Nestify
Mobile Computing and Implementation

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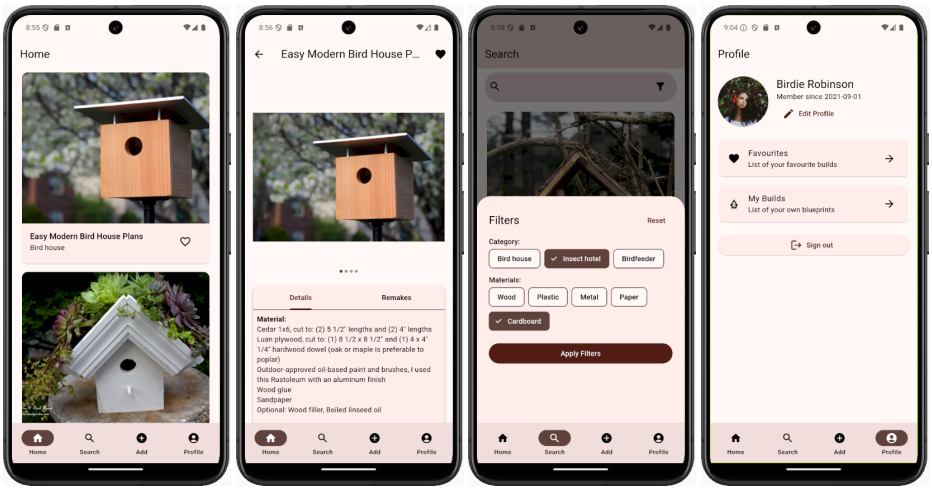

Figure 1: Overview of the app "Nestify"

ABSTRACT

A mobile application was created with two sustainability goals in mind: Goal 12 Responsible Consumption and Production, focusing on 12.5 Substantially reduce waste generation, and Goal 15 Life on Land with focus on 15.5 Protect biodiversity and natural habitats. It was built in Visual Studio Code with Flutter and Firebase. Goal 12 is achieved by giving users the opportunity to reuse material that would otherwise just have been laying around. Goal 15 is achieved by providing an app which gives easy access to instructions on how to build more habitats for life on land, focusing on birds and insects. In the app it is possible to browse, upload and edit build posts as well as search posts, favourite, comment on posts and have user profiles.

1 INTRODUCTION

The sustainable goals is an important factor in maintaining a sustainable future. While they cover many large subjects, even small changes matter and can contribute to the goals [3]. Apps are something many people have experience using but most of them are used for social media or games [6] with little to no focus on sustainability. Nestify is an app made to promote sustainability and help people build bird houses and insect hotels. The app has been designed with two of the sustainable development goals [3] as guidelines. The goals are:

- Goal 12: Responsible Consumption and Production
  12.5 Substantially reduce waste generation
- Goal 15: Life on Land
  15.5 Protect biodiversity and natural habitats

The target group are people that are interested in maintaining a good habitat for birds and insects by making do-it-yourself (DIY) projects and thereby helping life on land.

By using Nestify one can be an influence in maintaining a sustainable environment for life on land with focus on birds and insects. Goal 12 is achieved by having instructions for what materials to use. The app encourages reuse of materials which can be found laying around in one's home. Using what could be considered to be trash in other situations would reduce the amount of waste generated by the household. Furthermore, by providing alternative material option and encouraging creators to provide the alternatives, the idea is that the user can find many of the materials needed ready at home instead of buying new ones. This way, one can contribute to making more homes for the birds and insects, and thus help with protecting biodiversity and natural habitats.

2 PROTOTYPING AND BUILDING THE APP

The prototypes were made in Figma. Figma is a digital program for interface design with a wide variety of tools to build interface elements. The initial mockup consisted of pictures and a basic layout of the general structure, see Figure 2. This included some of the screens and post layout.

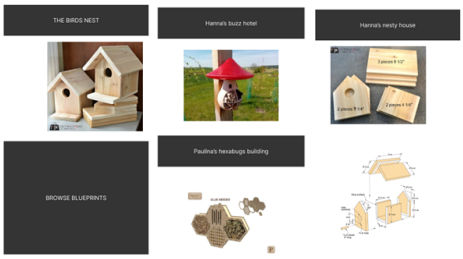

Figure 2: Initial mockup of Nestify

The second iteration of the prototype was likewise made in Figma. It consisted of a more detailed sketch and was made to use as a reference for the final implementation. This included all screens, what features should be included, and the layout, see Figure 3. The design and layout is based on Google's material design 3 (M3) [2] as it has many guidelines for how to create an app with a consistent feel.

