Meterrific: Adding Smart Functionality to Traditional Parking Meters

By: Shiv Chopra, Blake Heard, Madison Hester, Michael Knudson, Raj Patel, Andrew Trimper

Date: January 16, 2019

Introduction

- The main goal of Meterrific is to develop a smart add-on for existing parking meters
  - Why?
    - Address main points or issues with urban street parking
      - Minimize time spent and gas wasted looking for parking
      - Minimize stress associated with city parking
  - How?
    - Use sensors to identify spot availability
    - Relay information to users
    - Navigate to open parking spots near destination
    - Re-route users if selected spot becomes unavailable
- The team is requesting $164.20 in funding to develop the prototype

Qualitative Goals

- Target population: people driving in heavily populated cities with street parking and associated parking meters

- Parking Meter
  - Protects processing unit from the environment
  - Keeps track of overall status and sends status to a cloud database

- Mobile App
  - Navigates user to the closest parking spot near specified destination
  - Receives meter status from cloud database and re-routes user as necessary in real time
  - User can pay for the meter through the app

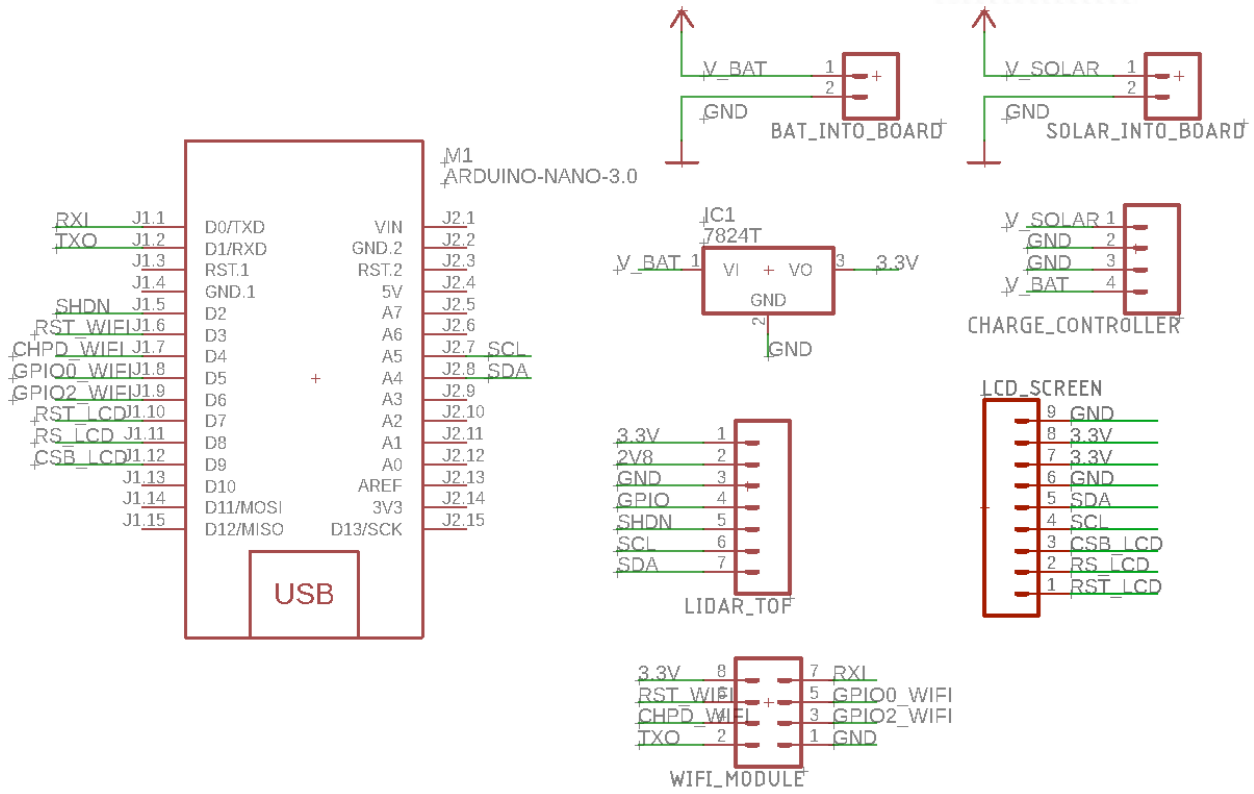
Design Approach: Hardware

- Attachment to existing parking meter
  - Interchangeable connection point
  - Customizable part between connection point and parking meter

