to give you a chance to assess your own learning and that of your group as a whole, and to find ways to improve in the future. Reflection is an important part of the learning process. Reflection is also an essential component of a successful software development process.

Reflections are most interesting and useful when they're honest, even if the stories they tell are imperfect. You will be marked based on your depth of thought and analysis, and not based on the content of the reflections themselves. Thus, for full marks we encourage you to answer openly and honestly and to avoid simply writing "what you think the evaluator wants to hear."

Please answer the following questions. Some questions can be answered on the team level, but where appropriate, each team member should write their own response:

1. What went well while writing this deliverable?

   'We were able to define the problem clearly' the problem was defined clearly by looking at research on 'access to physiotherapy' unsupervised performance of physiotherapy exercises. Having two members that were more knowledgeable about the topic helped guide 'our' discussions 'while also piquing our interests as well'. At the same time, the rest of the team 'put in a fair amount of research' did additional research of the topic, which 'allowed us to fully understand' aided in understanding the problem and align on realistic "scope and" goals. Moreover, splitting up each of the deliverable sections also made it easier to combine different perspectives.

2. What pain points did you experience during this deliverable, and how did you resolve them?

   One of the major pain points was that 'our original scope was too broad, as we were trying to cover the entire body' the entire body was too broad of a scope. To make the project more manageable, 'we decided to narrow our focus to a specific area of the body and concentrate on measurable aspects such as time-under-tension and form correction. the scope was narrowed to a specific body part where measurements such as time-under-tension

3. How did you and your team adjust the scope of your goals to ensure they are suitable for a Capstone project (not overly ambitious but also of appropriate complexity for a senior design project)?

   'To ensure our scope of goals remained realistic within the bounds of our timeline, we decided to focus on a specific area of the body rather than the entire thing. We also decided to stick to a small set of exercises to ensure that the project can be completed within our timeline.'

   As mentioned above, the focus was shifted to a singular body part as opposed the full body. This project involves the integration of multiple technologies related to computer vision into a functional application, which is a complex endeavour.

The goals listed above will become more specific and concrete over time as the project development progresses.