M3 design elements that were used include:

- Bottom navigation bar
- Top bar
- Menu
- Dropdown menu
- Cards
- Lists and list items
- Buttons
- Dialogue
- Backdrop
- Tabs
- Text fields
- (Filter) Chips
- Snackbar
- Tooltip

The functional app was built in Visual Studio Code using Flutter and Firebase. In VS code, a structure was set up in order to make it easier to find things and coordinate the team, see Figure 4.

The data is stored in a database configured with Firebase [1]. Firebase is a tool that provides functions for applications. In this case database storage and data base management were used. The main file, together with firebase configurations, resided in the existing "lib" folder that was created when the flutter project was created. Within it, there was apis, models, providers, screens, utils, widgets. The "models" folder contained files that defined blueprint constructors as well as handles the database communication. "Screens" contained the different screens such as "Home", "Details", "Search", "Add", and "Profile". The routing definitions were in the "Utils" folder and finally, widgets contained different smaller components of the

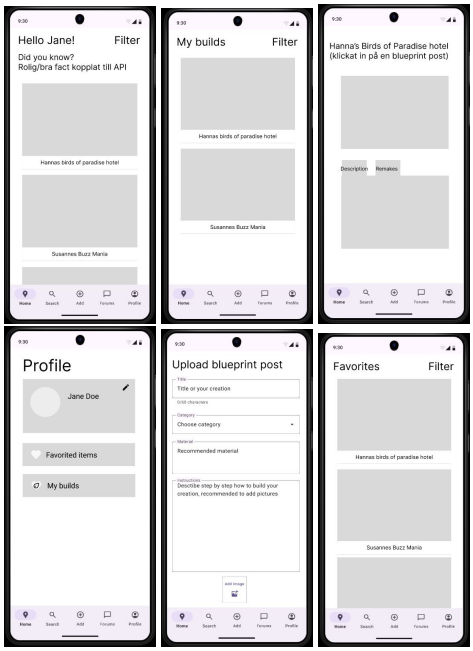

Figure 3: Second iteration of design in Figma

app. "Apis" contained communication with firebase, and "providers" was used for state management.

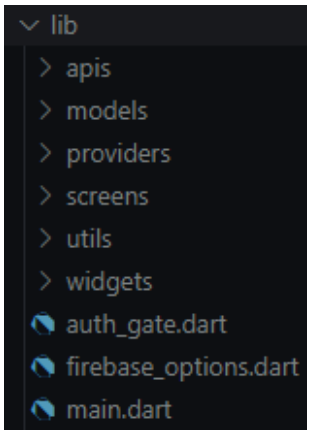

Figure 4: File structure in VS Code

In order to code a convenient way of navigating between screens the routing was done using GoRouter. GoRouter [4] is a routing package for Flutter which uses the Flutter Router API. To have the navigation bar stay visible at all times, a "Shell router" [5] was used. It is a router that displays a UI shell around the matching child route. Without a shell, the new screen will completely cover the navigation of the current screen. Therefore, by using a "shell router", the navigation will always be visible and the newly opened screen will be placed inside the shell and not cover it.

3 RESULT

Nestify is an app that acts as a hub for people interested in building bird houses and insect hotels. There is a navigation bar at the bottom for persistent navigation following M3's guidelines for a navigation bar. From this the user can navigate between "Home", "Search", "Add", and "Profile" and deeper. There is a top bar for each screen always containing a title, and depending on screen it might contain a leading icon to navigate back to previous screen. Buttons have been used throughout the app with varying functions. According to M3's guidelines, different buttons should be used for different purposes which is why there are buttons with matching hierarchies ranging from low to high depending on the importance of the action. The theme for Nestify is a neutral colour and relates with an earthy and woody environment.

