Group Report: Kempten 2 - AllMove

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1. Mission statement

AllMove is a mobile application developed to support and accelerate the transition towards sustainable, active mobility by transforming everyday walking and cycling into a visible, motivating, and rewarding experience. The app encourages citizens to choose environmentally friendly and health-promoting forms of transportation by gamifying movement – users can earn points, track progress, and receive tangible rewards for their participation.

Our mission is to make the mobility transition not only understandable, but also personally meaningful and fun. AllMove bridges the gap between abstract climate and mobility policies and the real-world behavior of individuals. Through playful incentives and community-based challenges, the app fosters awareness, motivation, and long-term behavior change.

AllMove promotes multiple societal goals simultaneously: reducing carbon emissions, improving public health, and strengthening social interaction. The app was initially developed as a pilot for the city of Kempten, serving as an example of how local initiatives can drive broader change. By combining technology, behavioral science, and local engagement, the project empowers the people of Kempten and the Allgäu region to actively shape a sustainable future and become part of a larger movement for change.

In this way, AllMove transforms the mobility transition from a top-down strategy into a grassroots initiative that brings climate protection to life – step by step, ride by ride.

2. Problem definition

The city of Kempten has established a sustainable mobility concept for 2030, providing a strategic framework for environmentally friendly urban transport (*Mobilitätskonzept 2030*, o. J.). However, despite this comprehensive plan, there is currently a lack of motivation and active engagement, both in political decision-making and among the general population. The mobility transition remains largely abstract, with limited connection to people's everyday lives *(Canzler, 2024)*.
This lack of engagement is not only a societal issue but also has political consequences. Political efforts to promote sustainable mobility often depend on citizens' readiness to accept lifestyle changes, as such policies directly affect everyday routines. Research indicates that a lack of public enthusiasm, combined with concerns about societal cohesion, can significantly dampen the momentum for implementing transport reforms (*Germans Are Not Satisfied with the Transformation of the Transport Sector but Do Support Important Policy Measures*, o. J.). As a result, progress stalls, despite the existence of a well-defined strategy.
Without tangible incentives, personal relevance, and visible progress, the willingness to adopt sustainable mobility behaviors remains low. This disconnect between strategic goals and everyday action represents a major barrier to the success of the mobility transition. A concrete, engaging approach is needed to activate citizens, demonstrate real-world benefits, and build momentum for long-term change.

3. Idea & solution approach

The project began with five initial ideas: cyclist-specific routing, 2D/3D image generation to visualize a more sustainable city center, an analysis of how bike lanes and traffic redesigns impact the urban landscape, and a gamification concept involving a virtual chase game. After presenting these ideas to the challenge giver and engaging in further internal discussions, we conducted research into existing solutions. This led us to the "Radlland Bayern" bike map (*Radroutenplaner*, 2021), which closely mirrored our concept for cyclist-specific routing. Since another team was already implementing the cityscape transformation idea and the image generation concept was highly similar to solutions proposed for a different challenge, we decided to develop a new approach by combining key elements from our original ideas. The outcome was AllMove – a mobile application for cyclists and pedestrians. It is designed not just as another fitness tracker, but as a platform to actively encourage residents to adopt car-free transportation in their daily lives, focusing on cycling and walking, with gamification elements at its core.

Given the accessibility and widespread use of smartphones, app development was seen as the most effective way to engage a broad audience. Once the conceptual foundation was clearly defined, the project moved into the implementation phase. Throughout the concept development, the focus was placed on integrating meaningful incentives - educational, financial, and social - to encourage long-term behavioral change in mobility habits. A detailed explanation of these incentives can be found in Section 3.3.

To bring the app to the public, we planned a multi-channel rollout: partnering with schools, sports clubs, and local businesses, offering real-world rewards through local sponsors (such as free coffee or ice cream in exchange for the points collected in the app), and promoting the app through local media. Launch events could include public challenges with attractive prizes, referral bonuses (e.g., a “bring-a-friend” feature limited to five per month), and a combination of traditional marketing - such as posters - and digital outreach via social media.

AllMove is designed for long-term use and aims to encourage sustainable mobility habits. By combining personalized challenges with tangible benefits, the app supports physical health, fosters intrinsic motivation, and raises awareness through built-in educational content. Tailored specifically for the city of Kempten, AllMove encourages sustainable behavior in a way that is engaging, local, and impactful.

4. Implementation & process

We began by surveying existing mobility and gamification apps in the Google Play Store and Apple App Store.