- Electronics Housing
  - Protects electronics from environmental factors
    - Waterproof
    - Impact resistance
  - Smallest possible size and mass
    - Custom 3D-printed component cutouts
    - Waterproof Shell

Design Approach: Electrical

- Single printed circuit board (PCB)
  - LCD screen, LIDAR, solar panel, sit off-board
  - Central microprocessor handles interactions and logic
  - Wi-Fi module deals with sending data to cloud
- Microprocessor
  - Requires: I2C Interface, SPI Interface
  - Prototype with Arduino Nano
  - Final product uses Atmega328p
- Power
  - 3.7V lithium polymer battery
  - Use external voltage regulators
  - Use decoupling capacitors



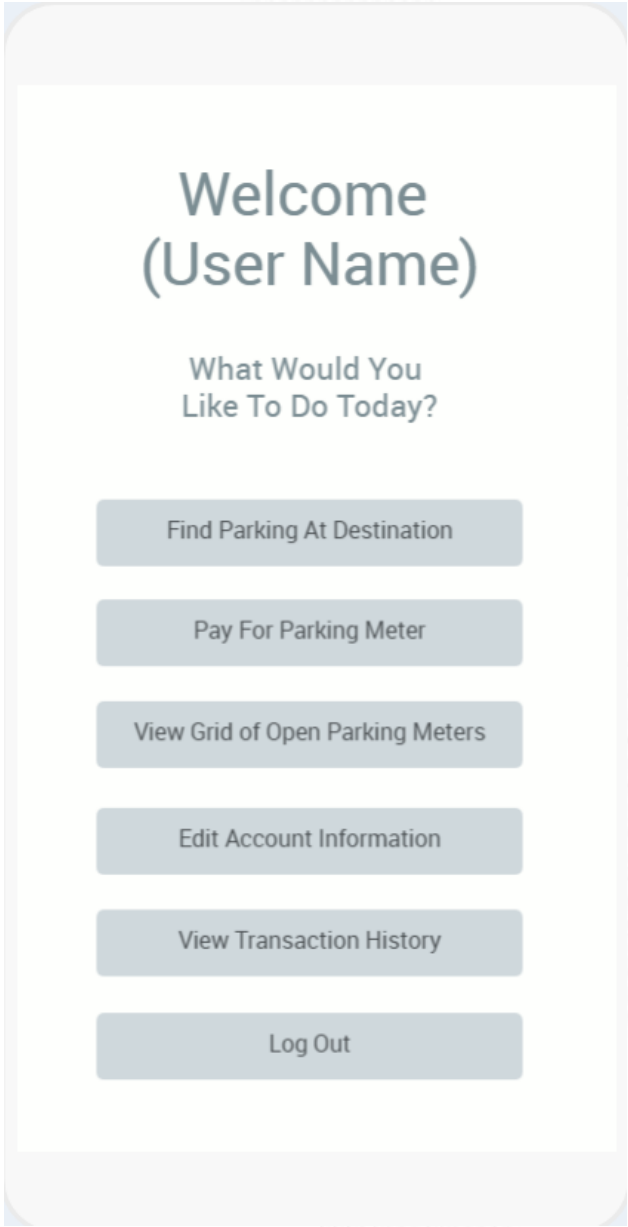
Quantitative Specs

Resting current draw	~30mA
Active current draw	~300mA
Time active (wifi)	< 0.1%
Battery life	1700 mAh for 300 to 500 cycles
Usage time per battery charge	~52hrs
Dimensions	6 in x 3 in x 2 in
Cost per unit	$82.10

* Dimensions and cost per unit based on preliminary research. Both are expected to decrease in final product

Design Approach: Software

- Parking Meter Add-on Firmware
  - Keeping tabs on spot availability
  - Power management
  - Sending status to database
- Cloud Database
  - Retrieving and handling of meter status data
- Mobile App
  - Integration of Pre-existing Maps and Navigation API
  - Retrieving and handling of meter status data