The main focus of the app is to be able to browse through plans of builds. Therefore, the home page of the app is a feed of posts from others. It is similar to a social media layout to bring a familiar feel. The post includes pictures of the build, the blueprints in case you want to build it yourself, materials and tools needed to build it, and comments. If you find a build you want to build they can be bookmarked by pressing a heart icon and it will be saved to the favourites list that can be found on the profile page. If there is something unclear or for some reason you want to ask or tell the owner of a post something, you can leave a comment.

3.1 Home

When the user logs in, the landing page is Home, see Figure 5. Here you can browse different projects. The home page consists of a list of cards with explicit containment, which have a title for the name of the project and subtitle showing the category name. There is also a supplemental action, favourite, which is a heart that is filled when the project has been added to favourites. This also shows at the top right corner when viewing the details of the build, see Figure 6

3.2 Detailed project view

When the card is tapped, a detailed view of the project is shown, Figure 6. A bigger picture is presented and a container with two tabs display information such as description and material. The other tab contains a list with builds that are modifications or remakes of the current blueprint. This is however not implemented yet. At the end of the page is a comment section where it is possible for everyone to post comments.

3.3 Search

The second tab in the navigation bar is Search, Figure 7. It has a search bar at the top and a trailing filter. The filter is toggled by pressing the filter icon which opens a variation of a backdrop where a front layer appears containing all filter options in the form of chips. It is possible to filter by build type and material. Additionally, search suggestions will pop up in a list when typing in the search bar.

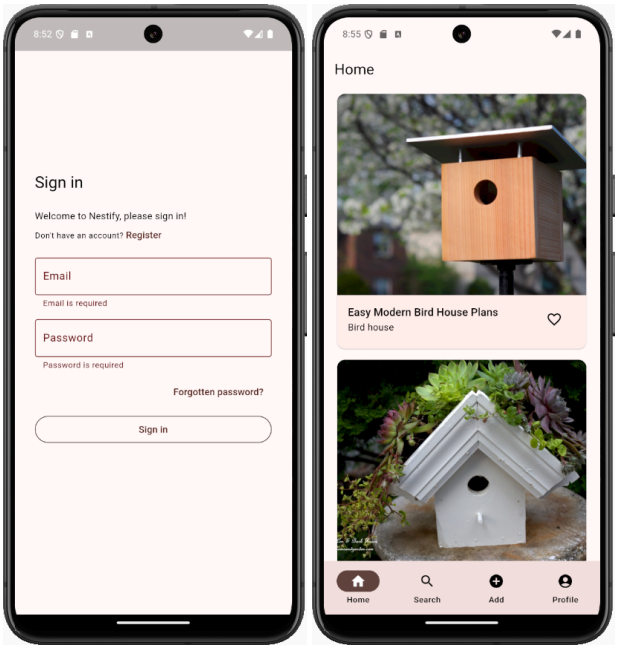

Figure 5: Login and Home page.

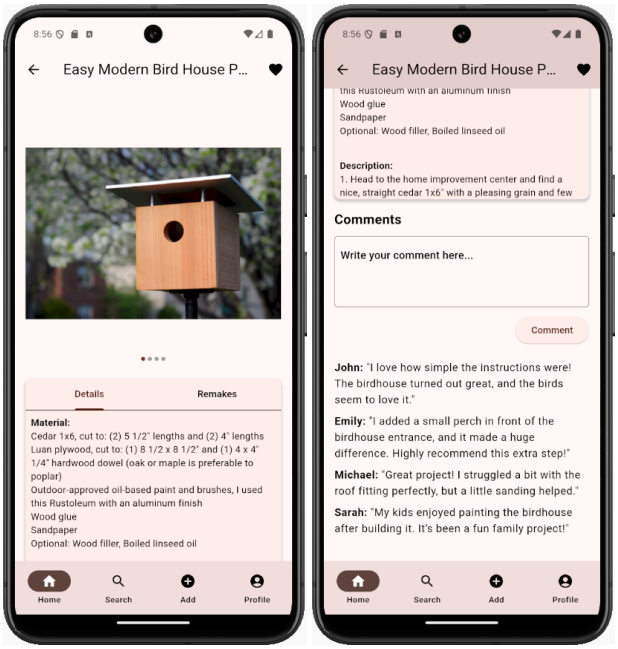

Figure 6: Detailed view.