Our market analysis showed that only three apps—Naviki, Radbonus, and Klima-Taler—both (a) calculate CO_2 savings and monetary savings relative to car use and (b) offer gamified challenges:

- Naviki provides the savings calculations but includes no challenge functionality at all (*Naviki*, o. J.).
- Radbonus does include challenges, yet they are sparse and rather unappealing: riders must cover 100–300 km within a limited time window merely to enter a prize draw whose outcome depends on luck (*Werde Mit Radbonus Belohnt*, o. J.).

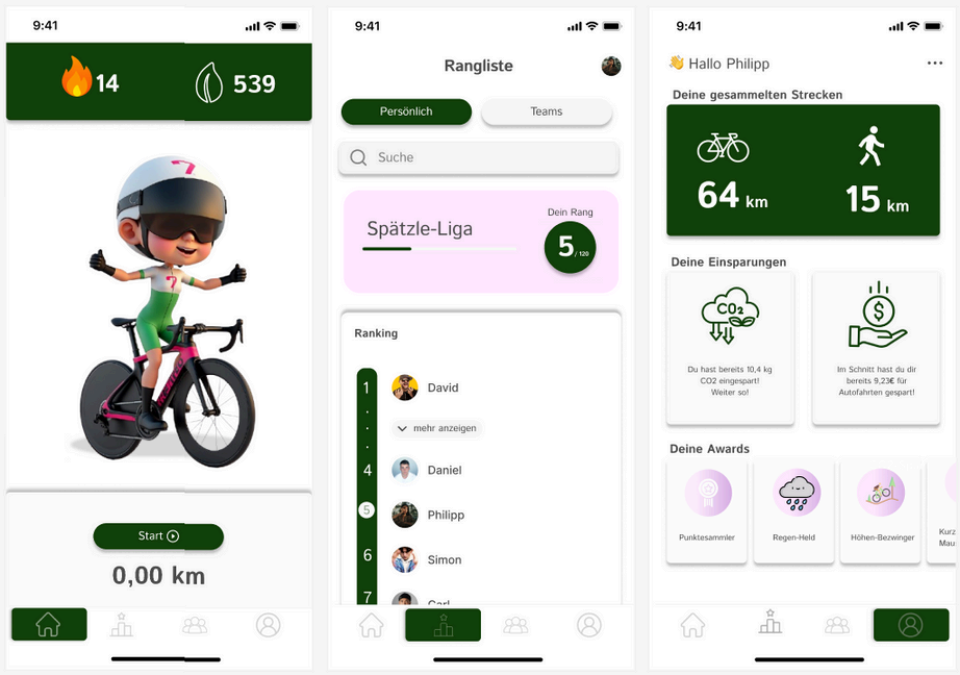
- Klima-Taler implements the strongest challenge concept, pitting cities against one another and organising separate leagues for schools. One “Klima-Taler” corresponds to 5 kg of CO_2 saved; participants earn and redeem them as rewards.
  However, neither Kempten nor any other Allgäu municipality is represented in Klima-Taler, and its rewards cannot be redeemed within the Allgäu region, making the app unattractive for local users (*Home*, o. J.).

However, neither Kempten nor any other Allgäu municipality is represented in Klima-Taler, and its rewards cannot be redeemed within the Allgäu region, making the app unattractive for local users.
Stadtradlen, a popular app for team biking challenges in cities and companies, was also considered (*STADTRADELN - Radeln für ein gutes Klima*, o. J.). Yet, rather than simply tracking kilometers, a measure with limited impact on sustained behavior, we prioritized community-building features, particularly team challenges. Our vision from the outset was to blend established design approaches with innovative, Kempten-specific concepts, achieved through extensive personalization and engaging gamification.

AllMove was developed in an iterative, highly collaborative workflow supported by two tightly-integrated sub-teams: one responsible for UX/UI design and visual identity, the other for technical implementation. The process moved through research, concept creation, prototyping, development, and continuous feedback loops.

4.a Design Development

Using Figma as our primary design tool, we defined a clear visual identity centered on a green color palette to reflect themes of nature and sustainability. We structured the app around four key screens: a home screen with integrated activity tracking, a ranking view showing both personal and team performance, a leaderboard, and a user profile. These were iteratively refined to ensure consistency, usability, and aesthetic appeal. Particular emphasis was placed on ensuring a fast and intuitive user experience, especially when starting a new tracking activity.



