



---

*The* UNIVERSITY *of* OKLAHOMA

# **Automated Directional Drilling**

---

Emmanuel Akita

Forrest Dyer

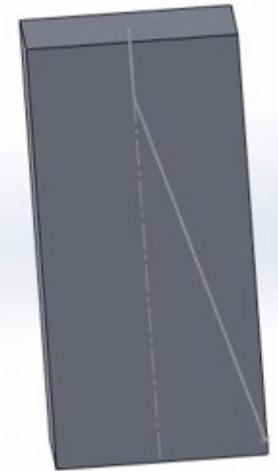
Dr. Ramadan Ahmed

# Highlights

---

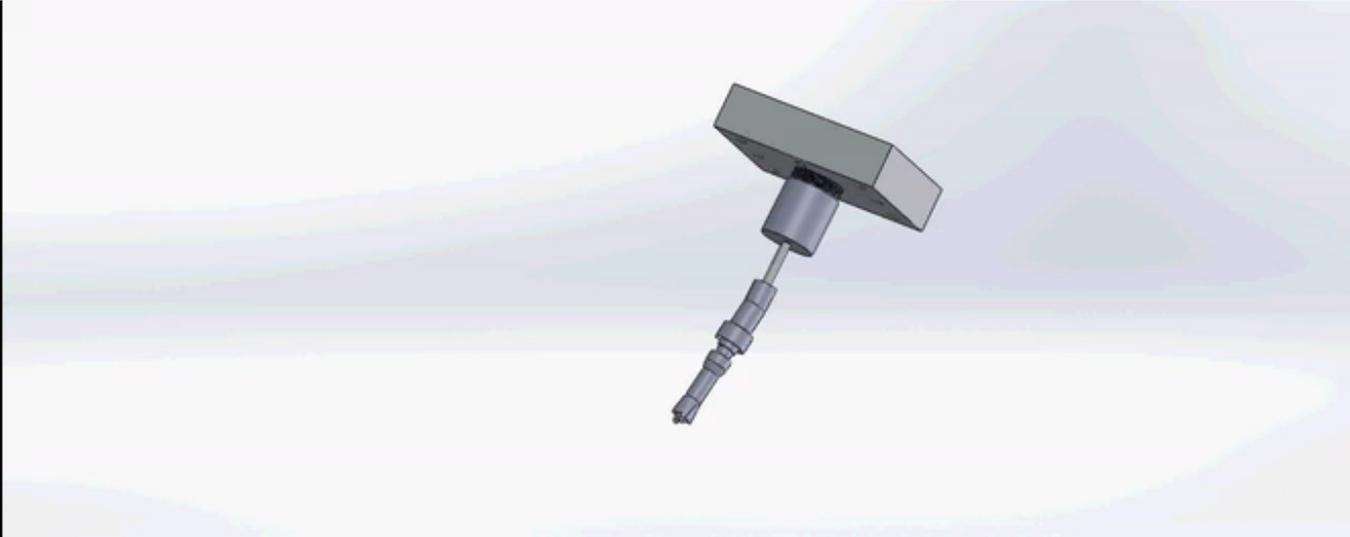


- **Directional automation – access more area**
- **Downhole sensor feedback loop in controls**
- **Sensor redundancies**
- **Cable drilling applied to straight wells**
- **Power constraints, WOB restrictions**



# Design Concept

---





# Thank you

---



## VIII. Acknowledgements

---

- Mewbourne Oil Corporation
- Jeff McCaskill
- Jack Borer







# 2019 Team Members

---

- Emmanuel Akita
- Forrest Dyer
- Payton Duggan
- Savanna Drummond
- Monica Elkins
- Dr. Ramadan Ahmed

Team Captain  
Mechanical/Machinist  
Electrical  
General Logistics  
General Logistics  
Advising Professor

- VimleshBavadiya      Advising Liason



# Presentation Outline

---

- I. 2018 Recap
- II. 2019 Design Concept
- III. 2019 Improvements
- IV. Mechanical Systems
- V. Electrical Systems
- VI. Control System
- VII. Capital Expenditures
- VIII. Acknowledgements

