

FlexBoard

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OBJECTIVE

Paapri Cloud Technologies is developing FlexBoard, a hardware device designed to interface with PLCs via serial communication with the help of the PCTFlex platform. The project will involve designing and developing the hardware for various types of PLCs. The FlexBoard prototype will interface with any PLC machine as desired.

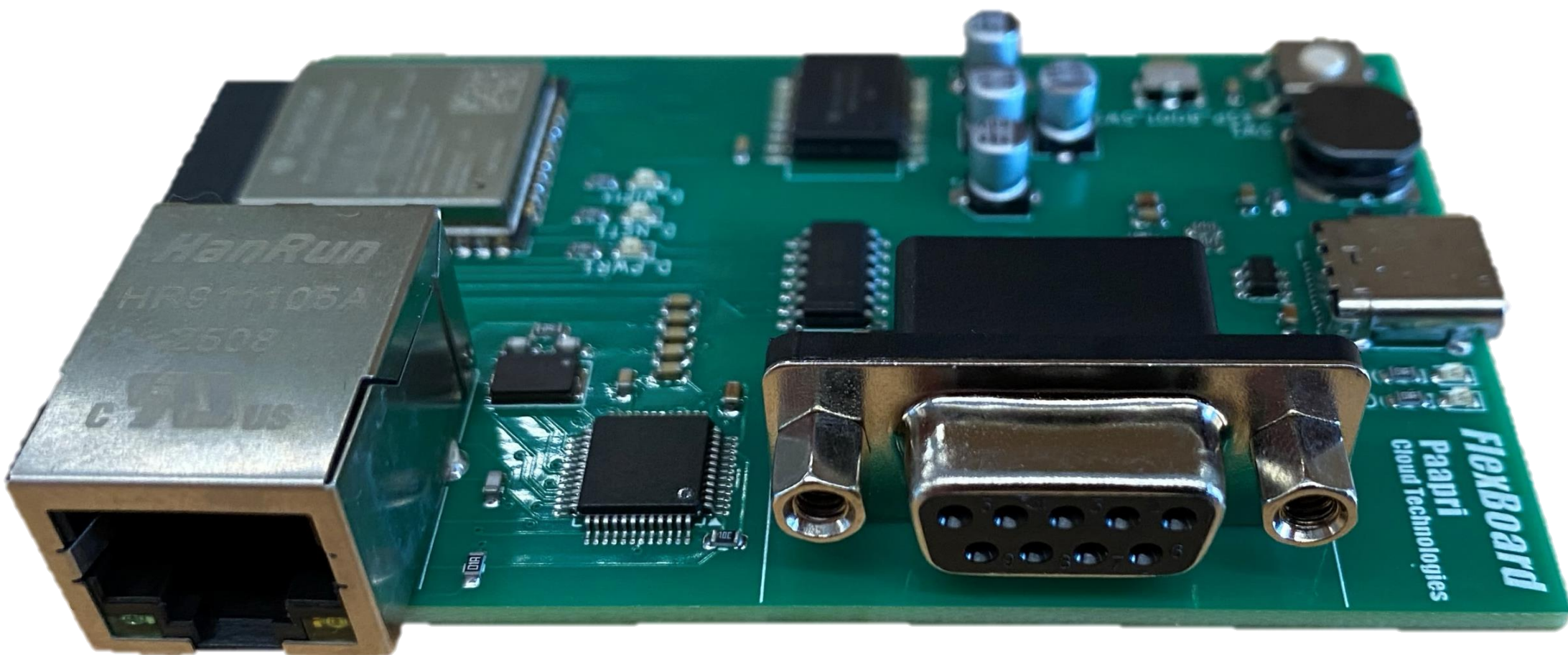


CUSTOMER PROBLEM AND BACKGROUND

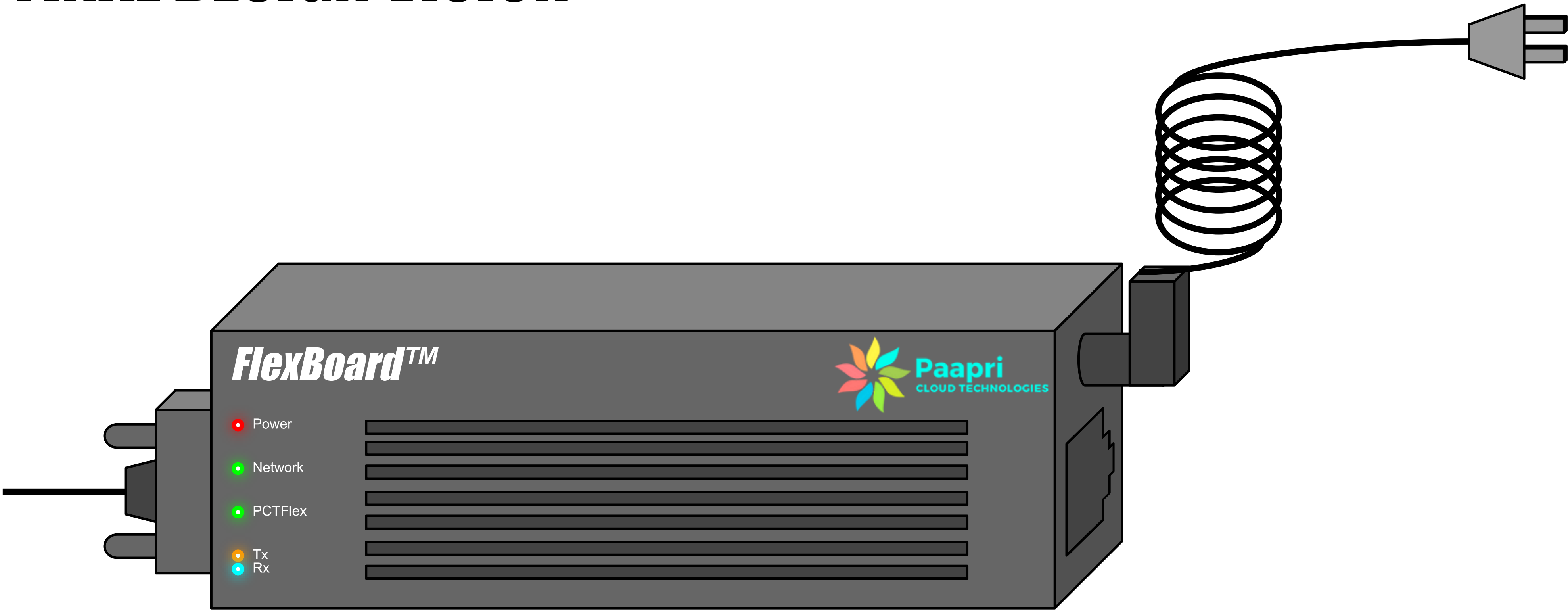
Paapri Cloud Technologies is a digital transformation company that specializes in enterprise resource planning (ERP) consulting and implementation for small to mid-sized manufacturing businesses. Paapri seeks to aid customers in solving any problems they may have by utilizing their own technologies, such as PCTFlex, a cloud and app-based platform. Apps within the platform can perform various functions valuable to Paapri customers. Whether it be data processing or machine monitoring, PCTFlex can do it. A common request from customers is connectivity from their machinery to Paapri’s platform. However, one problem arises when integrating PCTFlex and older PLC style machines. A serial connection would be needed to send data to PCTFlex, but not all PLCs follow the same serial communication protocol. This would require an almost unique device for each customer. As a result, Paapri has tasked us with creating a commercially viable device, titled FlexBoard, that can interface with PLCs via a variety of serial communication protocols.

CUSTOM FULL STACK DESIGN

The full stack design of FlexBoard is tailored specifically to meet Paapri Cloud Technology’s unique requirements. Interfaces are provided for power, diagnostics, serial, ethernet, and wireless connectivity. Custom software uses an array of technologies on the board to communicate with most standard PLC interfaces and maintains a network connection to make this connection available online. A local web server enables easy online configuration to adjust system settings without touching the device. The online connectivity also allows for over-the-air software updates to ensure the latest features are supported.