Although no formal user testing was conducted, the interface flow and appearance were internally validated, and the layout continuously improved based on team feedback and stakeholder input.

4.b Gamification & Incentives

Gamification was core to our concept. Research has shown that gamification increases user engagement, motivation, and behavioral persistence by leveraging intrinsic and extrinsic motivators (Werbach & Hunter, 2012).
Based on feedback from our city partner, we've introduced an avatar that visually changes as a user's activity streak grows. This creates a strong sense of progress and a personal connection to the app. Basic animations have already been implemented for the avatar; for example, it begins “biking” when the user starts tracking a ride. These animations enhance the avatar’s expressiveness, fostering a deeper user engagement. While adding features like challenges was discussed, we were unable to implement them due to time constraints and the need for further collaboration with local partners.To effectively encourage sustainable behavior, three types of incentives have been implemented:

- **Financial Rewards:** Users earn points for cycling or walking instead of driving. We also add weather bonuses to reward effort in less-than-ideal conditions (e.g., rain). Points can then be exchanged for real-world items or benefits from local shops or the municipality.
- **Educational Insights:** The app provides short, digestible "knowledge nuggets" about sustainability to raise awareness and help users make informed decisions. Future updates will base these nuggets on reliable sources and manual verification. Additionally, the app clearly displays CO_2 and cost savings, demonstrating the tangible environmental and financial impact of users’ choices. These metrics are compared to an average-sized car, with car costs focusing on direct expenses only (excluding indirect costs like pollution).
- **Social Connection:** Points earned contribute to improving the team’s ranking in the overall Team Ranking or help users reach a new individual league. The Team Ranking especially fosters friendly competition and encourages shared progress within groups.

4.c Teamwork & Feedback Integration

Our team of four worked in daily structured sessions, including morning briefings, retrospective meetings at the end of the day, and timeboxed planning discussions. Design and development teams worked closely together and used visual boards to align priorities. To keep the team organized and on track, tasks were managed using Trello, while Miro facilitated collaborative brainstorming and design sessions.

We actively responded to feedback from professors and city representatives. For instance, concerns about data privacy and cheating led to tighter design constraints, and suggestions for more gamification resulted in the development of the evolving avatar. Though we were unable to fully implement all planned features, we laid a solid foundation for potential future partnerships and technical enhancements.

5. Technical Implementation

Our development process was built on a foundation of robust tools and a clear roadmap. For the core application, we chose Flutter as our primary framework, allowing us to build a single codebase for both iOS and Android. On the Apple side, Xcode played a key role in building and testing the iOS version. GitLab was central to our workflow, serving as our version control system and enabling seamless code integration among team members. The code can also be found there (*Stasswender, Philipp / Kempten_challenge · GitLab*, 2025). The app's fundamental design and functions were successfully implemented and are demonstrated in the video. Furthermore, we also started with the development of more complex application functionalities, as outlined below.

5.a Intelligent Tracking System

A core feature of our app is its smart movement tracking system, designed to tell how you're getting around accurately. At its heart, an AI model can precisely identify if you're walking, riding a regular bike, or using an e-bike. This AI also functions as a powerful fraud prevention mechanism. It automatically spots if you're using excluded methods like a car or an e-scooter. When it detects these unauthorized modes, the system immediately lets you know that these activities will no't count towards rewards, ensuring fairness and integrity in our reward system. Additionally, the system can identify user pauses, automatically halting tracking and resuming when activity restarts.
While our vision relies heavily on advanced AI, it is currently in development. We began by implementing a Random Forest classification algorithm using Google Colab to test its feasibility. This initial model aims to differentiate between walking, biking, and car usage by analyzing GPS data and calculating metrics like speed and acceleration. Due to a lack of sufficient quality data, the model remains incomplete. However, the primary objective was to determine whether it was possible to distinguish between these different modes of transportation.

Looking ahead, our next big step would be the transition to a more sophisticated Neural Network architecture, built with TensorFlow (*TensorFlow*, o. J.). This will allow us to identify an even wider range of transportation methods with much greater precision. To achieve this, our Neural Network will be trained on a richer dataset that includes not only GPS information but also gyroscope data from the app User. Combining these motion sensor inputs will lead to exceptionally accurate detection of how the user is moving.
Finally, to make sure this AI runs smoothly and efficiently right on the users phone, we are planning to convert our TensorFlow model into a TensorFlow Lite model. This optimization is crucial for deploying the AI directly onto mobile devices, guaranteeing peak performance on both Android and iOS platforms (*LiteRT Overview | Google AI Edge*, o. J.).

