HEADS-UP DISPLAY HUDDLE DATA LINK EXPERIENCE

OVERVIEW

A heads-up display (HUD) is a car device that allows the driver to see vital statistics of the vehicle on a virtual display reflected off the windshield. This device is intended to promote safety, in that it prevents the need for the driver's eyes to look away from the road.

While initially limited to sports cars and luxury vehicles, HUDs are starting to become a popular option for the general public.

PROBLEM

Current HUDs on the market have suffered from subpar reviews, especially regarding bad visibility and glare during sunny weather. Other shortcomings include short lifespans, overlapping images, user interface difficulties, and unclear instructions.

SOLUTION

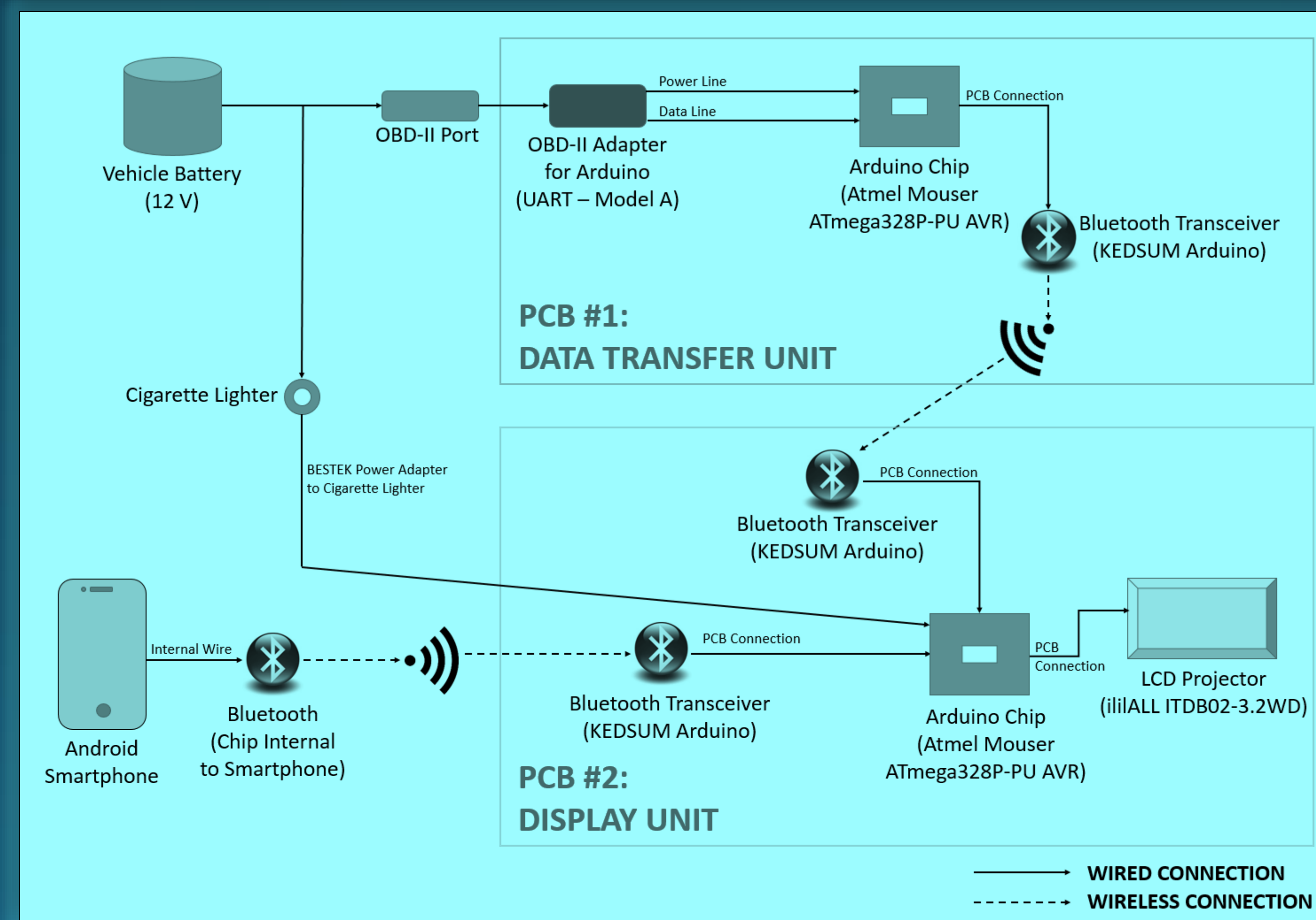HUDDLE (Heads-Up Display Data Link Experience) is designed to overcome these shortcomings as follows:

• Provides an intuitive usability experience.

• Enables the driver to control the brightness of the display using a smartphone app.

• Uses durable material that will last several years.

• Presents clear and concise directions.

DATA TRANSFER UNIT

SMARTPHONE APP

IMPLEMENTATION

HUDDLE has three basic subsystems: 1) data transfer unit, 2) display unit, and 3) smartphone app. All three subsystems work together to create an intuitive interface, safe environment, and trendy experience.

DATA TRANSFER UNIT

The data transfer unit is controlled by an ATmega chip that utilizes Arduino code. The chip is powered by – and reads data from – the car via the OBD-II port (which is familiar to many drivers as the plug-in port for car emission tests). This transfer unit "hangs" from the port, so its location is such that it will not distract the driver.

DISPLAY UNIT

The display unit is situated on the dashboard of the car, and it is also controlled by an ATmega chip. It pairs with the OBD-II transfer unit wirelessly via Bluetooth, which prevents the need for a distracting wire connection. Finally, the unit projects the car data via an LCD projector onto the windshield, which is then reflected as a virtual image to the driver.

SMARTPHONE APP

The smartphone app was created using Android Studio, and it pairs with the display unit via Bluetooth. The app interface includes a slider for controlling brightness, which is accomplished using a power transistor in the display unit that utilizes pulse width modulation (PWM).

PCB #1: DATA TRANSFER UNIT

Vehicle Battery (12 V) — OBD-II Port — OBD-II Adapter for Arduino (UART – Model A) — Power Line / Data Line — Arduino Chip (Atmel Mouser ATmega328P-PU AVR) — PCB Connection — Bluetooth Transceiver (KEDSUM Arduino)

Cigarette Lighter

BESTEK Power Adapter to Cigarette Lighter

PCB #2: DISPLAY UNIT

Bluetooth Transceiver (KEDSUM Arduino) — PCB Connection

Android Smartphone — Internal Wire — Bluetooth (Chip Internal to Smartphone) — Bluetooth Transceiver (KEDSUM Arduino) — PCB Connection — Arduino Chip (Atmel Mouser ATmega328P-PU AVR) — PCB Connection — LCD Projector (ililALL ITDB02-3.2WD)

WIRED CONNECTION
WIRELESS CONNECTION

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