FINAL DESIGN VISION



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Philo, Miles, Quinn, and Jesse are all seniors studying Computer Engineering Technology in the Polytechnic Institute. Professor Fred Berry and Professor James Condron served in an advisory capacity as Academic Mentors during the length of the Capstone course.

WEB INTERFACE

FlexBoard3

Online

✔ Connected to Network

✔ Connected to PCTFlex Cloud

✘ Not Linked to PLC

IP Address: 172.20.10.2
FlexBoard 0.0.1.2
MAC Address: f4:65:0b:b1:f3:60
FlexID: 9000
Uptime: 00:04:12
Interface: wifi

REQUIREMENTS AND FEATURES

Based on Paapri's unique requirements, a fully custom PCB and accompanying software were designed to maximize utility at the lowest price point. Harnessing the power of modern embedded IoT technology, FlexBoard enables inexpensive access to Enterprise Resource Planning (ERP) for PLCs. This innovative solution provides seamless online access to PLC resources, allowing users to monitor and manage operations remotely through a cloud-based platform. The FlexBoard interface is designed for user-friendly navigation, offering intuitive dashboards that display real-time data, system status, in a clear, customizable format. Its compatibility with existing PLC systems eliminates the need for costly hardware upgrades, while over-the-air updates ensure the software remains current with the latest features and security patches. This combination of affordability, accessibility, and advanced functionality empowers businesses to streamline operations, enhance decision-making, and achieve greater efficiency, all while maintaining a user-centric experience that prioritizes convenience and ease of use.