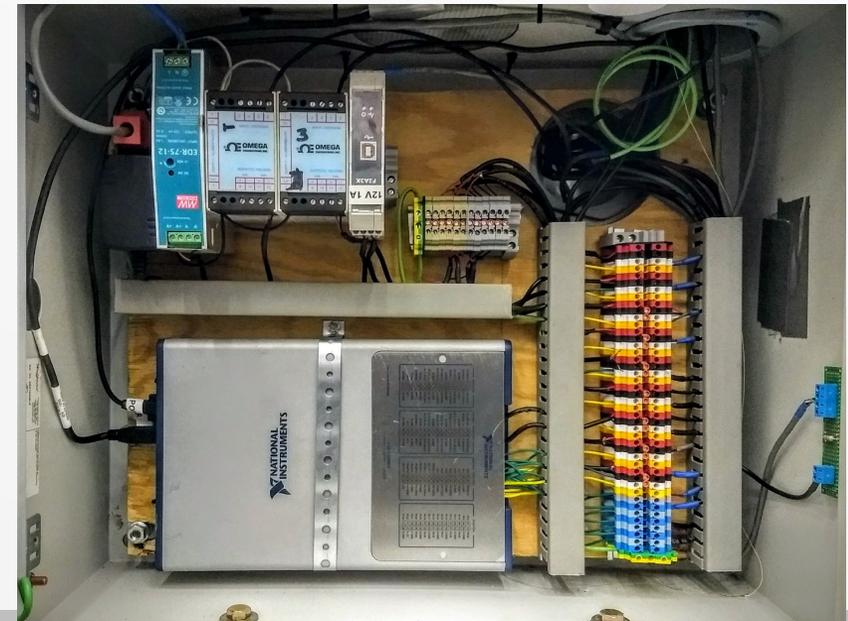
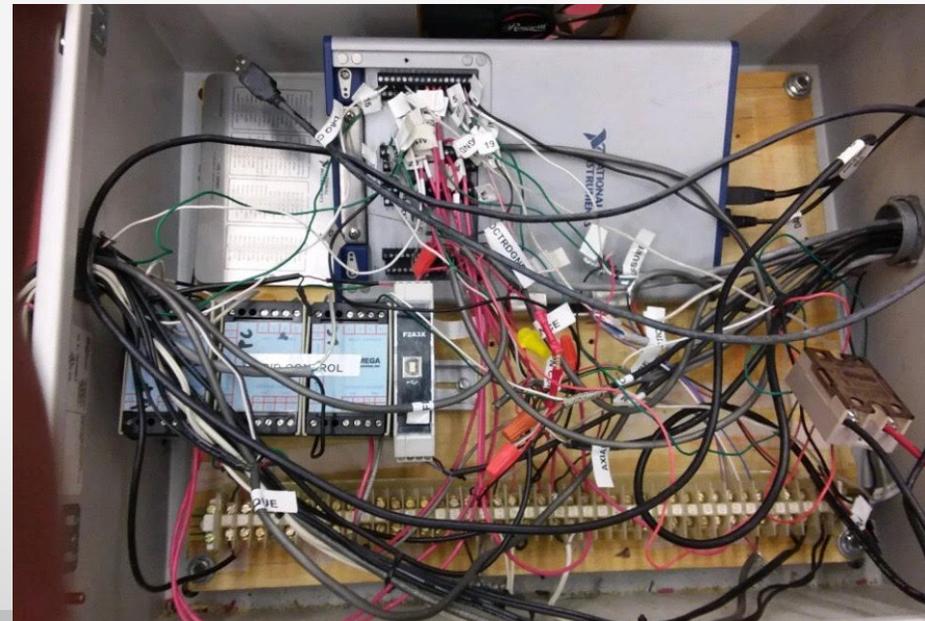


# I. 2018 Recap

---

## Major improvements

- Electrical System
- Pneumatic System





## II. 2019 Design Concept

---

### **4 major system designs**

- Rotation
- Circulation
- Weight on Bit
- Directional



## II. 2019 Design Concept

---

### **Rotation: Transfer Power to the Bit**

- Cable Drilling
- Special Connections

### **Circulation:**

- Flow between cable and pipe

### **Weight on Bit:**

- Mainly transferred by drill pipe





## II. 2019 Design Concept

---

### **Directional Drilling Assembly**

- Downhole Sensor
- Stepper Motor
- New BHA





## II. 2019 Design Concept

---

### **New Bottom Hole Assembly**

- Bent Sub
- Roughly 12°





# III. 2019 Improvements

---

## Swivel Removed

- Bypass to camlock connection

## Safety Measures

- Enclosed rotating parts





# IV. Mechanical Systems

---

## **New Top Drive**

- Max RPM-1800

## **Camlock Assembly**

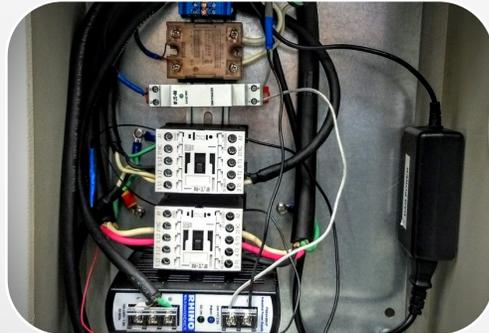
- Quick Disconnect





# V. Electrical Systems

---



Power System  
and Control



Data  
Acquisition



Rig Sensors



Downhole  
Sensor



# VI. Control Systems

---



# VII. Capital Expenditures



Category	Expenditures
Big Ticket Improvement	\$5,793
Parts/Materials	\$3,012
Safety	\$297
Miscellaneous	\$437
<b>TOTAL</b>	<b>\$9,537</b>



# Trial and Error



Trial and Error