# Project Plan SDG9

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Problem Statement

Currently in order to read Arinc 429 data there is a need for a bulky and expensive data receiver and transmitter. We will be altering a size and cost-effective bus reader to meet a variety of requirements so it can be used in the avionics industry and replace the bulky and expensive one.

- ESP32
  - (Primary Substitute)
- Flutter Application
  - (Debug & User App)
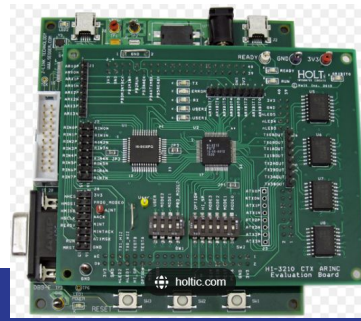
Project Management

We have split our team into 2 sides, the firmware team and the Flutter team.

Agile focused approach within each team.

- Allows us to better work through the different components as if they were separate projects.
  - Fluidity in a real-time environment

Communication through Trello and Discord, work coordination, organization, and delegation through Github.

Task Decomposition (Firmware)

- Implement Bluetooth Low Energy (BLE) to send and receive data to/from our Flutter application (2 weeks)

- Write firmware to send ARINC429 data (1 month)

- Write firmware to receive ARINC429 data (1 month)

Task Decomposition (Flutter App)

- Converting the BLE data into a more usable form
- Reading the label and retrieving its definition
- Converting the data bits into the proper formats based on the label
- Displaying data in the proper format
- Define and implement the label storage
- Allow for users to create and store custom labels

Sprints

Sprint 1 - BLE on Flutter App, BLE on ESP32S3, Converter

Sprint 2 - Sending Data on ESP32S3, Label Creator, Display Functions

Sprint 3 - Sending Data on ESP32S3, Label Creator

Sprint 4 - Receiving Data on ESP32S3, Data Handler

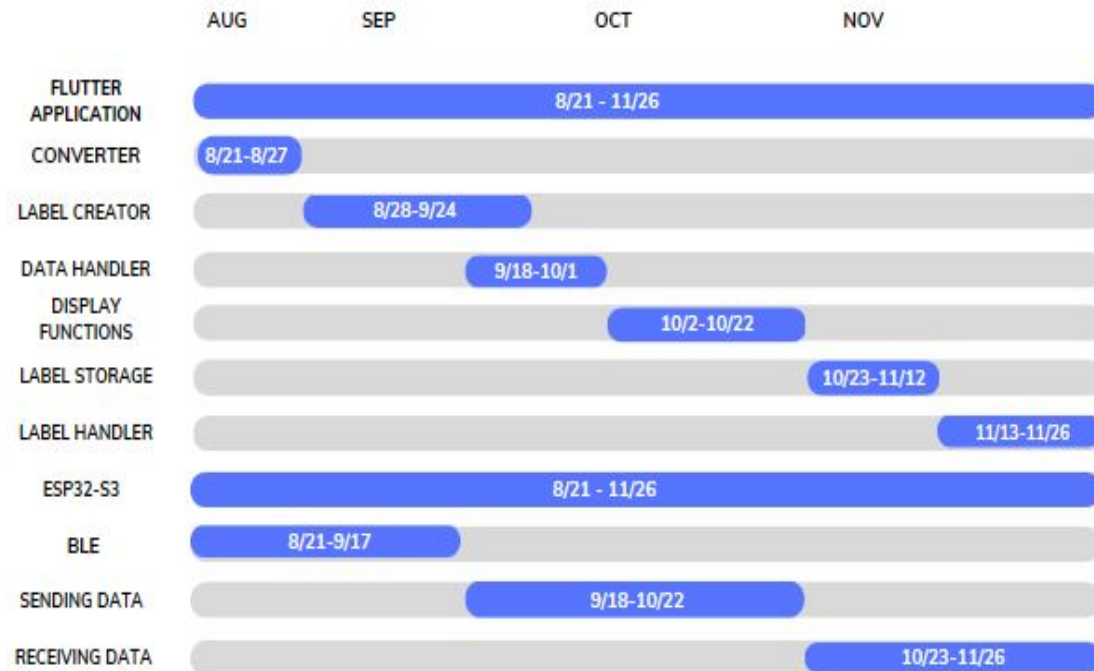Sprint 5 - Receiving Data on ESP32S3, Storage Handler

Sprint 6 - Finish Debugging on ESP32S3, Label Handler

Sprint 7 - Debugging entire project, wrap everything up

Each Sprint is Around 2 Weeks

Gantt Chart

	AUG	SEP	OCT	NOV
FLUTTER APPLICATION	8/21 - 11/26			
CONVERTER	8/21-8/27			
LABEL CREATOR		8/28-9/24		
DATA HANDLER		9/18-10/1		
DISPLAY FUNCTIONS			10/2-10/22	
LABEL STORAGE				10/23-11/12
LABEL HANDLER				11/13-11/26
ESP32-S3	8/21 - 11/26			
BLE	8/21-9/17			
SENDING DATA		9/18-10/22		
RECEIVING DATA				10/23-11/26

Risks

Task	Sub Task	Risk Factor	Probability(0-1)	Cost(1-5)
Firmware	Read Data	Loss of data during transmission	0.01	4
	Transmit Data	Loss of data during transmission	0.01	4
Flutter Application	Converter	Reading data over BLE fails	0.1	5
	Label Handler	Binary Search Takes Longer than Expected	0.2	2
	Label Storage	Creating files works differently on different operating systems	0.2	2
	Label Creator	User created custom labels are inaccurate to the Arinc429 word format	0.2	3
	Data Handler	Casting errors when handling different data types	0.1	1
	Display Functions	On-screen display is significantly out of place on different mobile platforms	0.1	1

Personal Effort: Firmware

Task	Effort(hours)
Implement BLE Server to Broadcast Information to the Flutter App and Receive Information from the Flutter App	6
Read Arinc data from the Holt 429 receiver and send it over BLE	15
Receive Information from BLE and send it over Arinc 429	15

Personal Effort: Flutter Application

Task	Effort(hours)
Converting the BLE data into a more usable form	9
Reading the label and retrieving its definition	8
Converting the data bits into the proper formats based on the label	5
Display the given metadata and actual data	6
Define and implement the label storage	3
Allow for users to create and store custom labels	4

Other Resources

- Holt 429 Receiver
- Arinc 429 list of Standard Labels
- ESP32-S3 Datasheet
- ESP32-S3 Development Board
- General Circuit Parts
- Breadboard