

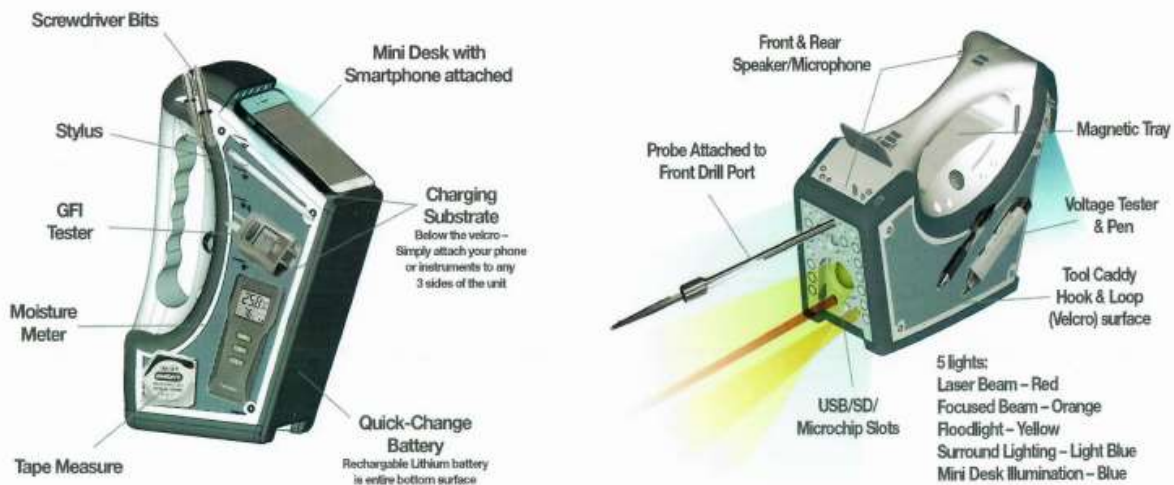
SECS Senior Design Available Projects – Summer 2023

mySmartWorkBuddy (MSWB)

Sponsor/liaison: Richard Glitz (rgiltz@houseprofessor.com)

mySmartWorkBuddy (MSWB) is a Multi Tool/Multi Task Apparatus for the Building Inspection Professional. This product was inspired by the founder's own needs as a Private Home Inspector. Years of Customer Discovery shaped the product features and components.

Each feature within MSWB is an interchangeable module, thus features can easily be omitted, replaced, or swapped out for a different feature. We envision 6 potential models: "Buddy Boy", (Our Minimal Viable Product), "Buddy Junior", "Buddy Senior", "Buddy Supreme" and "Buddy Almighty". We also created an "Inspector Buddy" model, specifically aimed at our Beach Head Client.



The basic unit consists of a base with the following features:

- Outer Casing - Nylon 12 or similar, waterproof gaskets
- Protective Rubberized Bumper Trim - protects perimeter edges, 10-foot Drop Guarantee
- Tool Caddy - sides, top front and "Mini-Desk" covered in industrial strength Velcro, allowing the User to caddy his/her readily used small instruments.
- English & Metric Scale – for quick check of step risers, tread dimensions, joist dimensions and isolation distances

- Adjustable Non-Slip Cushioned Handle Grip - multiple finger grips, soft cushioning material
- Lithium Batteries - power all energy draw needs of the unit, battery sled slides onto the bottom, similar to cordless drills
- Distant Floodlight - front facing, with an adjustable capacity up to 1,000 lumens dimming, strobe
- Focused Beam Light - front facing, with an adjustable capacity up to 300 lumens, dimming, strobe
- General Surround Light - front facing perimeter, with an adjustable capacity up to 800 lumens, dimming, strobe, the "go to light" for the inspection process.
- Charging In/Out Ports - front facing, charging of the main battery, via car or 110-volt chargers
- Magnetic Tray - top center below the handle, firmly hold and keep track of screws, nails, etc
- U-Shaped Clips - located along both rear upper sides, built into the rubberized bumper trim
- Six control buttons - three front top buttons used to operate the three front facing lights
- Mouse Ball/Thumb Wheel - top handle, controls the "Smart Informational Screen"
- Three-Point Housing Attachment Slots & Associated Strap - secures MSWB around user with a cushioned shoulder pad
- Mini Desk - rear face becomes a desk surface with lighting, notepad/phone/tablet
- Panic Button - piercing alarm will emanate from your attached smart phone speaker(s)
- Laser/Infrared Beam - front facing, provides surface temperature, length measurements and instructional pointer
- Wireless Battery Charging Station Substrate - wireless charging substrate below the Velcro on both sides and at the Mini Desk, allows for continuous charging of instruments
- Business Card Holder - top center, below the handle
- Gripping Hole Slots - hold/store the clients various small instruments, First Aid Kit, disposable gloves sanitary wipes, etc