3.4 Add new post

The third tab in the navigation bar is "Add". This is for uploading a blueprint. A form is filled in with title, category, material, instructions, and images. The form has two input types, text fields for all input except the category which uses a dropdown menu, Figure 8.

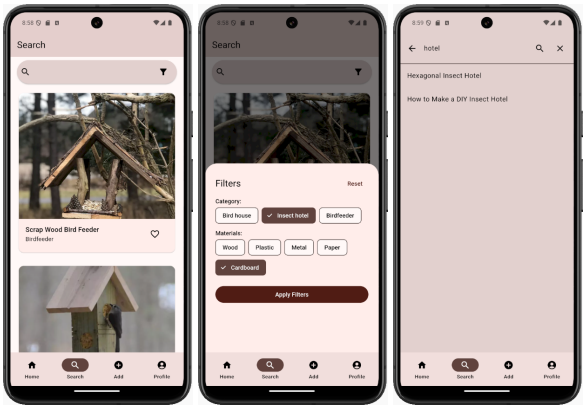

Figure 7: Search view.

To help the user, the text fields all have a tooltip, see Figure 9, indicating what should be included in the field, such as recommended materials. It is possible to save it and complete later, which "save as draft" is for. Either when saving a draft or publishing, a snack bar is triggered informing the user that the post has been published. This appears as feedback of what is happening to the post, see Figure 10.

The main difference between one's own posts and other's posts is in the top bar trailing icon, Figure 11. For other's posts, there is a heart icon which is used to save or take away form favourites, and for one's own post there is a menu where the post can be edited or deleted. If the post is deleted, a dialogue box appears where the user needs to confirm the action.

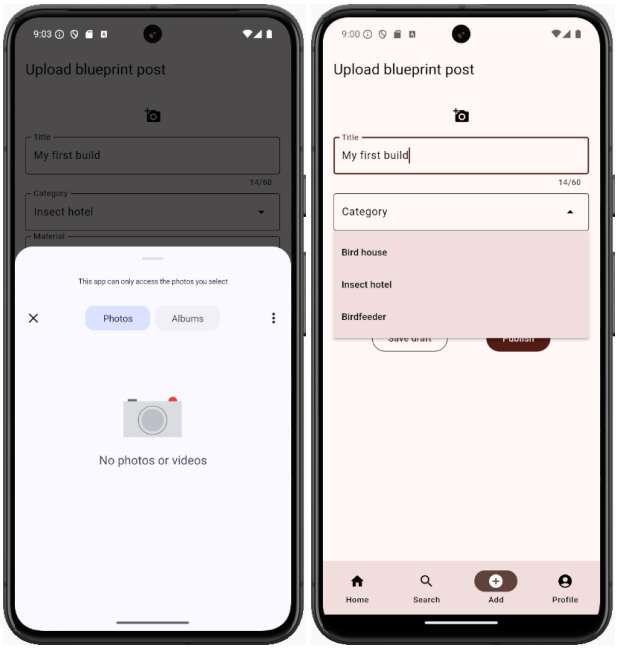

Figure 8: New post - add image and category menu.

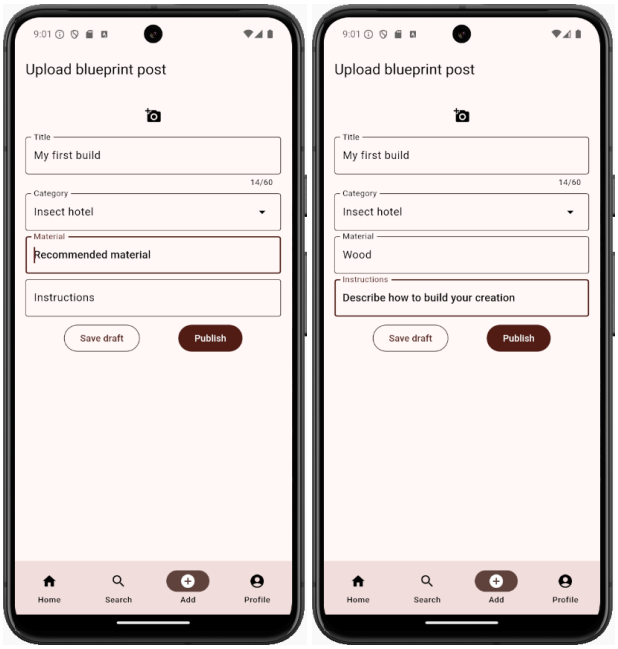

Figure 9: New post - tooltips.