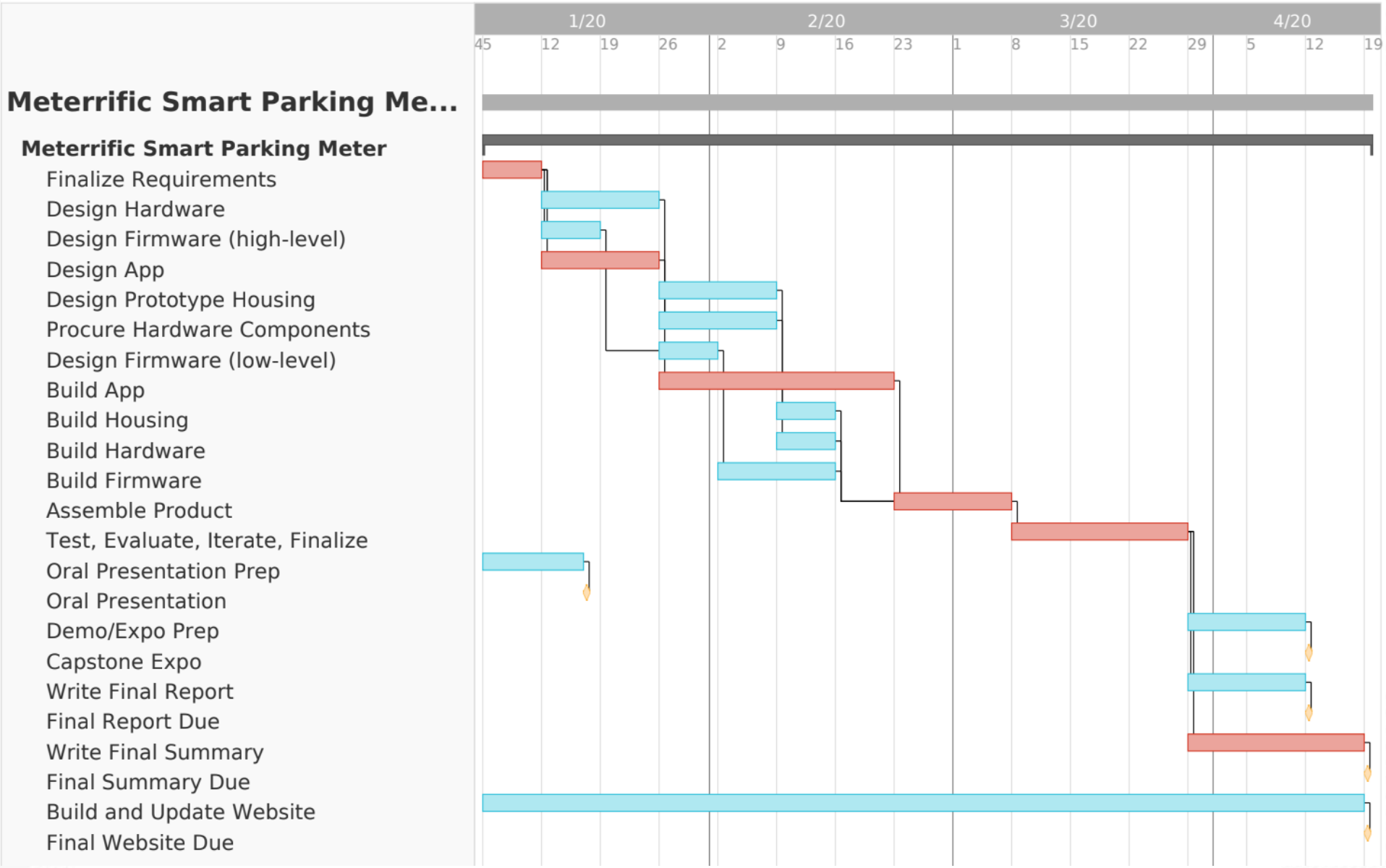
Current Status

- Moving to production stage
  - Any usability, feasibility, or efficiency discoveries will lead to changes in final design
- Finalizing parts requirements and placing orders

	Asset Name	Cost	Amount	Total Cost	Source
Electronics	LCD screen	$11.52	1	$11.52	Digikey
	LIDAR sensor	$0.00	1	$0.00	Team Supply
	Microprocessor	$3.50	1	$3.50	Digikey
	Wi-Fi Chip	$6.95	1	$6.95	Sparkfun
	Solar Panel	$5.99	2	$11.98	Xump
	LiPo Charge Controller	$6.95	1	$6.95	Digikey
	3.7V LiPo Battery	$0.00	1	$0.00	HIVE Makerspace
	PCB printing	$33.00	1	$33.00	Advanced Circuits
			Total Electronics:	$73.90	
Mechanical Hardware	ABS Filament	$0.00	1	$0.00	Interdisciplinary Design Commons
	PVC Rod (1ft)	$0.55	4	$2.20	Home Depot
	Mounting Hardware	$6.00	1	$6.00	Home Depot
			Total Hardware:	$8.20	
			Grand Total (per):	$82.10	
			Grand Total (x2):	$164.20	

Georgia Tech
CREATING THE NEXT

Schedule and Next Steps



Georgia Tech
CREATING THE NEXT

Questions?