We desire Working Prototypes of the Minimal Viable Product (MVP), aka "Buddy Boy", at minimum. Ideally, we would like the Inspector Buddy model. The desired features/components are listed and attached. We have a 3-D Artist Concept of the "Buddy Almighty" prototype. We also have a modified "Off the Shelf" old flashlight we cobbled into a working version that we use daily. I will provide physical 3-D Artist Prototypes and the current Cobbled Unit to study and examine. The desired prototype will be a little larger than the 3-D Version and the handle needs to be revised to accommodate a better hand grip/clearance, more like the Cobbled version.

NOTE: Confidentiality and assignment agreements are required before students can begin work on this project

Elevated Truck Platform

Sponsor: Phares A. Noel, Ph.D. PE (panoel@oakland.edu)

The goal of this project is to create a system that is intended to be used by owners of common light duty pickup trucks which allow them, once assembled and installed, to have a platform and stair assembly mounted on the back of the truck bed that will provide a comfortable, shaded, seating arrangement that has an elevated vantage point which will allow for unobstructed views of such events as outdoor auto races, musical concerts, parades or any other activity that would benefit from having an elevated view.

Several of the important design goals of this effort is that the system should be modular in concept and portable in nature, which will allow for the quick and easy deployment of the system, and will allow for easy disassembly, storage, and transportation of the entire system. Once disassembled the entire system should be able to be stored in the back of the pickup truck.



The required deliverables will include a fully functional system, as depicted in the renderings, that can be assembled and disassembled without any hand tools, along with detailed CAD drawings that can be used for eventual mass production of the proposed system, along with a CAD based stress analysis of the proposed system which will simulate the conditions that the system will undergo while being deployed, and will depict the structural integrity of the system in order to validate and substantiate the load capacity and stability requirements of the system under various static and dynamic structural loads including loads to the system that would be induced by wind loads on the awning.

NOTE: Confidentiality and assignment agreements are required before students can begin work on this project

EV Kart

Sponsors: Profs A. Arefifar, J. Chen, and O. Rawashdeh (ECE Dept.)
Alex Stefanek (ECE UG Student)



Objective

Research, design, and implement an OU branded electric Go-Kart that meets the specifications and requirements of annual Purdue evGrandPRix competition:

<https://engineering.purdue.edu/evGrandPrix/>

Motivation

Electric vehicles continue to gain attention from both industry and academia. There is an ever-increasing need for a workforce with skillsets relevant to electric vehicle design, control, and optimization. Consequently, Oakland University plays a critical role in providing future STEM engineers that meet this workforce need locally and nationally. In response, the ECE department and SECS have been working diligently on developing

programs, certificates, and PACE courses in these areas. What we need to do next is to establish an OU Electric Vehicle (EV) Racing Team to help increase our visibility in this domain, attract talent, and provide an exciting opportunity for our students to get involved on campus (to help with engagement and consequent retention).

Most local universities already have EV Racing activities. SECS has focused on Formula SAE Racing, which has an ICE (Internal Combustion Engine) vehicle, and has been Page 2 of 2 performing phenomenally. SAE Formula will continue to exist and strive. The proposed EV effort will be parallel to it. Passions are high on both side of the ICE-vs-EV divide and will be for the foreseeable future, which is why we should have two sperate efforts. Both our Department and the Mechanical Engineering (ME) department have discussed this and are excited about this dual approach and will be supporting each other across the aisle.

The vehicle will serve as a starting point for an OU student organization. Senior design students working on this project are welcome and encouraged to become part of the student organization and compete at the May 2024 event.

High-level Tasks and Deliverables

- Research and understand general usage guidelines and safety procedures associated with the work on and the operation of go-karts and adhere to them.
- Research and understand competition rules and requirements.
- Study existing vehicle designs that participated in previous years
- Develop specifications, evaluate options, and acquire/design parts and components.
- Integrate into a complete functioning electric go kart that meets the competition requirements.
- Paint/stylize vehicle with OU colors and branding.
- Characterize performance of the vehicle.
- Create a document repository on all aspects of the project for future reference and use by the student organization.

Space and Funds

Work will be performed in the Senior Design lab and in part the Mechatronics lab next door. Prof. Rawashdeh will provide funding for parts.