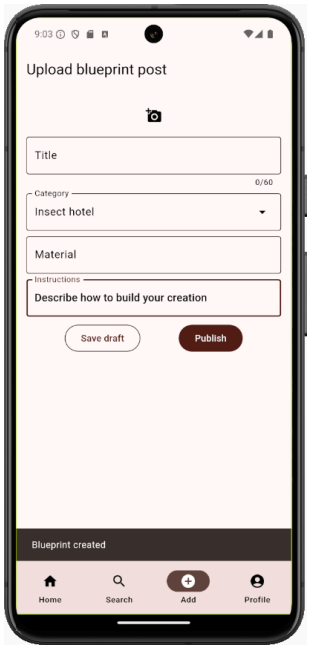

Figure 10: Published post snackbar.

3.5 Profile

The last tab is "Profile", Figure 12. It contains a list with two-line items: the users profile, "Favourites" and "My builds", Figure 13. The supporting visuals are the profile picture and the icons, while the primary text is the description of the items. As mentioned earlier, posts can be saved by pressing the heart icon to make it a favourite.

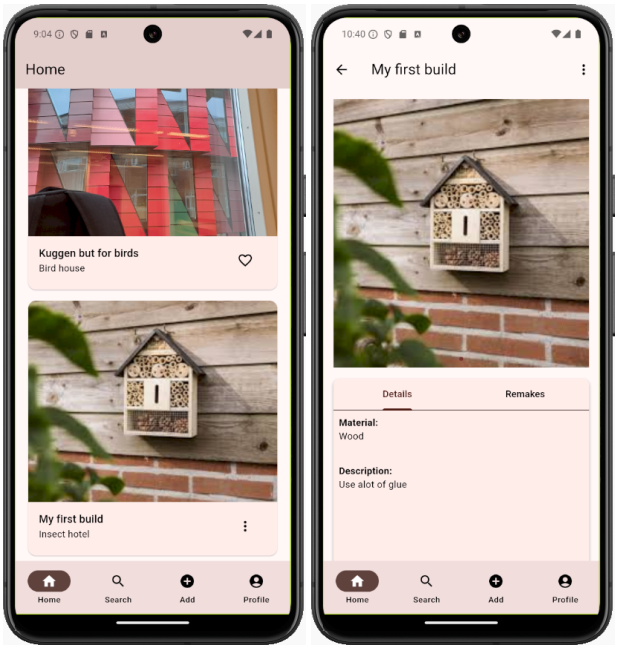

Figure 11: Published post shown in Home and Detailed view of own post.

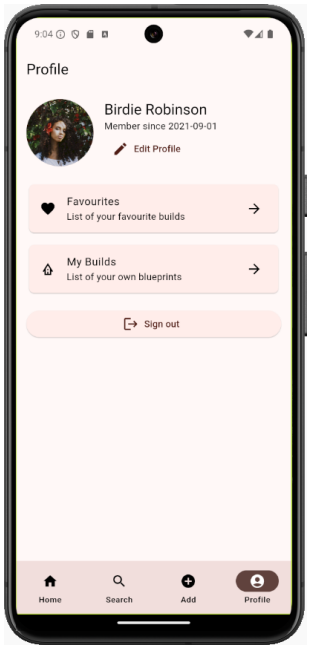

Figure 12: Profile page.

They are then found within the profile page. This makes it easy to find the post later, e.g. if it is something you might want to build. Other reasons could be that it has good instructions for exchanging materials or comments you might want to follow. Additionally, this is where you store your own published posts (builds). When they are posted you might need to go back to answer comments or update if something changes over time, e.g. a change in the design or if a new material might be a better option.

4 DISCUSSION AND CONCLUSION

Nestify is an app designed promoting sustainable acts by encouraging building projects centered around birdhouses and insect hotels. As mentioned earlier, the application aligns its functionality with two key United Nations SDGs: Goal 12, Responsible Consumption and Production, and Goal 15, Life on Land. Nestify does this by offering instructions that advocate reusing common household materials, which reduces waste and supports biodiversity by helping users create habitats for birds and insects. By focusing on DIY birdhouse and insect hotel projects, the app encourages users to engage directly with sustainable practices at an individual level.