5.b GPS Tracking

We've already integrated the geolocator plugin into our Flutter app (*Geolocator | Flutter Package*, o. J.). This powerful tool lets us accurately track the phone's GPS coordinates, which we then transform into various useful data points like distance traveled over time or altitude changes.

Although the real-world tracking functionality has no't been live-tested with users yet, we have thoroughly simulated it using the simulator's built-in features to confirm its behavior and reliability.

5.c User Accounts

For managing user access, we have already developed and implemented full User Registration and User Login functionality. This is powered by the firebase_auth Flutter package, which seamlessly integrates with a dedicated Firebase backend that was set up for this purpose (*Firebase_auth | Flutter Package*, o. J.) and ensures secure and reliable authentication for all users.

5.d Animations

Initial animations for various components, particularly the user avatar, were designed in Figma. The avatar itself was created using AI-based image generation and then integrated into the app as a GIF. This approach allowed us to quickly implement visual feedback and bring an early sense of dynamism. As the animation needs evolve and become more sophisticated, we plan to transition from GIFs to LottieFiles. Lottie, integrated via the lottie Flutter package, offers a modern, highly efficient alternative to traditional GIFs (*Lottie | Flutter Package*, o. J.). It provides significantly more control over animation playback, scalability, and file size. This shift enables the implementation of more complex and fluid avatar animations.

5.e Point System

To encourage sustainable mobility, we designed a point system that rewards eco-friendly behavior such as walking and cycling. The number of points depends on factors like:

- Distance traveled
- Type of activity (e.g. walking scores more than cycling)
- Effort (e.g. uphill routes give extra points)
- Vehicle type (e.g. bike vs. e-bike)

In addition, users can earn bonus points for:

- Age (children and seniors)
- Bad weather (rain)
- Consistency (daily streaks)
- Teamwork (joining or achieving goals with a team)
- Inviting friends
- Progress in the user’s level (league system)

The weather data we planned to get with the flutter weather plugin (*Weather | Flutter Package*, o. J.)

5.f Data Protection

User privacy is central to the app's design. Several features prioritize privacy protection. Therefore full app functionality is available without using community features. Team Ranking and individual league placement rankings are optional and require explicit user consent. These rankings display only user nicknames, ensuring pseudonymity. Additionally the access to individual or team rankings can be restricted, providing controls suitable for younger users and potentially mitigating negative impacts.

To ensure data protection of the users, route data is not stored, preventing the disclosure of sensitive locations. The intelligent AI tracking component operates locally on the user's device. Background tracking is disabled. Users must actively initiate tracking, giving them control over data access. When user data is required for purposes such as GPS tracking, we request explicit permission, thereby ensuring legal compliance („Art. 6 DSGVO – Rechtmäßigkeit der Verarbeitung“, o. J.) Abs. 1a.

6. Results & evaluation

The project achieved several concrete milestones. A comprehensive Figma design was developed, and a points-based system was elaborated. The conceptual integration of an AI functionality was defined, and a first functional prototype in flutter was implemented.
Feedback received during the pitch and the subsequent Q&A session was positive. There was notable interest from fellow students regarding the app’s potential use. Additionally, representatives from the cities of Munich and Kempten expressed interest in the project.
Suggestions for improvement include emphasizing and more deeply integrating the regional context of Kempten and the Allgäu area, as highlighted by Prof. Wurster. Furthermore, the motivation for local businesses to participate needs clearer explanation and further consideration.

7. Conclusion & outlook

The team considers the project a success based on the positive feedback received. One of the key takeaways from this project is how quickly strong ideas can emerge through effective teamwork and collaboration. We also learned how much can be achieved in just one week with clear goals and good organization. Additionally, navigating team dynamics and resolving conflicts constructively proved to be an important learning experience. As for future potential, the project could serve as the foundation for a startup, with opportunities for further development through public funding. A pitch to the City of Munich is also a possible next step to explore real-world application and support.

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9. Attachment

AllMove App Prototype Preview Video:

AllMove_app_preview.MP4

AllMove Visuals:
https://www.figma.com/proto/hCeL2pv3EQU1zE6tZirlCC/KemptenChallenge?page-id=0%3A1&node-id=113-117&p=f&viewport=830%2C48%2C0.16&t=ugu8EMB9gVui3DFI-1&scaling=min-zoom&content-scaling=fixed&starting-point-node-id=113%3A117&show-proto-sidebar=1