By providing instructions on how to repurpose items typically found at home, the app directly addresses SDG target 12.5, which aims to substantially reduce waste generation through prevention, reduction, and recycling. This reduces the need for users to purchase new materials, which can lessen their overall environmental footprint. Additionally, by promoting the creation of insect hotels and birdhouses, the app supports SDG target 15.5, focused on preventing biodiversity loss and protecting natural habitats. This is impactful as small DIY projects like these can make a difference in

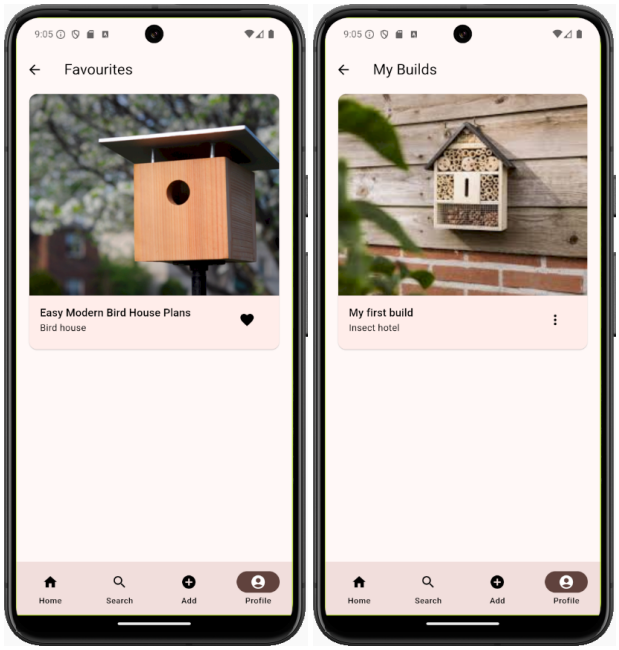

Figure 13: Favourites and My builds.

ecosystems by providing shelter and food for various species. Nestify's encouragement to build birdhouses and insect hotels could have a localized positive impact, providing essential shelter and food for wildlife. This local impact is meaningful but, in isolation, may be limited in scale and measurable environmental benefit.

Nestify could expand its impact by incorporating features that offer guidance on placement, seasonal maintenance, and localized species benefits, thus allowing users to make more informed and environmentally impactful choices in their creations.

While Nestify aims to influence waste reduction by encouraging the reuse of household materials, this assumes people have access to these materials or are motivated enough to source them. The effectiveness of such an initiative relies on the users willingness to use alternative materials, which may vary based on person to person. The app's focus on physical projects could also be seen as a double-edged sword; while it encourages hands-on work, it may also limit accessibility for those less inclined towards DIY projects or without access to certain tools or materials.

The community and social interaction features, such as comments and the ability to share modifications on builds, contribute to a collaborative environment where users can learn from each other and improve each other's designs. This system can further inspire responsible consumption and contribute to biodiversity preservation. Through its design, Nestify not only facilitates environmentally friendly projects but also educates users to be more mindful of their impact on the planet.

Ultimately, Nestify has a potential to inspire actionable changes at an individual level that collectively support larger environmental goals. The app's effectiveness will largely depend on how well it can maintain user engagement, expand upon its environmental features, and adapt to feedback from a growing community of environmentally conscious users.

REFERENCES

[1] Google. [n. d.]. *Firebase*. https://firebase.google.com/
[2] Google. [n. d.]. *Material design*. https://m2.material.io/
[3] United Nations. [n. d.]. *The 17 Goals*. https://www.globalgoals.org/goals/
[4] pub.dev. [n. d.]. *go-router*. https://pub.dev/packages/go_router
[5] pub.dev. [n. d.]. *Navigation Topic*. https://pub.dev/documentation/go_router/latest/topics/Navigation-topic.html
[6] WVO. [n. d.]. *Mobile App Or Website? 10 Reasons Why Apps Are Better*. https://vwo.com/blog/10-reasons-mobile-apps-are-better/#1-mobile-apps-offer-better-personalization